ISSN 0021-2571 (print) · 2384-8553 (online) | Coden: AISSAW 60 (No. 2) | 85-170 (2024)

ANNALI
DELL'ISTITUTO SUPERIORE DI SANITÀ

Volume **60** No. **2**
2024

A SCIENCE JOURNAL *for* PUBLIC HEALTH

ISTITVTO SVPERIORE DI SANITÀ
www.iss.it

Ann Ist Super Sanità 2024 | Vol. 60, No. 2

Annali
dell'Istituto Superiore di Sanità
A SCIENCE JOURNAL FOR PUBLIC HEALTH

Publication
Annali dell'Istituto Superiore di Sanità is published quarterly and in special issues.
Freely available online at www.iss.it/annali - https://annali.iss.it

Annali dell'Istituto Superiore di Sanità is indexed in
- CAB
- CHEMABS
- EMBASE/Excerpta Medica
- FSTA
- MEDLINE
- ProQuest
- SCOPUS
- WEB OF SCIENCE

The Journal Impact Factor is 2.1

Annali Editorial Office
Scientific Communication Service
Istituto Superiore di Sanità
Viale Regina Elena 299, 00161 Rome, Italy
Tel.: +39 06 49902945 Fax: +39 06 49902253
E-mail: annali@iss.it
www.iss.it/annali - https://annali.iss.it

Papers to be presented for publication should be submitted online to https://annali.iss.it

Instructions to Authors are available online at https://annali.iss.it

Publishing support
Il Pensiero Scientifico Editore, Rome
Via San Giovanni Valdarno 8, 00138 Rome, Italy
www.pensiero.it

Subscription information & terms
Il Pensiero Scientifico Editore
Tel.: +39 06 86282324 Fax: 06 86282250
E-mail: abbonamenti@pensiero.it

Year 2024
Italy individual subscription € 57,00 | Italy institutional subscription € 67,00.
Other countries € 67,00
Each quarterly issue € 21,00

Responsibility for the contents and opinions expressed on this journal rests solely with the Author(s).

ISSN 0021-2571 (print), 2384-8553 (online)
Coden: AISSAW 60 (No. 2)

Reg. Stampa - Tribunale di Roma, n. 482 del 29 ottobre 1985 (cartaceo); n. 121 del 16 maggio 2014 (online)

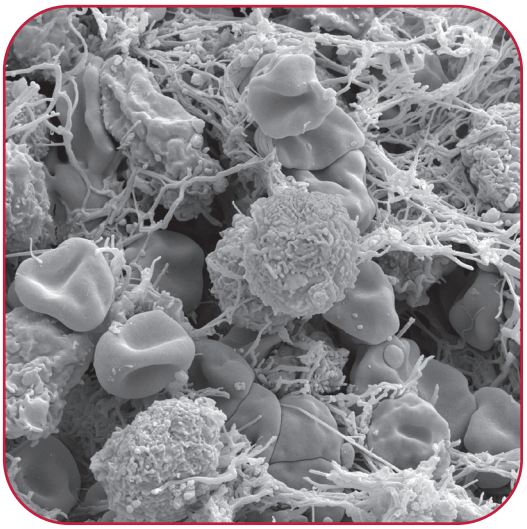
MISTO
Carta da fonti gestite in maniera responsabile
FSC® C017635

Printed in July 2024 by Ti Printing s.r.l.
Via Case Rosse 23, 00131 Rome, Italy

Ann Ist Super Sanità 2024 | Vol. 60, No. 2

Annali
dell'Istituto Superiore di Sanità
A SCIENCE JOURNAL FOR PUBLIC HEALTH

Graphic design of the cover: Massimo Delle Femmine, Istituto Superiore di Sanità
The cover image shows polymorphonuclear leucocytes and erythrocytes compressed by the contraction of fibrin fibers, a detail of a human arterious stroke obtained by high resolution scanning electron microscopy. The image is provided by the Microscopy Area, Core Facilities, Istituto Superiore di Sanità, Rome, Italy.



ANNALI
dell'Istituto Superiore di Sanità

Vol. 60, No. 2 2024

Contents

Commentary

Original articles and reviews

Ann Ist Super Sanità 2024 | Vol. 60, No. 2: 85-88
DOI: 10.4415/ANN_24_02_01

COMMENTARY

The "Investigating and translating genomic evidence for public health response to SARS-CoV-2 (INSIDE SARS-CoV-2)" project – Network of excellence

Angela Di Martino[1], Sankar Bhattacharyya[2], Flavia Riccardo[1], Rajesh Pandey[3], Matteo Chiara[4], Shailendra Mani[2], Patrizio Pezzotti[1], Alessandra Lo Presti[1], Luigina Ambrosio[1], Valentina Marziano[5], Piero Poletti[5], Graziano Pesole[6], Jitendra Narayan[3], Megha Brijwal[7], Aashish Choudhary[7], Fabio Tramuto[8], Walter Mazzucco[9], Anurag Agrawal[10], Anant Mohan[7*] and Paola Stefanelli[1*]

[1]*Istituto Superiore di Sanità, Rome, Italy*
[2]*BRIC-Translational Health Science and Technology Institute (THSTI), Faridabad, India*
[3]*CSIR-Institute of Genomics and Integrative Biology (CSIR-IGIB), Delhi, India*
[4]*Dipartimento di Bioscienze, Università degli Studi di Milano, Milan, Italy*
[5]*Centro Health Emergencies, Fondazione Bruno Kessler, Trento, Italy*
[6]*Dipartimento di Bioscienze, Biotecnologie e Biofarmaceutica, Università degli Studi di Bari Aldo Moro, Bari, Italy*
[7]*All India Institute of Medical Sciences (AIIMS), New Delhi, India*
[8]*Azienda Ospedaliera Universitaria Policlinico "P. Giaccone", Palermo, Italy*
[9]*Dipartimento PROMISE, Università degli Studi di Palermo, Palermo, Italy*
[10]*Trivedi School of Biosciences, Ashoka University, Sonipat, India*
**These Authors contributed equally*

Abstract
The "Investigating and translating genomic evidence for public health response to SARS-CoV-2 (INSIDE SARS-CoV-2)" project is part of the initiative "Joint science and technology cooperation call for joint project proposals for the years 2021-2023" promoted by the Italian Ministry of Foreign Affairs and International Cooperation (MAECI) and the Republic of India.
To start the project activities, the pandemic response and the epidemiological situation in Italy and in India, together with the genomic surveillance strategies for SARS-CoV-2 virus in the two countries, are here described.

Key words
- SARS-CoV-2
- genomic analysis
- pandemic
- surveillance

INTRODUCTION

The INSIDE SARS-CoV-2 project is establishing a scientific network of excellence composed by Indian and Italian academia, research institutions and laboratories with already existing infrastructure and funding to create a solid framework for collaboration for the investigation of SARS-CoV-2 virus variants in Italy and India. The participating nodes and the main objectives of the INSIDE SARS-CoV-2 project are shown in *Figure 1* and *Figure 2*.

THE PANDEMIC RESPONSE AND THE EPIDEMIOLOGICAL SITUATION

Italy

Italy was the first western country to detect local SARS-CoV-2 transmission in February 2020 [1]. Since

Address for correspondence: Paola Stefanelli, Dipartimento Malattie Infettive, Istituto Superiore di Sanità, Viale Regina Elena 299, 00161Rome, Italy. E-mail: paola.stefanelli@iss.it.

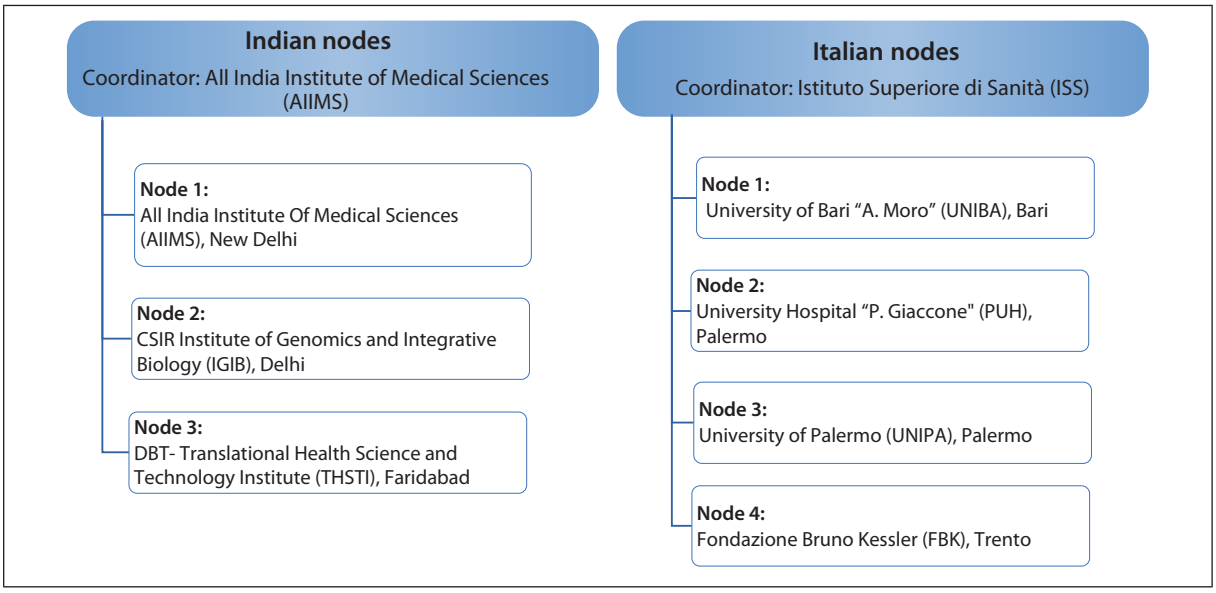


Figure 1
The "Investigating and translating genomic evidence for public health response to SARS-CoV-2 (INSIDE SARS-CoV-2)" project – Network of excellence participating nodes.

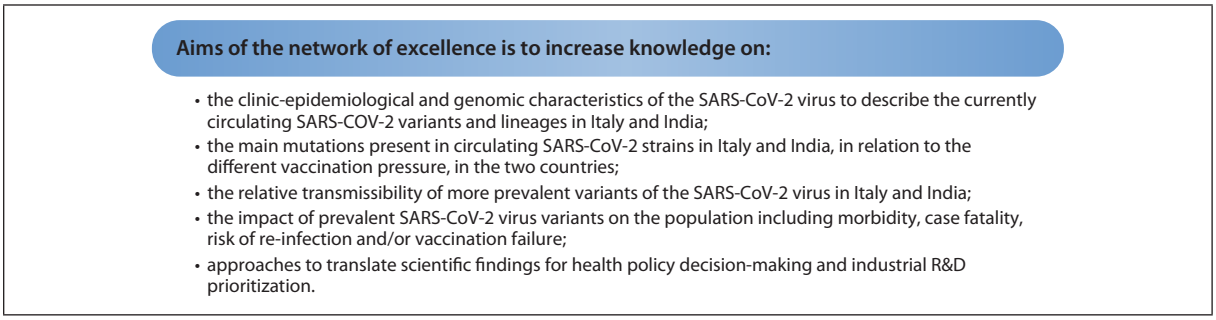


Figure 2
Aims of "Investigating and translating genomic evidence for public health response to SARS-CoV-2 (INSIDE SARS-CoV-2)" project – Network of excellence.

then, as of the 20th of December 2023, almost 27 million cases of confirmed SARS-CoV-2 infection were reported in Italy, including over 190,000 COVID-19 related deaths with a crude case fatality rate that progressively decreased from over 11% in 2020 to 0.7% in 2023.

The Italian pandemic response was structured in three different phases modelled on the epidemiological evolution. The first phase was aimed at controlling the spread of infection and was enacted through a nationwide lockdown that effectively reduced the transmission of SARS-CoV-2 below epidemic levels [2]. Following a gradual reopening in late 2020, the fall-winter recrudescence of SARS-CoV-2 circulation was successfully contrasted through the establishment of a tier-based response [3] applied within the 21 regions and autonomous provinces of Italy according to epidemiological data and weekly subnational rapid risk assessments [4]. This phase of response (Phase 2A) was aimed at suppressing the excessive spread of infection. The availability of effective vaccines and the rapid increase in vaccination coverage in 2021, gradually changed the epidemiology of COVID-19 in Italy. Notwithstanding an increase in the number of cases of infection due to the emergence of more transmissible variants of SARS-CoV-2, the proportion of severe and lethal SARS-CoV-2 infections decreased [5]. This led to a change in the parameters used to trigger the tier system from indicators of viral transmission to indicators of hospital burden. This shift (Phase 2B) characterized a change in the response strategy from suppression of viral circulation to mitigation of disease impact. Phase 3, with the suspension of non-pharmaceutical control measures, was reached with the end of the emergency in March 2022. The Italian pandemic response strategy was found to be evidence based [6] and in line with the response strategy described by the Lancet Commission on lessons for the future from the COVID-19 pandemic [7].

India

The COVID-19 pandemic in India started in the southern state of Kerala when a group of Indian students studying in China returned home in January, 2020 [8]. Initial reports suggested that the elderly (>65

years of age) and people with co-morbidities (hypertension and diabetes) were especially vulnerable to the severe symptoms. The spread of a respiratory pathogen is aided by high population density, a figure which stands at an average of about 464 per square kilometer in India. However, a demography with almost 40% of the population in the age group of <18 years, who did not show symptomatic infection, probably worked as a retardant to an early spread. In addition, on the 24th of March, 2020, the Government of India (GoI) imposed a country-wide lockdown, restricting population movement. Consequently, till the 12th of April, 2020 India reported lesser than 9000 cases of COVID-19. The lockdown was imposed till 17th of May, after which it was lifted in phases, a pre-unlock from 18th-31st of May, unlock 1.0 from 1st-30th of June and unlock 2.0 from 1st-31st of July, 2020.

During the lockdown, as part of the India COVID-19 Emergency Response and Health system Preparedness 2020, various steps were taken to support, train and protect the healthcare workforce, expand diagnostic facilities countrywide, deploy referral transport and enhance surveillance. For this, five objective measures to curb the growth in COVID-19 cases were taken, namely, imposition of COVID-appropriate behaviour (CAB), "Test, Track, Treat and Vaccinate". For the purpose of testing, the number of laboratories capable of performing real time polymerase chian reaction (RT-PCR) based diagnosis for SARS-CoV-2 RNA from nasopharyngeal and oropharyngeal (NP/OP) sample was augmented substantially, from a very few in the month of January, to 669 in May, 1,614 in September and 2,172 by December 2020. Tracking positive cases was done through the Unique-Identification-Authority of India (UIDAI) database wherein each NP/OP sample was necessarily tagged with the corresponding UIDAI-ID which contained the address and phone number of the patient. For contact tracing and help to create infection hotspot maps, a mobile application termed Arogya Setu (literally meaning "bridge to health") was created. Geographical areas with a cluster of cases were marked as "containment zone", which was surrounded by a "buffer zone" outside of which free movement was allowed once the lockdown was withdrawn. Diagnostic techniques and kits were rapidly developed by various institutes of national eminence.

The National Institute of Virology, Pune, India developed a whole-virus inactivated vaccine against COVID-19, which was manufactured as "Covaxin" by the Indian vaccine manufacturing company Bharat Biotech Pvt. Ltd. Apart from this, the ChAdOx1 nCOV-19 vaccine, developed in a collaboration between the Oxford University and AstraZeneca, was produced as "Covishield" by an Indian company, the Serum Institute of India Pvt. Ltd., globally the biggest manufacturer of vaccine products. The Drug Controller General of India (DCGI) gave approval for human trials of Covaxin in June, 2020 and for Covishield in August, 2020. Approval for human trials for an indigenous DNA-vaccine (Zycov-D) developed by the Indian pharma Cadilla healthcare, a sub-unit vaccine (Corvevax) and for an indigenous mRNA vaccine being developed by Gennova Biopharmaceutical Ltd. (India) were also provided within December 2020. In January 2021, the emergency use authorization (EUA) for both Covishield and Covaxin was given for mass immunization in India. A total budget of US$ 4.4 billion was allocated by the GoI for all these efforts.

Once the EUA for Covaxin and Covishield were issued, immunization of the population in India was initiated in a structured manner. The healthcare workers received the vaccines first, closely followed by the front-line workers involved in different essential services. This was followed by vaccination for persons at high risk for severe infection, and subsequently the people in the age group of 44-59 and 18-44 were allowed to get vaccinated. In the year 2022, precautionary vaccine for the age group of <18 years and booster doses for the vulnerable population was also permitted.

GENOMIC SURVEILLANCE

Italy

Genomic surveillance of SARS-CoV-2 has played a significant role in the early identification of new emerging variants and in monitoring their circulation during the COVID-19 pandemic.

Following the international recommendations from WHO and ECDC (https://iris.who.int/bitstream/handle/10665/338480/9789240018440-eng.pdf?sequence=1, https://www.ecdc.europa.eu/sites/default/files/documents/Guidance-for-representative-and-targeted-genomic-SARS-CoV-2-monitoring-updated-with%20erratum-20-May-2021.pdf) Italy has implemented, in accordance with the Italian Ministry of Health, the sequencing strategy continuously updated according to the epidemiological situation (https://www.trovanorme.salute.gov.it/norme/renderNormsanPdf?anno=2022&codLeg=86233&parte=1%20&serie=null, https://www.trovanorme.salute.gov.it/norme/renderNormsanPdf?anno=2023&codLeg=93585&parte=1%20&serie=null), based on two distinct sequencing flows with specific objectives and different sampling criteria. A periodic flow based on monthly flash surveys, is carried out in collaboration with the Bruno Kessler Foundation, to estimate the variants prevalence. Samples are collected on an agreed week of the month from subjects with suspected SARS-CoV-2 infection and based mainly on samples collected by general practitioners and paediatricians of free choice in the framework of the RespiVirNet network activities. In addition, all samples from swab points or drive-in organised by ASLs and samples from outpatient services are collected.

Moreover, to early identify the emergence of new or already known SARS-CoV-2 variants of public health interest in hospitalised COVID-19 patients a continuous sequencing flow has been implemented. Sampling is focused on hospitalised patients with severe COVID-19 disease and/or persistent SARS-CoV-2 infection in order to identify the most significant genomic features associated with COVID-19 outcome.

Data from both flows are regularly published on the Istituto Superiore di Sanità, ISS website (https://www.epicentro.iss.it/coronavirus/sars-cov-2-monitoraggio-varianti) and all SARS-CoV-2 sequences are uploaded

in the Italian COVID-19 genomic (I-Co-Gen) platform, accessible to all peripheral laboratories, and then shared in GISAID (https://gisaid.org/).

I-Co-Gen was developed by ISS for the collection of national sequencing data, their analysis (using specific international tools such as Pangolin and PUSHER for the lineage assignation), the early warning and for the international sharing in GISAID.

The network involves around 70 laboratories across the country and more than 200,000 sequences have been collected at the time of writing (October 2023).

India

Large scale sequencing of SARS-CoV-2 samples was initiated worldwide; in India, a conglomerate of institutes constituted the Indian SARS-CoV-2 Genomics Consortium (INSACOG) and led these efforts. An update in real-time showed different variants to emerge at varying frequency (frequency of detection) which reflected their predominance among the genomes sequenced from patients' samples. Based on this frequency and the meta data about patient clinical history variants were marked into different categories like variant being monitored (VBM) or variant of interest (VOI), variant of concern (VOC) or variant of high consequence (VOHC).

CONCLUSIONS

The COVID-19 pandemic has highlighted the need to enhance national and subnational preparedness specifically directed to fighting future epidemic/pandemic threats. This includes strengthening surveillance and diagnostic capacity not restricted to healthcare facilities but at a community level. Increased simulation exercises and communication efforts on pandemic response could increase the health workforce's capacity to implement national pandemic plans, increase coordination between health agencies at the state and national level as well as enhancing awareness and know-how in the general population on how individual behaviour can support control efforts during epidemics and pandemics. This should be integrated with umbrella organizations like the WHO to facilitate international collaborations in fighting an epidemic/pandemic.

This project represents a unique opportunity for an exchange of past experience for preparing the future.

Conflict of interest statement

No potential conflict of interest was reported by the Authors.

Received on 22 March 2024.
Accepted on 10 April 2024.

REFERENCES

1. Riccardo F, Ajelli M, Andrianou XD, Bella A, Del Manso M, Fabiani M, Bellino S, Boros S, Urdiales AM, Marziano V, Rota MC, Filia A, D'Ancona F, Siddu A, Punzo O, Trentini F, Guzzetta G, Poletti P, Stefanelli P, Castrucci MR, Ciervo A, Di Benedetto C, Tallon M, Piccioli A, Brusaferro S, Rezza G, Merler S, Pezzotti P; COVID-19 Working Group. Epidemiological characteristics of COVID-19 cases and estimates of the reproductive numbers 1 month into the epidemic, Italy, 28 January to 31 March 2020. Euro Surveill. 2020;25(49):2000790. doi: 10.2807/1560-7917. ES. 2020.25.49.2000790
2. Guzzetta G, Riccardo F, Marziano V, Poletti P, Trentini F, Bella A, Andrianou X, Del Manso M, Fabiani M, Bellino S, Boros S, Urdiales AM, Vescio MF, Piccioli A; COVID-19 Working Group 2; Brusaferro S, Rezza G, Pezzotti P, Ajelli M, Merler S. Impact of a nationwide lockdown on SARS-CoV-2 transmissibility, Italy. Emerg Infect Dis. 2021;27(1):267-70. doi: 10.3201/eid2701.202114
3. Manica M, Guzzetta G, Riccardo F, Valenti A, Poletti P, Marziano V, Trentini F, Andrianou X, Mateo-Urdiales A, Del Manso M, Fabiani M, Vescio MF, Spuri M, Petrone D, Bella A, Iavicoli S, Ajelli M, Brusaferro S, Pezzotti P, Merler S. Impact of tiered restrictions on human activities and the epidemiology of the second wave of COVID-19 in Italy. Nat Commun. 2021;12(1):4570. doi: 10.1038/s41467-021-24832-z
4. Riccardo F, Guzzetta G, Urdiales AM, Del Manso M, Andrianou XD, Bella A, Pezzotti P, Carbone S, De Vito T, Maraglino F, Demicheli V, Dario C, Coscioni E, Rezza G, Urbani A, Merler S, Brusaferro S; Italian COVID-19 Monitoring Group. COVID-19 response: Effectiveness of weekly rapid risk assessments, Italy. Bull World Health Organ. 2022;100(2):161-7. doi: 10.2471/BLT.21.286317
5. Marziano V, Guzzetta G, Menegale F, Sacco C, Petrone D, Mateo Urdiales A, Del Manso M, Bella A, Fabiani M, Vescio MF, Riccardo F, Poletti P, Manica M, Zardini A, d'Andrea V, Trentini F, Stefanelli P, Rezza G, Palamara AT, Brusaferro S, Ajelli M, Pezzotti P, Merler S. Estimating SARS-CoV-2 infections and associated changes in COVID-19 severity and fatality. Influenza Other Respir Viruses. 2023;17(8):e13181. doi: 10.1111/irv.13181
6. Camporesi S, Angeli F, Fabbro GD. Mobilization of expert knowledge and advice for the management of the Covid-19 emergency in Italy in 2020. Humanit Soc Sci Commun. 2022;9:54. doi: https://doi.org/10.1057/s41599-022-01042-6
7. Sachs JD, Karim SSA, Aknin L, Allen J, Brosbøl K, Colombo F, Barron GC, Espinosa MF, Gaspar V, Gaviria A, Haines A, Hotez PJ, Koundouri P, Bascuñán FL, Lee JK, Pate MA, Ramos G, Reddy KS, Serageldin I, Thwaites J, Vike-Freiberga V, Wang C, Were MK, Xue L, Bahadur C, Bottazzi ME, Bullen C, Laryea-Adjei G, Ben Amor Y, Karadag O, Lafortune G, Torres E, Barredo L, Bartels JGE, Joshi N, Hellard M, Huynh UK, Khandelwal S, Lazarus JV, Michie S. The Lancet Commission on lessons for the future from the COVID-19 pandemic. Lancet. 2022;400(10359):1224-80. doi: 10.1016/S0140-6736(22)01585-9
8. Andrews MA, Areekal B, Rajesh KR, Krishnan J, Suryakala R, Krishnan B, Muraly CP, Santhosh PV. First confirmed case of COVID-19 infection in India: A case report. Indian J Med Res. 2020;151(5):490-2. doi: 10.4103/ijmr.IJMR_2131_20

Ann Ist Super Sanità 2024 | Vol. 60, No. 2: 89-97
DOI: 10.4415/ANN_24_02_02

Diet and lifestyles of young women of childbearing age: an Italian survey

Drieda Zaçe, Emanuele La Gatta, Luigi Petrella, Alessia Orfino, Anna Maria Viteritti and Maria Luisa Di Pietro

Centro di Ricerca e Studi sulla Salute Procreativa, Università Cattolica del Sacro Cuore, Rome, Italy

Abstract

Background. Daily lifestyles play a pivotal role in influencing the preconception health of women in their childbearing years. The aim of this cross-sectional study is to delineate, within the Italian context, the lifestyles of young women of childbearing age, that may have repercussions on their preconception health.

Methods. From July 2020 until April 2021, an anonymous online questionnaire was administered to a sample of 340 women aged 18-25 years attending secondary grade schools and universities in Italy.

Results. Over the course of the preceding three days, 90.29% of women had meat, 45.59% had fish. 28.24%, 38.82% and 18.53% of women reported tobacco, alcohol and drugs consumption, respectively. The mean amount of folic acid taken through foods consumed was 341 µg/day. Only 53.53% of women did sports. Smokers were more frequently consuming alcohol and drugs. Women who never did sports, were more likely to use drugs.

Conclusions. Young women in our sample had suboptimal dietary habits. It is imperative to advocate for policies and interventions that endorse healthy dietary patterns and physical activity, improve knowledge and discourage young women from smoking, alcohol consumption and drug use.

Key words

- preconception
- diet
- lifestyle
- alcohol
- smoking

INTRODUCTION

Preconception health refers to women's health before they become pregnant. From a public health standpoint, the preconception period denotes a sensitive phase in the life course, such as adolescence, when health-related behaviours are established [1-3]. Lifestyle and dietary habits cultivated in everyday routine, particularly at a young age, are key to preconception health and could influence the health of women in their childbearing age [4-8].

Numerous studies have documented that nutrition, physical activity, control of body weight and healthy lifestyles (avoiding smoking, alcohol and drugs) are pivotal factors with the potential to enhance the health status of this population group [9].

Notably, an eating regimen characterised by meat consumption, snacks and sweets has been linked to a significantly higher risk of gestational diabetes mellitus in women, particularly in those with lower education level. Moreover, income plays a crucial role in fat-related chronic diseases, as the consumption of low-cost, high-fat/high-sugar foods is markedly more prevalent among socioeconomically disadvantaged populations [10]. The universal consensus surrounding the significance of folic acid is of particular relevance to women of childbearing age [11, 12]. Inappropriate dietary practices and insufficient supplementation lead to inadequate folic acid intake [13].

Physical activity plays an important role on women's body weight, pregnancy outcomes, and the risk of chronic diseases in their offspring during adulthood. Nevertheless, the number of women of childbearing age that meet the recommended amount of weekly physical activity remains still unsatisfactory [14].

Among lifestyle behaviours, the consumption of illicit substances and alcohol poses a considerable risk to women's health and pregnancy outcomes. Despite the well-documented adverse effects, some women persist in consuming alcohol, smoking or using drugs, during the preconception period, as well as throughout pregnancy [8, 15].

Unhealthy parental behaviours such as a high body mass index (BMI), smoking, low quality diet, food insecurity or sedentary lifestyle before or during pregnancy, are also associated with an elevated BMI and a heightened risk of overweight and obesity in children aged 5-12 years [16-18]. Higher rates of these unhealthy behaviours are generally associated with education level, educational interventions, screening services, general health counselling and income [19]. As indicated in the

Address for correspondence: Emanuele La Gatta, Sezione di Igiene, Dipartimento Universitario di Scienze della Vita e Sanità Pubblica, Università Cattolica del Sacro Cuore, Largo F. Vito 1, 00168 Rome, Italy. E-mail: emanuele.lagatta01@icatt.it.

literature, younger women are more prone to engage in unhealthy behaviours and are at higher risk of unintended pregnancies, underscoring the need for targeted attention to this demographic [19-21].

Considering these factors, interventions aimed at improving dietary and lifestyle behaviours are of paramount importance in safeguarding women's health, enhancing pregnancy outcomes and mitigating children's risks. However, interventions implemented at the moment of conception can be tardive in preventing these risks. In this context, the preconception period represents a unique opportunity to instigate positive health transformations.

In the Italian context, published data indicates that women pose a satisfactory level of knowledge regarding preconception health and its associated risks may be satisfying, particularly in terms of adopting a healthy lifestyle, including healthy food, exercise, sleeping habits, and avoiding alcohol and smoking [7]. Nevertheless, knowledge does not invariably translate into altered behaviours and is reported to increase significantly following educational interventions. It has been demonstrated that women who receive information by reliable sources tend to exhibit healthier behaviours throughout various phases of their life, leading to improved pregnancy outcomes and diminished likelihood of unintended pregnancies [3, 6, 8]. However, in order to be able to implement targeted interventions, it is imperative to acquire information about the lifestyle, dietary habits and behaviours of this group.

In this context, the aim of this paper is to describe the lifestyles of young women of childbearing age in Italy, encompassing dietary habits, alcohol and tobacco consumption, drug use, and levels of physical activity.

MATERIALS AND METHODS

Research design and setting

This cross-sectional study included young women attending secondary schools and universities in Italy, with data collection taking place from July 2020 to April 2021. The results presented herein are part of a broader project that examined the knowledge, attitudes and health status of young women regarding preconception health and have been published elsewhere [7].

Objectives

The present article aims to:

- describe the diet of young women of childbearing age in the last three days prior to the questionnaire;
- calculate the amount of folic acid consumed through the diet of young women of childbearing age;
- describe the lifestyles and behaviours of young women of childbearing age (such as smoke, alcohol and drug consumption, physical activity);
- to estimate a possible association between knowledge and behaviour of young women of childbearing age regarding preconception health.

Study population

Young women of childbearing age between 18 and 25 years were included in the study. This age group was chosen due to its peak fertility period for women. Furthermore, based on existing literature, these young women are reported to show varying levels of knowledge about preconception health and are considered to be at higher risk of unintended pregnancies [5, 22, 23].

We excluded from the study pregnant women, those who were actively planning a pregnancy and those who had already experienced a pregnancy. The reason behind these criteria was based on the understanding that these categories typically exhibit knowledge and behaviours influenced by their pregnancy experiences [8, 24].

The target population was recruited online. The link to the questionnaire was disseminated and publicised through pages linked to schools and universities, subject to their authorisation and through social media channels.

Questionnaire

The questionnaire employed for data collection was the same used for the broader project. Its development and validation adhered to a three-step methodology. The initial step involved a systematic review to identify the main topics to be addressed in the questionnaire [9]. The questionnaire was composed of the following sections:

1) socio-demographic information;
2) knowledge assessment (comprising issues such as preconception health definition; optimal timing for gynaecological visits; neural tube defects; safety of herbal supplements and teas; obesity, overweight, moderate exercise; alcohol; infectious diseases, including sexually transmitted infections; consumption of folic acid and vitamins; family and genetic history; medications revision; malformations; endocrine disruptors);
3) attitudes (data reported in a separate article [7]);
4) physical health (vaccination status; sexual, mental, emotional, social status, as reported in another article [7]);
5) lifestyles (diet, alcohol, smoke, drugs, exercise). The present article focuses on the part of the questionnaire regarding lifestyles, such as dietary behaviour, alcohol, tobacco and drugs consumption, physical activity. The questionnaire included a vast number of food items which were grouped based on the content of folic acid (in order to be able to calculate the amount of folic acid taken through the diet) [12] and subsequently categorised into broader categories (i.e., fruit, vegetables, fish, whole grains, meat and dairy products) consumed in the three days preceding questionnaire completion.

The questionnaire was afterwards validated through a two-round Delphi procedure, during which 21 experts were asked to rate each item on a Likert scale ranging from 1 (Totally disagree: the question is not relevant at all for the purpose of the questionnaire) to 5 (Strongly agree: the question is very relevant for the purpose of the questionnaire). After two rounds, the questionnaire presented a content validity index of 0.93. The final validation phase included a pilot study of 20 women who provided feedback on the questionnaire, reporting a Cronbach's alpha of 0.99.

Sample size

To calculate the required sample size, we considered a type 1 error of 5%, an absolute error (accuracy) of

2.5% and an expected percentage of preconception health knowledge among young women of 67% [25]. The obtained number was corrected considering an expected response rate of 70%, establishing the need to recruit 485 young women, to reach a final sample size of 340 young women.

Statistical analysis

The data were analysed by descriptive statistical methods using frequencies and percentages (N, %) for all qualitative variables such as: socio-demographic data (nationality, attending school/university, type of university being enrolled in, etc.); diet (consumption of various food types over the previous 3 days, categorised as yes/no and by portions i.e., 1-2 portions, 3-4 portions, >5 portions/day); drug use (including marijuana, cocaine, heroin, ecstasy); types of physical activity practised. Quantitative data were summarised using means and standard deviations (M, SD). Parametric analysis through T-test was used to compare the means of two groups (such as BMI mean among the groups who answered correctly or not to the questions on the negative effects of obesity on pregnancy and the importance of optimizing the weight before pregnancy; data normally distributed). Chi-2 test was used to test for significant association between two categorical variables. Associations with a p-value < 0.05 were considered statistically significant. Statistical analysis was performed with STATA 15 software.

Ethical and administrative procedure

The study protocol was approved by the Ethics Committee of the Fondazione Policlinico Universitario "A. Gemelli", Università Cattolica del Sacro Cuore, Rome, Italy. The approval was emitted on 12/12/2019, number 50160/19 ID 2902.

RESULTS

Characteristics of the study population

The studied population consisted of 340 young women, with a mean age of 21.9 years old (SD = 1.9), 98.2% of Italian nationality, 83.5% was attending school/university, of which 48.4% were enrolled in a health sciences university. More detailed information on the study population is provided elsewhere, as the present article primarily focuses on the dietary and lifestyle aspects of the studied group [7].

Diet and eating habits

A specific dietary regimen was followed by 18.8% of the participants; 4.1% adhering to a vegetarian diet, 1% adopting a vegan diet, 7.6% were following a diet for intolerance to gluten, lactose, etc, 2.9% were going through a hypocaloric diet. Concerning meal frequency, 9.71% consumed fewer than 3 meals/day, 67.9% had 3-4 meals/day, 22.3% had 5 or more meals/day.

In the 3 days preceding the questionnaire compilation, 93.8% consumed pasta or rice, with a mean intake of 78.1 g/day (SD 68.9 g/day; min 0 g/day-max 540 g/day). Additionally, 42.6% had peas or beans, averaging 26.0 g/day (SD 41.1 g/day; min 0 g/day-max 233.3 g/day), 49.41% had broccoli, Brussels sprouts, fava beans, asparagus or spinach, with a mean of 63.3 g/day (SD 95.2 g/day; min 0 g/day-max 583.3 g/day), 73.24% had courgettes, chicory, corn, cauliflower, cabbage, lettuce or beetroot, with a mean of 95.6 g/day (SD 104.1 g/day; min 0 g/day-max 500 g/day), 78.82% had celery, onion, cucumber, aubergine, turnip, radicchio, pumpkin, carrot, tomato, pepper or red cabbage, with a mean of 99.4 g/day (SD 107.6 g/day; min 0 g/day-max 950 g/day) and 50% had potatoes, with a mean of 0.4 potatoes/day (SD 0.62; min 0 potatoes/day-max 5 potatoes/day).

The average quantity of all vegetables consumed over the previous three days (excluding beans and potatoes) was 224.9 g/day (SD 197.4 g/day; min 0 g/day -max 1950 g/day), with 12% of women reporting no vegetable consumption during this period.

In the same timeframe, 43.8% had cereals, bran or sprouts, with a mean of 1 spoon/day (SD 1.4 spoon/day; min 0 spoons/day-max 6.7 spoons/day). Furthermore, 57.6% had milk, with a mean of 108.2 ml/day (SD 132.5 ml/day; min 0 ml/day-max 525 ml/day), 56.18% consumed eggs, with a mean of 0.5 eggs/day (SD 0.63 eggs/day; min 0 eggs/day-max 5 eggs/day), 90.3% had meat, with a mean of 81.3 g/day (SD 57.8 g/day; min 0 g/day-max 291.7 g/day), 80.6% had bread, with a mean of 60.3 g/day (SD 55.5 g/day; min 0 g/day-max 318.3 g/day) and 45.6% had fish, with a mean of 32.9 g/day (SD 48.0 g/day; min 0 g/day-max 300 g/day). The data pertaining to the consumption of various food categories over the preceding three days is presented in *Table 1*.

Over the same three-day period, 81.8% had fruit, averaging 1.1 fruits/day (SD 1 fruit/day; min 0 fruits/day-max 5 fruits/day).

The average consumption of folic acid, calculated based on the types of foods consumed in the last three days prior to filling the questionnaire, according to the values given in Głąbska *et al*., was 341 µg/day [12, 26].

Women who had no cereals in the previous three days were younger (21.6 *vs* 22.2 years old; p-value=0.003), of non-Italian nationality (55.7% of Italian participants consumed no cereals, compared to 100% of women from other nationalities; p-value=0.03) and were more likely to not conduct any physical activity (67.7% of those not consuming cereals did not engage in any physical activity, compared to 46.4% of those participating in any form of physical activity; p-value=0.001). 47.5% of non-smokers did not consume any fish in the previous three days, compared to 71.6% of smokers, p-value<0.001. Furthermore, 27.2% of non-physically active women did not consume any fruits in the last three days, compared to 10.5% of those who engaged in some form of physical activity (p-value=0.006).

Alcohol, tobacco and drug consumption

At the time of data collection, 96 out of 340 women (28.4%) were smokers, starting at a mean age of 16.8 years (SD 2.2; min-max 13-25y). The mean number of cigarettes per day was 5.3 (SD 3.3; min-max 1-16). 60 out of 340 (17.6%) women had previously smoked but had quit, with an average cessation duration of 2.5 years (SD 3.5). In response to questions about current alcohol consumption, 38.8% of the young women gave an affirmative answer. Among the drinkers, 69.5% fa-

Table 1
Consumption of different food categories in the three days prior to answering the questionnaire, including daily Mean and Standard Deviation (SD)

Type of food in the last 3 days	1-2 portions; number (percentage)	3-4 portions; number (percentage)	>5 portions; number (percentage)	Mean (SD)/day	Reference values (for 1500-2500 kcal/day diet)
Pasta/Rice				78.1 (68.9) g	1-1.5/day
50 gr	44 (62.9)	23 (32.9)	3 (4.3)		
80 gr	110 (64.7)	58 (34.1)	2 (1.2)		
100 gr	65 (61.3)	37 (34.9)	4 (3.77)		
150 gr	27 (75)	4 (11.1)	5 (13.9)		
Content of folate in 100 g of pasta/rice is 12 µg – corresponding to 9.37 µg in 78.1 g					
Peas/Beans				26 (41.1) g	3/week
80 gr	74 (92.5)	5 (6.3)	1 (1.2)		
100 gr	46 (85.2)	8 (14.8)			
200 gr	9 (81.8)	2 (18.2)			
400 gr	7 (87.5)	1 (12.5)			
Content of folate in 100 g of peas/beans is 69 µg – corresponding to 17.94 µg in 26 g					
Cereals/bran/sprouts				1 (1.4) spoons	1-3/week
1 spoon	19 (86.3)	3 (13.6)			
2 spoons	35 (66)	14 (26.4)	4 (7.6)		
3 spoons	36 (72)	13 (26)	1 (2)		
4 spoons	18 (69.2)	6 (23.1)	2 (7.7)		
Content of folate in 10 g of cereals/bran/sprouts (1 tablespoon) is 21 µg					
Milk				108.2 (132.5) ml	2-3/day
1/2 glass	46 (75.4)	10 (16.4)	5 (8.2)		
1 glass	29 (63)	16 (34.8)	1 (2.2)		
1 cup	23 (25.6)	50 (55.6)	17 (18.9)		
Content of folate in 250 g of milk is 11 µg – corresponding to 47.61 µg in 108.2 ml					
Eggs				0.5 (063) eggs	2-4/week
1 egg	97 (100)				
2 eggs	84 (100)				
3 eggs	7 (70)	2 (20)	1 (10)		
Content of folate in 50 g (1 egg) of eggs is 32 µg – corresponding to 16 µg in 0.5 eggs					
Meat				81.3 (57.8) g	1/week
100 gr	138 (80.7)	32 (18.7)	1 (0.6)		
150 gr	54 (71.1)	20 (26.3)	2 (2.6)		
200 gr	50 (83.3)	10 (16.7)			
Content of folate in 100 g of meat 10 µg – corresponding to 8.13 µg in 81.3 g					
Bread				60.3 (55.5) g	2.5-4.5/day
80 gr	123 (62.8)	64 (32.7)			
100 gr	30 (56.6)	22 (41.5)	1 (1.9)		
150 gr	6 (40)	5 (33.3)	4 (26.7)		
200 gr	3 (60)	2 (40)			
Content of folate in 35 g of bread is 12 µg – corresponding to 20.67 µg in 60.3 g					
Potatoes				0.43 (0.62) potatoes	1-2/week
1 potato	82 (95.4)	3 (3.5)	1 (1.2)		
2 potatoes	54 (93.1)	4 (6.9)			
3 potatoes	17 (89.5)	2 (10.5)			
Content of folate in 70 g of potatoes (1 potato) is 14 µg – corresponding to 6.02 µg in 0.43 potatoes					

Continues

Table 1
Continued

Type of food in the last 3 days	1-2 portions; number (percentage)	3-4 portions; number (percentage)	>5 portions; number (percentage)	Mean (SD)/day	Reference values (for 1500-2500 kcal/ day diet)
Broccoli/Brussels sprouts/broad beans/asparagus/spinach				63.3 (95.2) g	2-3/day*
100 gr	42 (84)	7 (14)	1 (2)		
200 gr	73 (78.5)	18 (19.4)	2 (2.1)		
300 gr	14 (58.3)	8 (33.4)			
Content of folate in 100 g of broccoli/Brussels sprouts/broad beans/asparagus/spinach is 150 µg – corresponding to 94.95 µg in 63.3 g					
Courgettes/chicory/corn/cauliflower/cabbage/lettuce/beets				95.6 (104.1) g	2-3/day*
100 gr	74 (72.3)	23 (22.8)	4 (4)		
200 gr	69 (60)	44 (38.2)	2 (1.8)		
300 gr	18 (64.3)	7 (25)	3 (10.7)		
Content of folate in 100 g of courgettes/chicory/corn/cauliflower/cabbage/lettuce/beets is 64 µg – corresponding to 61.18 µg in 95.6 g					
Celery/onion/cucumber/aubergine/turnip/radicchio/pumpkin/carrot/tomato/ pepper/red cabbage				99.4 (107.6) g	2.5-3/day*
100 gr	96 (70.1)	38 (27.7)	3 (2.2)		
200 gr	67 (62)	38 (35.2)	3 (2.8)		
300 gr	14 (58.3)	6 (25)	4 (16.7)		
Content of folate in 100 g of celery/onion/cucumber/aubergine/turnip/ radicchio/pumpkin/carrot /tomato/pepper/red cabbage is 26 µg – corresponding to 25.84 µg in 99.4 g					
Fish				32.9 (48) g	2-3/week
100 gr	94 (92.2)	8 (7.8)			
200 gr	36 (85.7)	6 (14.3)			
300 gr	1 (100)				
Content of folate in 50 g of fish is 5 µg – corresponding to 3.29 µg in 32.9 g					
Fruits				1.1 (1) fruits	2-3/day
1 fruit	82 (43.2)	85 (44.7)	23 (12.1)		
2 fruits	31 (46.7)	26 (39.4)	9 (13.7)		
3 fruits	8 (38.1)	9 (42.9)	4 (19)		
Content of folate in 100 g of fruits is 15 µg – corresponding to 30 µg in 1 fruit					

*The recommendation of 2-3/day refers to all vegetables.

voured beer, with 67.2% consuming 1-5 glasses/week and 2.3% more than 5 glasses/week.

Of those who consumed alcohol, 18.6% had never tried beer and 7.7% had started beer consumption before the age of 13, 55.8% started between the ages of 14-17, while 17.8% started at age 18 or older. Furthermore, 5.4% never tried wine, sparkling wine or prosecco, 7.8% started consuming these beverages before the age of 13, 52.7% started between the age 14-17 and 34.1% after reaching 18 years of age. As for cocktails, 12.40% had never tried them, 3.1% initiated cocktail consumption before the age of 13, 63.6% began between the ages 14-17, and 20.9% started at age 18 or older. The consumption patterns of diverse alcohol beverages among participants during a one-week period, along with associated percentages, are delineated in *Table 2*. *Table 3* provides an overview of participants' ages at the onset of alcohol consumption, accompanied by corresponding percentages.

63 of 340 (18.5%) admitted to current drug use, with the most common choice being marijuana (14.7%), most frequently consumed once per month (29 of 63).

Among participants who smoked, 61.5% were also alcohol consumers, compared to 29.9% of non-smokers (p<0.001) and 34.7% of smokers reported drug use compared to 11.9% of non-smokers (p<0.001).

Alcohol consumption was significantly associated to feelings of stress (p=0.015), a history of experiencing violence (p<0.001) and feeling discriminated (p=0.001). Among alcohol consumers 61.4% had experienced some form of violence during their lifetime, compared to 36.1% of non-consumers. Additionally, 35.1% of alcohol consumers reported feelings of discrimination, while only 18.7% of non-consumers did (p=0.001).

Moreover, 31.1% of alcohol consumers also used drugs, compared to 10.1% of non-consumers (p<0.001).

No significant association was found between women who correctly answered the question concerning negative effects of alcohol and women who were using alcohol (p=0.284).

Physical activity and BMI

A total of 182 out of 340 participants (43.5%) engaged in some form of physical activity at the time of

Table 2
Consumption of different kind of alcohol beverages by the participants for one week and percentages

Quantity	No consume	1 gl	2 gl	3 gl	4 gl	5 gl	>5 gl
Beer	22 (19.82%)	48 (43.24%)	27 (24.32%)	5 (4.5%)	2 (1.8%)	4 (3.6%)	3 (2.7%)
Wine	18 (16.36%)	52 (47.27%)	19 (17.27%)	10 (9.09%)	2 (1.82%)	4 (3.64%)	5 (4.55%)
Cocktail	55 (61.8%)	25 (28.09%)	6 (6.74%)	0 (0%)	1 (1.12%)	0 (0%)	2 (2.25%)
Amari	52 (64.2%)	22 (27.16%)	5 (6.17%)	0 (0%)	0 (0%)	0 (0%)	2 (2.47%)
Grappa	67 (89.33%)	6 (8%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	2 (2.67%)

Gl: glasses.

Table 3
Participants' age when they started drinking alcohol and percentages

Age at start	Never	<12 yo	12-13 yo	14-15 yo	16-17 yo	18-19 yo	20-21 yo	>22 yo
Beer	19 (15.32%)	0 (0%)	10 (8.06%)	43 (34.68%)	29 (23.39%)	19 (15.32%)	3 (2.42%)	1 (0.81%)
Wine	4 (3.2%)	0 (0%)	9 (7.2%)	37 (29.6%)	31 (24.8%)	34 (27.2%)	9 (7.2%)	1 (0.8%)
Cocktail	7 (5.83%)	0 (0%)	4 (3.33%)	39 (32.5%)	43 (35.83%)	25 (20.83%)	2 (1.67%)	0 (0%)
Amari	27 (23.28)	0 (0%)	1 (0.86%)	19 (16.38%)	22 (18.97%)	34 (29.31%)	12 (10.34%)	1 (0.86%)
Grappa	52 (46.43)	0 (0%)	0 (0%)	11 (9.82%)	18 (16.07%)	18 (16.07%)	12 (10.71%)	1 (0.89%)

Yo: years old.

data collection, the most frequent being jogging (39%), weightlifting (20.3%), and aerobic gymnastic (30.2%). Among those not currently engaged in physical activity, 94% had previously done so, but discontinued for reasons such as lack of time (72.3%) financial constraints (4.7%), personal preferences (16.9%), COVID-19 pandemic (23%). The prevalence of behaviours among the participants is illustrated in *Figure 1*.

Among women who rated their life satisfaction as 5 (highly satisfied), 74% were engaged in some form of physical activity, compared to those who rated their satisfaction as 1, where 42% participated in physical activity (p=0.01). A higher prevalence of drug use was identified among women who had never participated in sports at some point in their lives, compared to those who did sports (44.4 *vs* 14.9, respectively, p=0.020).

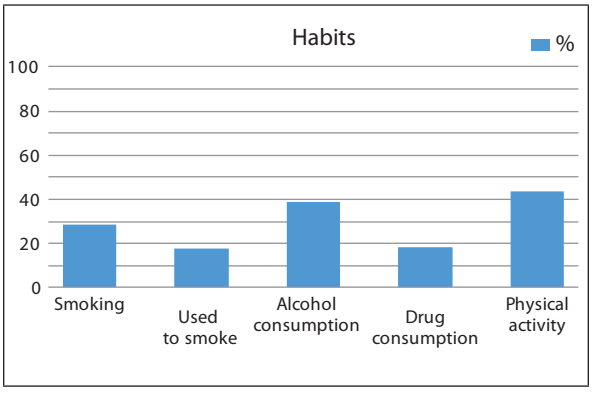


Figure 1
Behaviours of the respondents.

However, no significant association was observed between women who correctly answered the question regarding the importance of weight control before pregnancy and the significance of regular physical activity during pregnancy and their actual engagement in physical activity (p=0.244 and p=0.148, respectively).

Additionally, no significant association was found between the BMI of the participants and their correct answers to questions concerning the adverse effects of obesity on pregnancy and the importance of optimizing weight before pregnancy (p=0.2 and p=0.3, respectively).

An association was identified between BMI and school fulfilment, with a higher prevalence of overweight and obese individuals among those less fulfilled, compared to those who were more fulfilled (30.8% *vs* 19.5% and 15.4% *vs* 0%, respectively, p<0.001). Conversely, a higher prevalence of underweight individuals was observed among the most fulfilled, compared to the least fulfilled (18.8% *vs* 7.7%, respectively, p=0.016). Furthermore, we found an association between BMI and life fulfilment, with higher prevalence of obesity among the least fulfilled, compared to the most fulfilled (14.3% *vs* 0%, respectively, p=0.008).

DISCUSSION

In the past decades, the focus on influencing a child's health through diet has predominantly centred on the mothers' diet during pregnancy. However, there has been a recent shift towards expanding this focus to encompass the dietary and lifestyle choices of adolescents

and young adults', even years before parenthood. In this context, our study provides data on the lifestyles of young women of childbearing age in Italy, including dietary habits, alcohol, smoking, drug consumption, and physical activity.

Our findings indicate that young women aged 18-25 years have a somewhat suboptimal diet, when compared to Italian dietary guidelines. Only 22.3% had 5 or more meals/day, as recommended by the Consiglio per la ricerca in agricoltura e l'analisi dell'economia agraria (CREA, literally "Council for agricultural research and analysis of the agricultural economy"), which is higher compared to a previous Italian study conducted among students, reporting that only 8.5% ate an average of 5 meals per day [27, 28].

In the Italian population, women aged 18-64 years typically consume 213.1 g/day of vegetables and 429.6 g/day of fruits. The recommendation is to consume a total of 400 g/day or at least 5 portions of fruits and vegetables [27, 29]. In our sample, 41/340 (12%) women did not have any portion of vegetables in the previous three days, and 214/340 (62.9%) had less than 6 portions of vegetables (excluding potatoes or beans) in the previous three days, not meeting the recommended intake of 2-3 portions/day, similar to previous data, which reported that 49.1% of the females meet the recommended fruit consumption [30]. 62/340 (18.2%) of women did not have any fruits in the previous three days and 198/340 (33.2%) had less than 6 portions of fruits in the last three days, also not meeting the recommended amount of 2-3 portions/day. Moreover, 69/340 (20.3%) women had more than 2 portions of meat in the last three days, exceeding the recommended intake of 1 portion/week. These results are consistent with other European studies, such as a Norwegian study including students 20-40 years old, which reported lower than recommended intake of fruits, vegetables, oily fish, and whole grain [30].

The amount of folic acid consumed was 341 µg/day, which is less than the recommended amount of 400 µg/day [12, 26].

Unhealthy lifestyles tend to co-occur, creating a self-reinforcing cycle [31, 32]. We found associations between reduced consumption of cereals and fruits and a lack of physical activity. Additionally, less fish consumption was associated with smoking. Smoking women were more likely to consume alcohol and drugs. Moreover, women who never engaged in sports, were more likely to use drugs.

Our study also revealed significant associations between alcohol consumption and feelings of stress, experiences of violence, feelings of discrimination, as well as physical activity, life satisfaction, and finally BMI and school and life fulfilment.

We investigated whether knowledge on preconception health (results reported in a previous article) could be associated to diet and lifestyle behaviours. However, we found no significant associations between women who correctly answered the question on adverse effects of alcohol and women who consumed alcohol. There was no significant association between women who correctly answered the question on the importance of weight control before pregnancy and the importance of regular physical activity during pregnancy and those engaging in physical activity. Moreover, no significant association was found between participants' BMI and the correct answers to the questions on the adverse effects of obesity on pregnancy and the importance of optimizing the weight before pregnancy. As reported in other studies, often, knowledge is not enough to change unhealthy behaviours or attitudes [33, 34]. This underscores the need for more personalised, targeted and active interventions [35-37].

Considering the substantial impact of lifestyle and behaviours, starting from a young age, on the outcomes of future pregnancies, public health interventions targeting behaviours well ahead of pregnancy could offer significant health benefits at a low cost [38]. Future research should explore how to effectively promote such measures.

The results of this study should be interpreted in the light of some limitations. First, all results are self-reported, which introduces the risk of reporting bias. However, considering that participants tend to over-report healthy foods and behaviours and underreport unhealthy ones, challenges related to lifestyle may be even more substantial than our findings suggest, and public health initiatives aimed at lifestyles in this population of young adults would be even more relevant. The cross-sectional design of the study only allows for the identification of associations, not causality. The questionnaire was filled through an online link and may have attracted only women more attentive to their health in general, and preconception health in particular. We lack information on the participants' residence, therefore we cannot drive to any conclusions regarding differences in lifestyle and diet behaviours among women of childbearing age across different regions of Italy. Considering that access to public structures, counselling centres and sexual education programs varies across Italy, future research could address this issue. Furthermore, we did not investigate fresh foods *vs* processed foods. Lastly, considering the high proportion of respondents enrolled in a health sciences university, there is a probability that higher participation of students from our institution could have influenced sample composition.

Nonetheless, this study has several strong points. The sample size was calculated to ensure adequate statistical power. The questionnaire used for data collection was created based on a systematic literature review and validated through a rigorous process, including a two-round Delphi procedure, and a pilot study. Hence, the questionnaire could serve as a valuable tool, acting as an impetus for future research in the field, not only in Italy, but also in other countries.

CONCLUSIONS

Lifestyles, including diet, alcohol consumption, smoking and physical activity are an important part of maternal and child health and play a crucial role in pregnancy outcomes. These attitudes and behaviours begin at a young age and persist throughout life, ultimately impacting future pregnancies. In our sample young women of childbearing age have a suboptimal

diet, consume alcohol and smoke. To improve maternal and child's health, as well as pregnancy outcomes, preconception lifestyle interventions targeting all women of childbearing age should be warranted. These interventions should include counselling on subjects such as diet, alcohol consumption, smoking and physical activity. Furthermore, policies and guidelines on preconception health should incorporate these aspects to better address the preconception needs of young women of childbearing age.

Conflicts of interest statement

The Authors declare no conflicts of interest.

Received on 23 August 2023.
Accepted on 9 February 2024.

REFERENCES

1. Stephenson J, Heslehurst N, Hall J, Schoenaker DAJM, Hutchinson J, Cade JE, Poston L, Barrett G, Crozier SR, Barker M, Kumaran K, Yajnik CS, Baird J, Mishra GD. Before the beginning: Nutrition and lifestyle in the preconception period and its importance for future health. Lancet. 2018;391(10132):1830-41. doi: 10.1016/S0140-6736(18)30311-8. Erratum in: Lancet. 2018;391(10132):1774.
2. Moss JL, Harris KM. Impact of maternal and paternal preconception health on birth outcomes using prospective couples' data in Add Health. Arch Gynecol Obstet. 2015;291(2):287-98. doi: 10.1007/s00404-014-3521-0
3. Ekstrand Ragnar M, Grandahl M, Stern J, Mattebo M. Important but far away: adolescents' beliefs, awareness and experiences of fertility and preconception health. Eur J Contracept Reprod Health Care. 2018;23(4):265-73. doi: 10.1080/13625187.2018.1481942
4. Frey KA, Files JA. Preconception healthcare: What women know and believe. Matern Child Health J. 2006;10(5 Suppl):S73-7. doi: 10.1007/s10995-006-0110-2
5. Richards J, Mousseau A. Community-based participatory research to improve preconception health among Northern Plains American Indian adolescent women. Am Indian Alsk Native Ment Health Res. 2012;19(1):154-85. doi: 10.5820/aian.1901.2012.154
6. Cuervo M, Sayon-Orea C, Santiago S, Martínez JA. Dietary and health profiles of Spanish women in preconception, pregnancy and lactation. Nutriens. 2014;6(10):4434-51. doi: 10.3390/nu6104434
7. Zaçe D, La Gatta E, Orfino A, Viteritti AM, DI Pietro ML. Knowledge, attitudes, and health status of childbearing age young women regarding preconception health - an Italian survey. J Prev Med Hyg. 2022;63(2):E270-81. doi: 10.15167/2421-4248/jpmh2022.63.2.2571
8. Naimi TS, Lipscomb LE, Brewer RD, Gilbert BC. Binge drinking in the preconception period and the risk of unintended pregnancy: Implications for women and their children. Pediatrics. 2003;111(5 Pt 2):1136-41.
9. Zaçe D, Orfino A, Mariaviteritti A, Versace V, Ricciardi W, DI Pietro ML. A comprehensive assessment of preconception health needs and interventions regarding women of childbearing age: A systematic review. J Prev Med Hyg. 2022;63(1):E174-E99. doi: 10.15167/2421-4248/jpmh2022.63.1.2391
10. Townshend T, Lake A. Obesogenic environments: current evidence of the built and food environments. Perspect Public Health. 2017;137(1):38-44. doi: 10.1177/1757913916679860
11. Nilsen RM, Leoncini E, Gastaldi P, Allegri V, Agostino R, Faravelli F, Ferrazzoli F, Finale E, Ghirri P, Scarano G, Mastroiacovo P. Prevalence and determinants of preconception folic acid use: an Italian multicenter survey. Ital J Pediatr. 2016;42(1):65. doi: 10.1186/s13052-016-0278-z
12. Głąbska D, Książek A, Guzek D. Development and Validation of the Brief Folate-Specific Food Frequency Questionnaire for Young Women's Diet Assessment. Int J Environ Res Public Health. 201714;14(12):1574. doi: 10.3390/ijerph14121574
13. Quillin JM, Silberg J, Board P, Pratt L, Bodurtha J. College women's awareness and consumption of folic acid for the prevention of neural tube defects. Genet Med. 2000;2(4):209-13. doi: 10.1097/00125817-200007000-00002
14. Vamos CA, Sun H, Flory SB, DeBate R, Daley EM, Thompson E, Bleck J, Merrell L. Community level predictors of physical activity among women in the preconception period. Matern Child Health J. 2015;19(7):1584-92. doi: 10.1007/s10995-015-1668-3
15. Witt WP, Mandell KC, Wisk LE, Cheng ER, Chatterjee D, Wakeel F, Park H, Zarak D. Infant birthweight in the US: The role of preconception stressful life events and substance use. Arch Womens Ment Health. 2016;19(3):529-42. doi: 10.1007/s00737-015-0595-z
16. Zaçe D, Di Pietro ML, Caprini F, de Waure C, Ricciardi W. Prevalence and correlates of food insecurity among children in high-income European countries. A systematic review. Ann Ist Super Sanità. 2020;56(1):90-8. doi: 10.4415/ANN_20_01_13
17. Zaçe D, Di Pietro ML, Reali L, de Waure C, Ricciardi W. Prevalence, socio-economic predictors and health correlates of food insecurity among Italian children- findings from a cross-sectional study. Food Sec. 2021;13:13-24. doi: 10.1007/s12571-020-01111-1
18. Lecorguillé M, Schipper M, O'Donnell A, Aubert AM, Tafflet M, Gassama M, Douglass A, Hébert JR, Kelleher C, Charles MA, Phillips CM, Gaillard R, Lioret S, Heude B. Parental lifestyle patterns around pregnancy and risk of childhood obesity in four European birth cohort studies. Lancet Glob Health. 2023;11(Suppl. 1):S5. doi: 10.1016/S2214-109X(23)00090-6
19. Montanaro C, Lacey L, Robson L, Estill A, Vukovic S. Preconception Care: A technology-based model for delivery in the primary care setting supported by public health. Matern Child Health J. 2019;23(12):1581-6. doi: 10.1007/s10995-019-02806-4
20. Delgado C. Pregnancy 101: A call for reproductive and prenatal health education in college. Matern Child Health J. 2013;17(2):240-7. doi: 10.1007/s10995-012-0967-1
21. Panchal BD, Cash R, Moreno C, Vrontos E, Bourne C, Palmer S, Simpson A, Panchal AR. High-risk medication prescriptions in primary care for women without documented contraception. J Am Board Fam Med. 2019;32(4):474-80. doi: 10.3122/jabfm.2019.04.180281
22. Xaverius PK, Tenkku LE, Salas J. Differences between women at higher and lower risk for an unintended pregnancy. Womens Health Issues. 2009;19(5):306-12. doi: 10.1016/j.whi.2009.06.002

23. Mastroiacovo P, Nilsen RM, Leoncini E, Gastaldi P, Allegri V, Boiani A, Faravelli F, Ferrazzoli F, Guala A, Madrigali V, Scarano G. Prevalence of maternal preconception risk factors: An Italian multicenter survey. Ital J Pediatr. 2014;40:91. doi: 10.1186/s13052-014-0091-5
24. Harelick L, Viola D, Tahara D. Preconception health of low socioeconomic status women: Assessing knowledge and behaviors. Womens Health Issues. 2011;21(4):272-6. doi: 10.1016/j.whi.2011.03.006
25. Delgado CE. Undergraduate student awareness of issues related to preconception health and pregnancy. Matern Child Health J. 2008;12(6):774-82. doi: 10.1007/s10995-007-0300-6
26. National Center on Birth Defects and Developmental Disabilities. Folic Acid Recommendations. NCBDDD: Atlanta; 2023. Available from: https://www.cdc.gov/ncbddd/folicacid/recommendations.html.
27. Consiglio per la Ricerca in agricoltura e l'analisi dell'Economia Agraria. Linee guida per una sana alimentazione. Revisione 2018. CREA: Roma; 2018. Available from: https://www.crea.gov.it/documents/59764/0/LINEE-GUIDA+DEFINITIVO.pdf/28670db4-154c-0ecc-d187-1ee9db3b1c65?t=1576850671654.
28. Teleman AA, de Waure C, Soffiani V, Poscia A, Di Pietro ML. Nutritional habits in Italian university students. Ann Ist Super Sanità. 2015;51(2):99-105. doi: 10.4415/ANN_15_02_05
29. World Health Organization. Healthy diet. Geneva: WHO; 2020. Available from: https://www.who.int/news-room/fact-sheets/detail/healthy-diet.
30. Valen EL, Engeset D, Øverby NC, Hillesund ER. StudentKost: A cross-sectional study assessing college students' diets: reason for concern? J Nutr Sci. 2020;9:e39. doi: 10.1017/jns.2020.33
31. Hillesund ER, Øverby NC, Valen EL, Engeset D. Alcohol consumption among students and its relationship with nutritional intake: A cross-sectional study. Public Health Nutr. 2021;24(10):2877-88. doi: 10.1017/S1368980020004450
32. Rollins LG, Sokol NA, McCallum M, England L, Matteson K, Werner E, Stroud LR. Electronic Cigarette Use During Preconception and/or Pregnancy: Prevalence, Characteristics, and Concurrent Mental Health Conditions. J Womens Health (Larchmt). 2020;29(6):780-88. doi: 10.1089/jwh.2019.8089
33. Musgrave L, Homer C, Gordon A. Knowledge, attitudes and behaviours surrounding preconception and pregnancy health: An Australian cross-sectional survey. BMJ Open. 2023;13(1):e065055. doi: 10.1136/bmjopen-2022-065055
34. Cairncross Z, Dennis CL, Brennenstuhl S, Ravindran S, Enders J, Graves L, Mill C, Telner D, Brown HK. Development and Psychometric Evaluation of the Preconception Health Knowledge Questionnaire. Am J Health Promot. 2021;35(2):172-8. doi: 10.1177/0890117120946682
35. Karsten MDA, van Oers AM, Groen H, Mutsaerts MAQ, van Poppel MNM, Geelen A, van de Beek C, Painter RC, Mol BWJ, Roseboom TJ, Hoek A. LIFEstyle study group. Determinants of successful lifestyle change during a 6-month preconception lifestyle intervention in women with obesity and infertility. Eur J Nutr. 2019;58(6):2463-75. doi: 10.1007/s00394-018-1798-7
36. Khani Jeihooni A, Layeghiasl M, Yari A, Rakhshani T. The effect of educational intervention based on the theory of planned behavior on improving physical and nutrition status of obese and overweight women. BMC Womens Health. 2022;22(1):13. doi: 10.1186/s12905-022-01593-5
37. Sijpkens MK, van Voorst SF, Rosman AN, de Jong-Potjer LC, Denktaş S, Koch BCP, Bertens LCM, Steegers EAP. Change in Lifestyle Behaviors After Preconception Care: A Prospective Cohort Study. Am J Health Promot.;35(1):116-20. doi: 10.1177/0890117120927287
38. Barker M, Dombrowski SU, Colbourn T, Fall CHD, Kriznik NM, Lawrence WT, Norris SA, Ngaiza G, Patel D, Skordis-Worrall J, Sniehotta FF, Steegers-Theunissen R, Vogel C, Woods-Townsend K, Stephenson J. Intervention strategies to improve nutrition and health behaviours before conception. Lancet. 2018;391(10132):1853-64. doi: 10.1016/S0140-6736(18)30313-1

Ann Ist Super Sanità 2024 | Vol. 60, No. 2: 98-106
DOI: 10.4415/ANN_24_02_03

Characteristics of out-of-hospital births and perinatal outcomes: data from the Lazio Region, Italy, cross-sectional study from 2019 to 2021

Roberta Vittoria Cicero[1], Francesca Zambri[2], Michele Grandolfo[3]*, Federica Varone[4], Margaret Smith[4] and Sofia Colaceci[4]

[1]*Dipartimento di Biomedicina e Prevenzione, Università degli Studi di Roma Tor Vergata, Rome, Italy*
[2]*Centro Nazionale per la Prevenzione delle Malattie e la Promozione della Salute, Istituto Superiore di Sanità, Rome, Italy*
[3]*Istituto Superiore di Sanità, Rome, Italy*
[4]*Saint Camillus International University of Health and Medical Sciences (UniCamillus), Rome, Italy*
**retired*

Abstract

Introduction. In Italy, the primary place of birth is typically a hospital, with only a small number of women opting for an out-of-hospital setting. This study details the characteristics of midwifery care and perinatal and maternal outcomes of women who gave birth in an out-of-hospital setting in the Lazio Region, Italy, from 2019 to 2021.

Methods. A cross-sectional study was carried out. The study population included 542 healthy low-risk women who completed the process of planning an out-of-hospital birth, and excluding transfers, this resulted in a total sample of 478 women who gave birth out-of-hospital. Descriptive and inferential analyses and also a logistic regression model were performed.

Results. The main outcomes of the out-of-hospital deliveries were: intact perineum in 38.9% of cases, two cases of 3rd degree laceration (0.4%) and in one case (0.2%) episiotomy. Intrapartum emergencies occurred in 85 out of 478 women (17.8%) but only 10 women required a transfer to hospital after delivery. The one minute Apgar score was equal to or greater than 7 in 99.2% of cases. Exclusive breastfeeding of 96% one week after birth and 94.6% one month. Furthermore, having a previous vaginal hospital birth (adjOR 9.7; CI 95% 4.33-21.68 $P<0.001$) and a previous out-of-hospital birth (adjOR 24.2; CI 95% 3.23-181.48 $P=0.002$) was associated with the continuation of out-of-hospital birth.

Conclusions. For low-risk pregnant women who have planned an out-of-hospital birth, it has been shown to be a safe, adequate, appropriate, and effective alternative.

Key words
- birth setting
- birthing centres
- home birth
- midwifery
- out-of-hospital birth

INTRODUCTION

In recent years, in Italy, there has been an increase in the frequency of births occurring outside the hospital setting (at home or in maternity homes). Despite the national prevalence remaining low, the trend in 2020 and 2021 has shown an increase which may be due to the COVID-19 pandemic [1]. Between 2018 and 2022, the rate of out-of-hospital births increased by 87.5% (from 0.08% to 0.15%) [2, 3]. Specifically, the latest available data show that 0.04% of births occurred in "other" locations, with 0.11% occurring at home, with significant regional variations [3].

Globally, the practice of delivering out-of-hospital varies widely. The number of home births in the United States rose from 1.26% in 2020 to 1.41% in 2021 [4]. In Australia, 2% of births occurred in birth centres, 0.5% at home, and 0.7% in other contexts [5]. In Japan, 0.6% of births occurred in birth centres and 0.2% at home. In New Zealand, out-of-hospital births accounted for 3.4% of all births nationwide [6].

Among the European countries the Netherlands is an exception, with approximately 20% of births occurring at home, while in England, 63% of women give birth in midwifery-led birth centres (located either inside or out-

Address for correspondence: Roberta Vittoria Cicero, Dipartimento di Biomedicina e Prevenzione, Università degli Studi di Roma Tor Vergata, Via Montpellier 1, 00133 Rome, Italy. E-mail: roberta.cicero@hotmail.it.

side hospitals) and 3% deliver at home. The prevalence of home births was 2.4% in Wales in 2019 and 2.2% in Iceland in 2012 [6]. Home births made up 1.4% of births in Scotland [7], between 1% and 2% in Denmark, 0.7 per 1,000 (0.07%) in Sweden, 1.5 per 1,000 (0.15%) in Norway, and less than 1% in Belgium in 2017. In Germany, approximately 2% of births took place outside of a hospital setting in 2010, while in France, the percentage was less than 1% in 2016 [6].

According to the World Health Organization (WHO), every woman should give birth in a place that is perceived as safe and capable of providing adequate, respectful, and timely care. For women with low-risk pregnancies, this place can be not only a hospital obstetrical unit (OU) but also a midwifery clinic, a birth centre, or their own home [8]. Additionally, the National Institute for Health and Care Excellence (NICE) [9] supports the idea that women who meet the criteria for low-risk pregnancies should be supported and encouraged to give birth at home or in midwifery-led birth centres. These settings offer a higher likelihood of spontaneous birth without unnecessary invasive interventions compared to hospitals, which are associated with a higher likelihood of interventions such as vacuum or forceps-assisted births, episiotomies, and caesarean sections (CS). Furthermore, there are no significant differences in neonatal health outcomes related to the planned place of birth in various settings [9]. The literature widely demonstrates that among low-risk pregnant women, the planned choice of birth setting has a minimal impact on adverse perinatal outcomes [10, 11]. Additionally, low-risk women who plan to deliver out-of-hospital are less exposed to invasive interventions (e.g., episiotomy, etc.) and severe morbidity during labour and delivery [12].

The American College of Nurse-Midwives supports home birth as a safe option for women who are essentially healthy at term with a singleton fetus, as the health outcomes for women and newborns from studies have been comparable or better than births that occur in the hospital [13]. Similar statements are supported by the Royal College of Obstetricians and Gynaecologists, and the Royal College of Midwives in a joint statement, emphasising a higher level of satisfaction with the birth experience for those who have chosen home birth [14]. The Australian College of Midwives also advocates home birth as a safe option for women with uncomplicated pregnancies [15].

In Italy, in addition to hospital OU delivery rooms, it is possible to choose to give birth in midwifery units (MUs) located inside or outside of hospitals, at private freestanding midwifery units (FMUs or maternity homes) managed by independent midwives, as well as at home. The services offered by MUs are part of the National Health Service (NHS), following a model similar to that adopted in Great Britain. In Italy, the established MUs are concentrated in the central-northern regions. There are three midwifery units inside hospitals recognised by the NHS located in Turin, Florence and Genoa; however, the Genoa unit has been closed since 2020. Additionally, various groups of independent midwives are actively involved in assisting births at private maternity homes and/or at home, with the costs being borne by the couple [12].

To our knowledge, there is only one Italian study on the midwifery care and maternal-neonatal outcomes of out-of-hospital births. The study included 1,099 women who chose to give birth outside of the hospital between 2014 and 2018, and illustrates that out-of-hospital birth can be considered a safe choice for women with low-risk pregnancies [16]. However, it is important that this option is adequately planned, monitored, regulated, and evaluated through healthcare control systems to ensure safe and effective care for both the mother and the newborn, as is done in hospitals [16].

Therefore, due to a lack of sound evidence from Italy and with the intention of implementing a surveillance system in the near future, a quantitative study was conducted with the aim of describing the characteristics of midwifery care and perinatal and maternal outcomes of women who gave birth in an out-of-hospital setting in the Lazio Region, Italy.

METHODS

Design

A cross-sectional study was carried out.

Participants and settings

Women eligible for out-of-hospital birth, in general, must meet the criteria for low obstetric risk. The women taken into consideration are all those who have sought the out-of-hospital birth at maternity homes and/or independent midwives. The professionals follow the selection criteria outlined in the national coordination guidelines and in the care protocol adopted by Lazio Region [17, 18]. Therefore, the study population was based on the physiological requirements, to be identified and met during pregnancy (e.g., absence of maternal and/or fetal pathology, absence of pregnancy-related conditions, single pregnancy, etc.) and at the onset of labor (single cephalic presentation, full-term pregnancy, normal fetal weight, premature rupture of the membranes <24 hours, regular fetal heart rate, normal maternal blood pressure, and temperature) [17, 18].

The study population was examined in the three-year period 2019-2021.

The inclusion criteria were:

- women who completed the process of planning an out-of-hospital birth (n=542).

The exclusion criteria were:

- women who decided not to have an out-of-hospital birth;
- women who had planned an out-of-hospital birth but changed their decision during pregnancy for all the analyses (n=36);
- women who required transfer to a hospital before delivery for the analysis of out-of-hospital birth, neonatal outcomes, and the postpartum period (n=64).

The final total sample included 478 women who gave birth at home or in a maternity home (*Figure 1*).

Study instrument and data collection

An online form, including literature-based variables was built by three trained researcher midwives and was

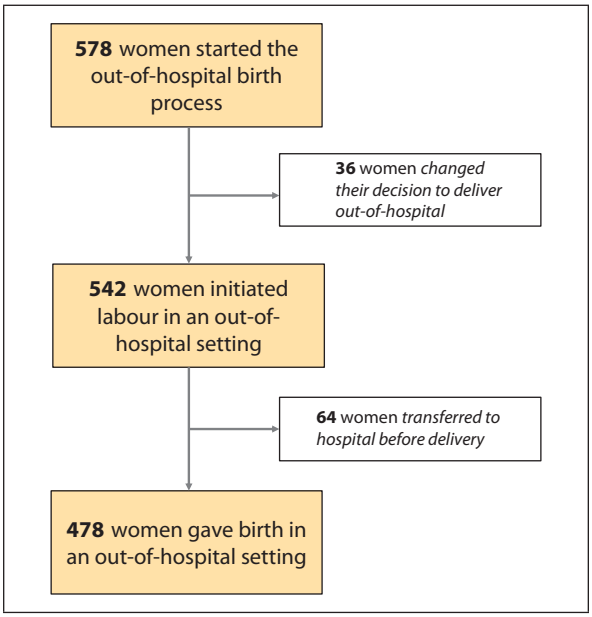


Figure 1
Flow diagram of study population in the Lazio Region, Italy.

approved by a committee of independent midwives of Lazio Region which supported and disseminated the project.

The form was divided into four sections: socio-demographic characteristics, medical history and pregnancy, labour and delivery, and neonatal outcomes and post-partum period.

Thirty independent midwives, working in home or maternity home care settings in the Lazio Region, were trained to fill in the online form. Local coordination was established to ensure comprehensive data collection by the independent midwives.

Data analysis

Descriptive and inferential analyses were performed. The frequency and percentage of socio-demographic characteristics, medical history and prenatal care were determined.

A logistic regression was performed to analyze the factors associated with the continuation of out-of-hospital birth compared to those who had to discontinue the process.

Adjusted odds ratio (adjOR) and 95% confidence intervals (CI) were calculated.

The analyses were performed using STATA version 17 (StataCorp LP, College Station, TX, USA).

Ethical considerations

The design of the study was approved by the Ethics Committee of UniCamillus – Saint Camillus International University of Health and Medical Sciences, Rome, Italy. The midwives and the mothers were informed and agreed to the use of their anonymous data in accordance with Italian and European data protection legislation. No funding was received for this study. This manuscript was prepared in accordance with STROBE guidelines for observational studies [19].

RESULTS

In the years of the study period, 124 (21.5%) women in 2019, 174 (30.1%) in 2020, and 280 (48.4%) in 2021, totaling 578 women initiated the out-of-hospital birth process. Of these, 36 decided not to continue the process due to the onset of medical conditions that did not allow continuation; therefore, they were not included in the study. Among the remaining 542 women who initiated labour in the out-of-hospital setting, 64 were transferred to hospital due to the onset of obstetric risk conditions. A total of 478 women experienced labour and delivery in the out-of-hospital setting (*Figure 1*). Of these, 10 were transferred to hospital after completing the delivery.

Social and obstetric maternal characteristics (n=542 women)

Of the 542 women who initiated labour out-of-hospital, 87.0% were Italian, 70.5% had a university degree or higher education, and 79.3% were employed. The average age of the sample was 34.0 (standard deviation, SD±4.4) years.

About 61.3% of the women were multiparous, of whom 22.2% had chosen an out-of-hospital birth for their previous deliveries, and 10.8% had a history of CS. The median gestational age at the beginning of care by independent midwives was 26.0 (IQR 16-32) weeks, and the average number of visits during pregnancy with the chosen midwives was 5.9 (SD±2.9).

Birth settings and outcomes (n=542 women)

The average gestational age was 39.6 (SD±1.1) weeks. Transfer to a hospital or clinic pre-labour or during the first stage of labour was necessary in 64 cases (*Table 1*). In another 4 cases (0.7%), ambulance intervention was required, but no transfer was needed.

The principal reasons for transfer were: prolonged first or second stage of labour (n=25), fetal complications (n=14), and post-partum complications (n=8). After the transfer, the independent midwife stayed with the woman in 45 cases.

The prevalence of vaginal delivery was 94.1%. Among the 34 women who had a previous CS and attempted a vaginal birth (VBACs), 30 gave birth vaginally, 3 had a repeat CS, and one had an operative birth following transfer to the hospital.

Out-of-hospital births: characteristics (n=478 women)

Of the 478 women who gave birth in an out-of-hospital setting, 45.3% delivered in their own home and 54.7% in a maternity home. About 98% of the women had at least one support companion of the mother's choice with them during labour and birth.

In 73.4% of cases women used a birthing pool during labour, 48.7% of whom also delivered in the birthing pool (*Table 2*). In 3.6% of cases, the placenta was subsequently delivered in the pool. Almost 95% of the women gave birth in a position of their own free choice. The perineum remained intact in 38.9% of women. An episiotomy was performed in one of 478 cases (0.2%). Among the spontaneous tears, 43.5% were first-degree tears, and 17.0%

Table 1
Birth setting and outcomes for the 542 women who initiated labour in an out-of-hospital setting

BIRTH SETTINGS AND OUTCOMES	n	%
Out-of-hospital birth		
Yes	478	88.2
No	64	11.8
Place of birth		
Home	216	39.9
Maternity house	262	48.3
Hospital	61	11.3
Clinic	3	0.6
Mode of delivery		
Spontaneous vaginal birth	510	94.1
Operative delivery	6	1.1
Caesarean section	26	4.8
Mode of delivery for attempted VBACs		
Spontaneous vaginal birth	30	88.2
Operative delivery	1	2.9
Caesarean section	3	8.8
Gestational age at birth (weeks)	mean 39.6 (SD±1.1)	
Transfer to hospital or clinic		
Yes	74	13.6
No	464	85.6
No, but ambulance request	4	0.7
Timing of transfer		
Pre-labour	10	13.5
Prodromal stage	14	18.9
Active labour	32	43.2
Second stage	8	10.8
Third stage	7	9.5
Immediate postpartum	3	4.1
Reasons for transfer		
Prolonged 1st or 2nd stage of labour	25	34.7
Fetal complications	14	19.4
Post-partum complications	8	11.1
Other	25	34.8
Presence of the freelance midwife in the hospital		
Yes	45	60.8
No	29	39.2

SD: standard deviation.

were second-degree tears. There were 2 cases (0.4%) of third-degree tears. Intrapartum emergencies occurred in 85 out of the 478 women who laboured and delivered in an out-of-hospital setting (17.8%). The most frequent emergency was maternal haemorrhage (n=47; 9.8%), including 38 cases (80.9%) with blood loss between 500 and 1,000 ml and 9 cases (19.1%) with blood loss over 1,000 ml. Other emergencies included 18 cases (3.8%)

Table 2
Characteristics of out-of-hospital births (478 women)

BIRTH CHARACTERISTICS	n	%
Immersion in water		
Labour	351	73.4
Delivery	233	48.7
Placenta delivery	17	3.6
Delivery position		
Reclining	26	5.4
On all fours	168	35.2
Squatting	156	32.6
Other	128	26.8
Perineal outcomes		
Intact perineum	186	38.9
1st degree tear	208	43.5
2nd degree tear	81	17.0
3rd degree tear	2	0.4
4th degree tear	0	0.0
Episiotomy	1	0.2
Intrapartum emergencies		
Abnormal fetal heart rate	3	0.6
Malpresentation	9	1.9
Shoulder dystocia	14	2.9
Umbilical cord prolapse	0	0.0
Meconium-stained amniotic fluid	18	3.8
Haemorrhage	47	9.8
>500cc to 1,000cc	38	80.9
>1,000cc	9	19.1
Other	9	1.9
NEONATAL CHARACTERISTICS		
Apgar score at 1 minute	mean 9 (SD±0.8)	
≥7	474	99.2
Apgar score at 5 minutes	mean 9.9 (SD±0.4)	
≥7	477	99.8
≥9	471	98.6
Umbilical cord clamping		
Immediate	2	0.4
After 1 minute, before placenta delivery	19	4.0
After placenta delivery, within 12 hours	342	71.6
After 12 hours, before spontaneous detachment	76	15.9
Lotus birth	39	8.2
Stimulation/resuscitation interventions on the newborn		
None, or tactile stimulation only (rubbing, drying, massage)	464	97.1
Resuscitation with bag and mask ventilation or laryngeal mask	13	2.7

Continues

Table 2
Continued

Advanced resuscitation maneuvers (intubation, chest compressions, medications)	1	0.2
Skin to skin		
No	1	0.2
≤2 hours	36	7.5
>2 hours	441	92.3
Early initiation of breastfeeding		
Within 30 minutes of birth	305	63.8
After 30 minutes and within 2 hours of birth	157	32.9
After 2 hours	12	2.5
Non-breastfeeding	4	0.8
POSTNATAL PERIOD		
Concerns addressed		
Breastfeeding	100	20.9
Laceration/suturing	26	5.4
Urinary incontinence	13	2.7
Neonatal care	8	1.7
Other	34	7.1
Breastfeeding at 7 days		
Exclusive	459	96.0
Predominant	9	1.9
Complementary	8	1.7
Non-breastfeeding - formula feeding only	2	0.4
Breastfeeding at 1 month		
Exclusive	452	94.6
Predominant	11	2.3
Complementary	9	1.9
Non-breastfeeding – formula feeding only	6	1.3

SD: standard deviation.

of meconium-stained amniotic fluid, 14 cases (2.9%) of shoulder dystocia, 9 cases (1.9%) of abnormal presentation, 3 cases (0.6%) of fetal heart rate abnormalities, 6 cases (1.2%) of uterine atony, 1 case (0.2%) of placental abruption, 1 case (0.2%) of tight nuchal cord, and 1 case (0.2%) of umbilical cord rupture.

Neonatal characteristics of the out-of-hospital births (n=478 babies)

The average birth weight was 3,429.3 (SD±4.1) g. The one minute Apgar score was 7 or above in 99.2% of cases (*Table 2*).

Cord clamping occurred after placental delivery in 95.6% of newborns, including 8.2% of cases where lotus birth was chosen. There were 2 cases (0.4%) of immediate cord clamping, one involving a newborn requiring ventilation and one involving cord rupture immediately after delivery.

No airway suctioning was performed for 462 newborns (96.7%) and no tactile stimulation was needed for 464 newborns (97.1%). However, 13 newborns required bag and mask ventilation despite having an Apgar score of 7 or above at 5 minutes. One case required neonatal cardiopulmonary resuscitation due to shoulder dystocia, and was followed by transfer to hospital.

Immediate skin-to-skin contact after birth occurred in 99.8% of mother-baby pairs. The duration of skin-to-skin contact was over 2 hours in 92.3% of cases. The first breastfeeding latch occurred within 2 hours of birth in 96.7% of newborns. Most of newborns (95.2%) had their first bath after 24 hours from birth. In most cases (71%), the first paediatric visit occurred after 6 hours from birth.

Postnatal period (n=478 women)

Seven women were transferred to a hospital or clinic during third stage, due to a retained placenta, and 3 women were transferred in the postpartum period (*Table 1*).

The average number of postpartum visits by independent midwife was 6.0 (SD±2.0), with the last visit occurring between 30 and 42 days after birth in 40.1% of cases.

149 women (31.1%) experienced post-birth issues that required attention. The most common difficulties were related to breastfeeding (20.9%). In 5.4% of cases problems with lacerations and perineal healing were reported, and 2.7% of women had issues of incontinence (*Table 2*).

About 96% of women were exclusively breastfeeding at one week post-delivery, and 94.6% were exclusively breastfeeding at one month.

Logistic regression model

The logistic regression model showed that, compared to primiparous, multiparous who had a previous spontaneous hospital birth (adjOR 9.7; CI 95% 4.33-21.68 $P<0.001$) and women who had a previous out-of-hospital birth (adjOR 24.2; CI 95% 3.23-181.48 $P=0.002$) were associated with the continuation of out-of-hospital birth. The socio-demographic characteristics (education, citizenship, age, marital status) and having had a previous caesarean section were not significantly associated with out-of-hospital birth *(Table 3)*.

DISCUSSION

This is the second study reporting data on out-of-hospital births in Italy and the first that is representative of the Lazio Region. Similar to the first Italian study, the results appear representative for the low-risk pregnant women and confirm that the choice of giving birth outside the hospital is safe for this population [16].

Our regional data show a progressive annual increase in the number of out-of-hospital births, probably due to the COVID-19 pandemic. In fact, many studies have reported that the pandemic has led women to change the chosen place of delivery to ensure their desired birthing experience and to avoid the risk of exposure to COVID-19 during a hospital stay [20-22].

The average age, the high level of education (bachelor's degree and higher), and occupational status are in line with the national study on out-of-hospital births [16] and the international literature [23, 24].

Table 3
Effect of parity on the continuation of out-of-hospital birth (542 women) – logistic regression model

Variable	% (n/tot)	adjOR*	CI (95%)	*P*
Primiparous	76.7 (161/210)	1		
Multiparous with previous in hospital caesarean section	80.7 (25/31)	1.5	0.57-4.06	0.4
Multiparous with previous vaginal hospital birth	96.5 (219/227)	9.7	4.33-21.68	**0.000**
Multiparous with previous out-of-hospital birth	98.7 (73/74)	24.2	3.23-181.48	**0.002**

*Adjusted for education, citizenship, age, marital status.
adjOR: adjusted odds ratio. CI: confidence interval.

Consistent with the literature, multiparity is associated with out-of-hospital births [16]. Among multiparous women who chose the out-of-hospital setting for previous births, it is common to observe a continuation of this choice for subsequent deliveries. Additionally, based on national data from 2014-2018, 4.3% of women birthing out-of-hospital had a previous caesarean section [16], while in our study this frequency appears to be slightly more than twice as high, in line with the literature [25].

Regardless of the care setting, maternity services and healthcare professionals are responsible for ensuring that all care procedures are evidence-based, safe, and of high quality [26]. In the case of planned out-of-hospital births, ensuring a prompt transfer from home to the hospital represents a good practice when a potential risk is identified. Promoting high quality maternity care involves guaranteeing the transfer from home to hospital, which requires interprofessional collaboration, effective communication, and the implementation of standardised procedures to ensure personalised and safe care for the mother and baby [27]. In our study, the prevalence of transfers in the Lazio Region is 13.6%, in line with the literature [28, 29].

Consistent with previous studies [30-34], giving birth in an out-of-hospital setting is associated with a lower number of medical interventions (e.g., inductions, episiotomies, operative vaginal deliveries with vacuum extraction, and caesarean sections) and a lower rate of maternal complications (less instances of third and fourth-degree lacerations, haemorrhage, fever). In our study there were no cases of induced labour and a low number of medical interventions, while national data on hospital births, show a prevalence of 32.1% for induced labour, 4.24% for operative vaginal deliveries with vacuum extraction, and 31% for caesarean sections [3]. In this comparison, it is essential to emphasize how our sample is highly selected, as it comprises women with physiological pregnancies, a crucial requirement for giving birth in an out-of-hospital setting. Conversely, the hospital serves as the only alternative for women with high-risk conditions, despite the majority of pregnancies being physiological.

Regarding midwifery care, satisfactory results emerged in our study with respect to the utilisation of upright positions during birth, delayed cord clamping, the presence of a support person, immediate skin-to-skin contact to promote breastfeeding and prevent hypothermia, delayed bathing for 24 hours after birth, and continuity of care postpartum, all of which is in line with WHO recommendations on "intrapartum care for a positive childbirth experience" [35, 36]. In particular, as regard breastfeeding and companion of the mother's choice, our study guaranteed this best practice compared to what happened in hospital setting during COVID-19 pandemic [37].

The practice of planned out-of-hospital birth requires unique skills, knowledge and methods related to the birthing process and midwifery. In out-of-hospital settings, birth occurs with respect to physiology, without routine interference, and with careful use of technologies appropriate for such an environment [38]. This aligns perfectly with the preferences and motivations that drive low-risk women to choose this setting [23]. Furthermore, the midwifery model of care leads to greater satisfaction among women [39-41], and its continuity during the postpartum period could bring long-term benefits, including increased breastfeeding [42, 43]. Our study shows that the prevalence of exclusive breastfeeding remains high at one week and one month after birth. In Italy, the rates of breastfeeding initiation and continuation vary by region, depending on education and socio-economic conditions [44]. Moreover, the use of breast milk substitutes is a widespread practice during the hospital stay as well as their prescription at discharge [45]. In the Italian context where breastfeeding prevalence is low, our results must be taken into consideration, as they show how respect for birth physiology and adoption of the midwifery model of care play a pivotal role in strengthening the breastfeeding skills of women and babies [45, 46]. In fact, regardless of the place of birth, competent health personnel able to meet women's needs is a key factor for the satisfaction of the childbirth experience [47].

The strength of the study is the completeness and accuracy of data collection, covering 95% of out-of-hospital births in Lazio Region. Moreover, all groups of midwives involved in out-of-hospital assistance in the Lazio Region participated in this study. Trained midwives collected data using a coded questionnaire, ensuring data quality and completeness.

This descriptive study estimated how many women, having initiated the pathway, decide to forego it, and how many women are transferred due to problems during pregnancy, labor and delivery. These are useful indicators for comparing experiences. All these aspects can be a starting point for establishing an epidemiological surveillance system.

This study also has some limitations. First, the findings are not generalisable at a national level due to the involvement of only one region. Data collection relied on local coordination for completing the records due to the absence of a structured monitoring system. Possible implications for future research would include additional indicators in the medium to long term postpartum period to study the outcomes in terms of public health. Finally, it would be useful to replicate and implement the present investigation in other Italian regions in order to achieve a comprehensive national epidemiological overview.

CONCLUSIONS

This study confirms that a planned out-of-hospital birth is a safe, adequate, appropriate, and effective choice for low-risk pregnant women. However, it is essential to emphasise that the safety, quality, and appropriateness of such births depend on a regulatory system that includes careful planning and appropriate monitoring. Additionally, in view of the possible increase of out-of-hospital births, and in order to maintain the high standards of safety and quality, it would be desirable to implement a national surveillance system for monitoring maternal and neonatal outcomes of out-of-hospital births. A number of countries have adopted specific tools to support the continuous improvement and delivery of quality maternity care, for example the creation and maintenance of datasets such as the MANA Statistic Project (Midwives Alliance North America) in the United States [12].

Authors' contributions

RVC, SC: conceptualization, data curation, formal analysis, investigation, methodology, project administration, supervision, validation, visualization, writing – original draft, writing – review & editing; FZ, MG: data curation, formal analysis, investigation, methodology, project administration, supervision, validation, visualization, writing – original draft, writing – review & editing; FV: data curation, investigation, supervision, validation, visualization, writing – original draft; MS: investigation, methodology, project administration, supervision, validation, visualization, writing – original draft, writing – review & editing.

Acknowledgements

The Authors wish to thank Paola Mazza, Cristiana Romano, Valeria Barchiesi and all independent midwives of Lazio Region, Italy, which supported the project and data collection.

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Ethic Committee

The design of the study was approved by the Ethics Committee of Unicamillus – Saint Camillus International University of Health and Medical Sciences, Rome, Italy,

Conflict of interest statement

Each Author declares that he or she has no commercial associations (e.g., consultancies, stock ownership, equity interest, patent/licensing arrangement, etc.) that might pose a conflict of interest in connection with the submitted article.

Received on 20 September 2023.
Accepted on 13 February 2024.

REFERENCES

1. Società Italiana di Neonatologia. Parto in casa: Trend in aumento a causa della pandemia, 2020. Available from: https://blog.sin-neonatologia.it/wp-content/uploads/2020/06/CS-SIN-parto-in-casa-06.06.2020.pdf.
2. Ministero della Salute - Direzione Generale della Digitalizzazione, del Sistema Informativo Sanitario e della Statistica - Ufficio di Statistica. Certificato di assistenza al parto (CeDAP): Analisi dell'evento nascita - Anno 2018. Roma: Ministero della Salute; 2021. Available from: https://www.salute.gov.it/imgs/C_17_pubblicazioni_3034_allegato.pdf.
3. Ministero della Salute - Direzione Generale della Digitalizzazione, del Sistema Informativo Sanitario e della Statistica Ufficio di Statistica. Certificato di assistenza al parto (CeDAP) Analisi dell'evento nascita – Anno 2022. Roma: Ministero della Salute; 2023. Available from: https://www.salute.gov.it/imgs/C_17_pubblicazioni_3346_allegato.pdf.
4. Gregory ECW, Osterman MJK, Valenzuela CP. Changes in home births by race and Hispanic origin and state of residence of mother: United States, 2019-2020 and 2020-2021. Natl Vital Stat Rep. 2022;71(8):1-10. doi: https://dx.doi.org/10.15620/cdc:121553
5. Australian Institute of Health and Welfare. Australia's mothers and babies - 2021. Updated 2023. Available from: https://www.aihw.gov.au/getmedia/bf03fda0-6d37-46f3-8ba6-9c3ebadc26f8/australia-s-mothers-and-babies.pdf?v=20240115130043&inline=true.
6. Cicero RV, Colaceci S, Amata R, Spandonaro F. Cost analysis of planned out-of-hospital births in Italy. Acta Biomed 2022;93(4):e2022227. doi: 10.23750/abm.v93i4.12923
7. National Chilbirth Trust. NCT response: New national statistics on home birth. Bristol, UK: NCT; 2011. Available from: https://www.nct.org.uk/about-us/media/news/nct-response-new-national-statistics-home-birth.
8. World Health Organization. Safe motherhood. Care in normal birth: A practical guide. Report of a technical working group. Geneva: WHO Department of Reproductive Health and Research; 1996.
9. National Institute for Health and Care Excellence. Intrapartum care for healthy women and babies. NICE; 2014. Available from: https://www.nice.org.uk/guidance/cg190/chapter/Recommendations#place-of-birth.
10. Scarf VL, Rossiter C, Vedam S et al. Maternal and perinatal outcomes by planned place of birth among women with low-risk pregnancies in high-income coun-

tries: A systematic review and meta-analysis. Midwifery. 2018;62:240-55. doi: 1016/j.midw.2018.03.024
11. Hutton EK, Reitsma A, Simioni J et al. Perinatal or neonatal mortality among women who intend at the onset of labour to give birth at home compared to women of low obstetrical risk who intend to give birth in hospital: A systematic review and meta-analyses. EClinicalMedicine. 2019;14:59-70. doi: 10.1016/j.eclinm.2019.07.005
12. Colaceci S, Cicero RV, Reali L, Grandolfo M, Arena I, Battaglia S, De Angelis D, Romano C, Mazza P, Monsignore M, Olivieri S, Dellafiore F. Il parto extra-ospedaliero: un'indagine quanti-qualitativa presso una casa maternità di Roma. Quaderni ACP. 2021;28(6):258-62. doi: 1053141/QACP.2021.258-262
13. American College of Nurse-Midwives. Midwifery provision of home birth services: American College of Nurse-Midwives. J Midwifery Womens Health. 2016:61(1):127-33. doi: 10.1111/jmwh.12431
14. Royal College of Obstetricians and Gynaecologists, Royal College of Midwives. Home births. Joint statement n. 2; 2007.Available from: https://birthguidechicago.com/wp-content/uploads/2018/07/home_births_rcog_rcm0607.pdf.
15. Australian College of Midwives. (ACM). Position statement for planned birth at home. 3rd ed. 2019. Available from: https://www.midwives.org.au/common/Uploaded%20files/_ADMIN-ACM/Planned-Birth-at-Home-Position-Statement-2019.pdf.
16. Campiotti M, Campi R, Zanetti M et al. Low-Risk planned out-of-hospital births: Characteristics and perinatal outcomes in different Italian birth settings. Int J Environ Res Public Health. 2020;17:2718. doi: 10.3390/ijerph17082718
17. Associazione Nazionale Culturale Ostetriche Parto a Domicilio e Casa Maternità. Linee guida di assistenza al travaglio e parto fisiologico a domicilio e casa maternità. 1991, 4a rev. 2017. Available from: http://www.nascereacasa.it/wp-content/uploads/2016/08/Linee-Guida-_2017_AssociazioneNascereinCasa.pdf.
18. Italia. Regione Lazio. Decreto del Commissario ad Acta 23 dicembre 2016, n. U00395. "Protocollo assistenziale per il parto a domicilio in centro nascita ed in casa maternità. Regione Lazio", redatto ed approvato dal Gruppo di Lavoro Regionale Tecnico Parti a Domicilio ed in Casa di Maternità, istituito con Det. n. G09667 del 4 agosto 2015 e Det. n. G11586 del 28 settembre 2015. Bollettino Ufficiale della Regione Lazio n.104, suppl. n. 1, 29 dicembre 2016.
19. von Elm E, Altman DG, Egger M, Pocock SJ, Gøtzsche PC, Vandenbroucke JP. The strengthening the reporting of observational studies in epidemiology (STROBE) statement: Guidelines for reporting observational studies. Lancet. 2007;370(9596):1453-7. doi: 10.1016/S0140-6736(07)61602-X
20. Grünebaum A, Bornstein E, Katz A, Chervenak FA. Worsening risk profiles of out-of-hospital births during the COVID-19 pandemic. Am J Obstet Gynecol. 2022;226(1):137-8. doi: 10.1016/j.ajog.2021.11.1346
21. Cheng RJ, Fisher AC, Nicholson SC. Interest in home birth during the COVID-19 pandemic: Analysis of Google trends data. J Midwifery Womens Health. 2022;67(4):427-34. doi: 10.1111/jmwh.13341
22. Colaceci S, Anderson G, Ricciuto V, Montinaro D, Alazraki G, Mena-Tudela D. Experiences of birth during COVID-19 pandemic in Italy and Spain: A thematic analysis. Int J Environ Res Public Health. 2022;19(12):7488. doi: 10.3390/ijerph19127488
23. Descieux K, Kavasseri K, Scott K, et al. Why women choose home birth: a narrative review. MAHEC Online J Res. 2017;3(2):1-10. Available from: https://sys.mahec.net/media/onlinejournal/why_women.pdf.
24. Declercq E, MacDorman MF, Menacker F, et al. Characteristics of planned and unplanned home births in 19 states. Obstet Gynecol. 2010;116(1):93-9. doi: 10.1097/AOG.0b013e3181e21f6d
25. Bayrampour H, Lisonkova S, Tamana S, Wines J, Vedam S, Janssen P. Perinatal outcomes of planned home birth after cesarean and planned hospital vaginal birth after cesarean at term gestation in British Columbia, Canada: A retrospective population-based cohort study. Birth. 2021;48(3):301-8. doi: 10.1111/birt.12539
26. Safer Care Victoria. Homebirth: Clinical guidance. Melbourne: Safer Care Victoria; 2021. Available from: https://www.safercare.vic.gov.au/sites/default/files/2021-05/GUIDANCE_Homebirth.pdf.
27. Home Birth Summit, Collaboration Task Force. Best practice guidelines: Transfer from planned home birth to hospital. Available from: https://www.homebirthsummit.org/wp-content/uploads/2014/03/HomeBirthSummit_BestPracticeTransferGuidelines.pdf.
28. Blix E, Kumle MH, Ingversen K, et al. Transfers to hospital in planned home birth in four Nordic countries – A prospective cohort study. Acta Obstet Gynecol Scand. 2016;95:420-8. doi: 10.1111/aogs.12858
29. Blix E, Kumle M, Kjærgaard H et al. Transfer to hospital in planned home births: a systematic review. BMC Pregnancy Childbirth. 2014;14:179. doi: 10.1186/1471-2393-14-179
30. Olsen O. Meta-analysis of the safety of home birth. Birth. 1997;24(1):4-13;discussion14-6. doi: 10.1111/j.1523-536x.1997.tb00330.x
31. Olsen O, Clausen JA. Planned hospital birth versus planned home birth. Cochrane Database Syst Rev. 2012;9(9):CD000352. doi: 10.1002/14651858.CD000352.pub2
32. Janssen PA, Saxell L, Page LA, Klein MC, Liston RM, Lee SK. Outcomes of planned home birth with registered midwife versus planned hospital birth with midwife or physician. CMAJ. 2009;181(6-7):377-83. doi: 10.1503/cmaj.081869
33. Bolten N, de Jonge A, Zwagerman E, et al. Effect of planned place of birth on obstetric interventions and maternal outcomes among low-risk women: a cohort study in the Netherlands. BMC Pregnancy Childbirth. 2016;16(1):329. doi:10.1186/s12884-016-1130-6
34. Hutton EK, Cappelletti A, Reitsma AH, et al. Outcomes associated with planned place of birth among women with low-risk pregnancies. CMAJ. 2016;188(5):E80-E90. doi: 10.1503/cmaj.150564
35. World Health Organization. WHO recommendations: intrapartum care for a positive childbirth experience. Geneva: World Health Organization; 2018.
36. Istituto Superiore di Sanità; EpiCentro – L'Epidemiologia per la Sanità Pubblica. Percorso nascita. Documentazione. Nel mondo. Available from: https://www.epicentro.iss.it/percorso-nascita/documentazione-mondo.
37. Zambri F, Nannavecchia AM, Brescianini S, et al. Breastfeeding and presence of the companion of woman's choice during COVID-19 pandemic in Italy: Regional population-based routine data and best practices at birth. Epidemiol Prev. 2023;47(4-5):263-72. English. doi: 10.19191/EP23.4-5.A587.066
38. Stone NI, Thomson G, Tegethoff D. Skills and knowledge of midwives at free-standing birth centres and home birth: A meta-ethnography. Women Birth. 2023;36(5):e481-e94. doi: 10.1016/j.wombi.2023.03.010

39. Sandall J, Soltani H, Gates S, et al. Midwife-led continuity models versus other models of care for childbearing women. Cochrane Database Syst Rev. 2016;4(4):CD004667. doi: 10.1002/14651858.CD004667.pub5
40. Zielinski R, Ackerson K, Kane Low L. Planned home birth: Benefits, risks, and opportunities. Int J Womens Health. 2015;7:361-77. doi: 10.2147/IJWH.S55561
41. Scarf V, Catling C, Viney R, Homer C. Costing alternative birth settings for women at low risk of complications: A systematic review. Plos One. 2016;11(2):e0149463. doi: 10.1371/journal.pone.0149463
42. International Confederation of Midwives. Phylosophy and model of midwifery care. 's-Gravenhage, the Netherlands: ICM; 2024. Available from: https://internationalmidwives.org/resources/philosophy-and-model-of-midwifery-care/.
43. Menichini D, Zambri F, Govoni L, et al. Breastfeeding promotion and support: A quality improvement study. Ann Ist Super Sanità 2021;57(2):161-6. doi: 10.4415/ANN_21_02_08
44. Cernigliaro A, Palmeri S, Casuccio A, Scondotto S, Restivo V; In Primis Working Group. Association of the individual and context inequalities on the breastfeeding: A study from the Sicily Region. Int J Environ Res Public Health. 2019;16(19):3514. doi: 10.3390/ijerph16193514
45. Colaceci S, Chapin EM, Zambri F, et al. Verba volant, scripta manent: Breastfeeding information and health messages provided to parents in the neonatal discharge summary in the Lazio Region, Italy. Ann Ist Super Sanità. 2020;56(2):142-9. doi: 10.4415/ANN_20_02_03
46. Istituto Superiore di Sanità. Sorveglianza bambini 0-2 anni. Sintesi dei risultati – Edizione 2022. Available from: https://www.epicentro.iss.it/sorveglianza02anni/pdf/Sintesi_CONVEGNO-O_2__Versione%20STAMPA_23_Marzo_2023.pdf.
47. Anderson G, Zega M, D'Agostino F, et al. Meta-synthesis of the needs of women cared for by midwives during childbirth in hospitals. J Obstet Gynecol Neonatal Nurs. 2021;50(1):6-19. doi: 10.1016/j.jogn.2020.10.005

Ann Ist Super Sanità 2024 | Vol. 60, No. 2: 107-110
DOI: 10.4415/ANN_24_02_04

Compassionate drug uses in Italy. Analysis at single-center level

Daniela Pilunni[1], Maria Erica Blandino[1] and Pierluigi Navarra[2]

[1]*Farmacia Prodotti Sperimentali, Fondazione Policlinico Universitario A. Gemelli IRCCS, Rome, Italy*
[2]*Dipartimento di Sicurezza e Bioetica, Sezione di Farmacologia, Facoltà di Medicina e Chirurgia, Università Cattolica del Sacro Cuore, Fondazione Policlinico Universitario A. Gemelli IRCCS, Rome, Italy*

Abstract

Aims. Using a database from two pharmaceutical companies that managed several compassionate use programs in the last few years in Italy, we have previously analyzed the data by the number of patients and centers in each region and province, showing that the use of compassionate drugs is largely diffused in the country, in a manner directly related to the size of population of each region. In the present study we used the same database to expand the analysis to single-center level, aiming to test the hypothesis whether, despite a good diffusion of compassionate drug uses in each region, the majority of them concentrates within a relatively low number of centers.

Methods. Data from different programs were grouped per center, and the centers were ordered per the number of compassionate uses dispensed, and per region. Two cutoff levels, at 75% and 90%, were drawn to look at the number of centers accounting for such percentages of compassionate uses in each region.

Results. Out of 343 centers throughout Italy, 93 and 156 centers (i.e., 27.11% and 45.48% of the total) account for about 75% and 90% of all compassionate drugs dispensed in Italy. In 6 regions out of 20 (Valle d'Aosta, Liguria, Umbria, Lazio, Molise and Campania) the centers accounting for 75% of all compassionate drugs dispensed are located in a single town. Forty and 20 out of the 93 centers dispensing 75% of all compassionate drugs are academic hospitals and research hospitals (Istituti di Ricovero e Cura a Carattere Scientifico, IRCCS), respectively.

Conclusions. In this study we have demonstrated that, in spite of widespread diffusion of compassionate drug uses in all Italian regions, their management is restricted to a relatively low number of dispensing centers in each region.

Key words

- compassionate drug
- compassionate drug use
- early access program
- expanded access program
- Italy

INTRODUCTION

Compassionate drug use (CDU) is one of the manners to provide unauthorized treatments to patients with no further treatment options, along with the inclusion of patients in clinical trials, off-label prescriptions, or medicine import. Most often, compassionate drugs are given through the inclusion of patients into specific early access programs or expanded access programs (EAPs) managed by the companies producing the drug [1, 2]; this is especially true if the company has already applied, or is going to apply, to get the drug approved in a given indication. Less frequently, the compassionate drug is prescribed for individual use, outside any EAP. In both cases, the company scrutinizes the individual requests for approval, and provides the drug for free [1, 2].

In the European Community (EC) Regulation n. 726/2004, compassionate drugs are referred to as "unauthorized medicinal products" [3]. However, in Italy the notion of compassionate drug includes not only medicines that are not approved yet in the EC, but also medicines with one or more indications approved by European Medicines Agency (EMA)/EC, whose price has not been negotiated yet with the Italian drug agency (Agenzia Italiana del Farmaco, AIFA). As a matter of fact, the latter category is not available for use in the clinical practice even if approved in the EC.

In a previous study on the CDU requests processed in a big Italian academic hospital in the period 2018-2021 [4], we showed that more than 95% of the CDUs (i.e., 443 out of 463) was concerning drugs with at least one indication approved in the EC. Thus, CDUs (and EAPs) can be taken as an index of the access to *approved* innovative treatments in advance to their availability on the market. In this perspective, we have previously investigated how diffuse CDUs are in Italy by analyzing the databases of two pharmaceutical companies running several EAPs in the last few years in the country [5]. We analyzed the data by region and

Address for correspondence: Pierluigi Navarra, Dipartimento di Sicurezza e Bioetica, Sezione di Farmacologia, Facoltà di Medicina e Chirurgia, Università Cattolica del Sacro Cuore, Largo Francesco Vito 1, 00168 Rome, Italy. E-mail: pierluigi.navarra@unicatt.it.

district, showing that the use of compassionate drugs is widespread, and is closely related to the population of each region. However, this analysis did not consider the relative weight of centers of excellence and/or large hospitals present into the region. For this reason, in the present study we re-analyzed the above database at single-center level, showing that, despite a good diffusion of CDUs in each region, the large majority of CDUs was managed by a relatively low number of centers.

MATERIALS AND METHODS

The databases were provided by Bristol Myers Squibb (BMS) Italia and Roche Italia SpA. The data from BMS included seven EAPs and two products, nivolumab and luspatercept, which accounted for five and two EAPs respectively. The data from Roche included ten products, which were provided as compassionate drugs through three (atezolizumab), or two (pralsertinib, risdiplam) or a single EAP (alectinib, emicizumab, entrectinib, glofitamab, ocrelizumab, polatuzumab vedotin and trastuzumab emtansine) respectively, to a total of 14 EAPs. Emicizumab was not included in our analysis since only one patient was treated within the EAP. Overall, twenty EAPs involving twelve products were included in our analysis.

The two databases had similar structure; BMS data were based on the physician requesting the drug, and each string of information included: 1) the name of the physician, 2) the clinical center and 3) the number of patients enrolled in that center.

Roche data were based on the center requesting the drug, and included: 1) the clinical center, 2) the region where the center is located and 3) the number of patients enrolled in that center. Our analysis did not include the physicians.

Twenty-one regions were considered in our analysis, according to the approach used by AIFA, which takes separate the "autonomous provinces" of Bolzano and Trento (actually belonging to the same region, Trentino-Alto Adige) [6]. For each of the 343 prescribing centers, the total number of dispensed CDUs was calculated. The centers were grouped per region and ordered per number of CDUs managed. All statistics used in the study were descriptive.

The number of centers dispensing CDUs in each region are reported from the region with the higher number of dispensing centers downward. Two cutoff thresholds were set at 75% and 90%, respectively.

RESULTS

Compared to our previous report, which showed 348 centers dispensing CDUs in Italy in the study period [5], in the present re-analysis we found 343 dispensing centers. Careful single-center analysis carried out here let emerge that a number of centers were counted twice in the previous study, accounting for the discrepancy. Likewise, here we counted a slightly lower number of patients (7508 *vs* the previous 7529). Such 0.28% difference can be considered an acceptable margin of error.

Starting from the region with the higher number of dispensing center, we found that in Lombardy 13 and 23 centers out of 54 account for 75.59% and 90.17% of the CDUs, respectively. In Lazio, 7 and 12 centers out of 32 account for 76.11% and 90.42% of the CDUs, respectively. In Piedmont, 7 and 15 centers out of 32 account for 76.35% and 90.40% of the CDUs, respectively. In Tuscany, 8 and 14 centers out of 31 account for 76.02% and 90.88% of the CDUs, respectively. In Veneto, 7 and 12 centers out of 28 account for 73.65% and 90.14% of the CDUs, respectively. In Sicily, 8 and 13 centers out of 26 account for 73.82% and 90.34% of the CDUs, respectively. In Emilia-Romagna, 7 and 10 centers out of 23 account for 77.84% and 91.82% of the CDUs, respectively. In Puglia, 6 and 11 centers out of 20 account for 76.98% and 91.09% of the CDUs, respectively. In Campania, 4 and 7 centers out of 16 account for 71.95% and 91.10% of the CDUs, respectively. In Marche, 4 and 8 centers out of 13 account for 71.42% and 91.73% of the CDUs, respectively. In Liguria, 1 and 4 centers out of 11 account for 75.26% and 90.94% of the CDUs, respectively. In Abruzzo, 3 and 4 centers out of 11 account for 76.30% and 92.59% of the CDUs, respectively. In Sardinia, 4 and 5 centers out of 9 account for 78.30% and 88.16% of the CDUs, respectively. In Calabria, 4 and 5 centers out of 9 account for 80.00% and 90.59% of the CDUs, respectively. In Friuli Venezia Giulia, 2 and 3 centers out of 8 account for 70.59% and 89.84% of the CDUs, respectively. In Umbria, 1 and 2 centers out of 6 account for 69.86% and 96.17% of the CDUs, respectively. In the autonomous province of Bolzano, 2 centers out of 5 account for 90.90% of the CDUs. In the autonomous province of Trento, 1 center out of 2 account for 96.87% of the CDUs. In Basilicata, 2 and 3 centers out of 3 account for 71.86% and 100.00% of the CDUs, respectively. In Molise, 1 center out of 3 account for 87.50% of the CDUs. In Valle d'Aosta, there is a single center dispensing CDUs.

Detailed data of dispensing center in each region are reported as *Supplementary Material* available online. In these supplementary tables, the centers accounting for about 75% of the CDUs are highlighted in green; additional centers, accounting for up to 90% of the CDUs are highlighted in pale blue.

Table 1 summarizes the data for the whole country. Overall, 93 centers out of 343 (i.e., 27.11% of the total) account for about 75% (74.82%±2.9%) of CDUs dispensed in Italy, whereas 156 centers out of 343 (i.e., 45.48% of the total) account for about 90% (91.14%±2.2%) of CDUs dispensed in Italy.

DISCUSSION

In this study we have demonstrated that, despite a good diffusion of CDUs in all Italian regions (with a number of centers involved and patients treated in each region broadly proportional to the inhabitants of the region) [5], the handling of CDUs is restricted to a relatively low number of dispensing centers in each region. In fact, about 75% of all CDUs were managed by less than 30% of the centers, and about 90% of all CDUs were managed by less than 50% of the centers throughout the country. In 6 regions out of 20 (i.e., 30% of total), namely Valle d'Aosta, Liguria, Umbria, Lazio, Molise and Campania, the centers accounting for 75% of dispensed CDUs were concentrated in a single town; this fact has a special relevance for those regions with large

Table 1
Centers accounting for the majority (about 75% in column 3, and about 90% in column 4 from the left) of CDUs dispensed in each Region

Region	N. of Centers	N. of Centers accounting for ≈75% of CDUs	N. of Centers accounting for ≈90% of CDUs
Lombardy	54	13	23
Lazio	32	7	13
Piedmont	32	7	15
Tuscany	31	8	14
Veneto	28	7	12
Sicily	26	8	13
Emilia-Romagna	23	7	10
Puglia	20	6	11
Campania	16	4	7
Marche	13	4	8
Liguria	11	1	4
Abruzzo	11	3	4
Sardegna	9	4	5
Calabria	9	4	5
Friuli Venezia Giulia	8	2	3
Umbria	6	1	2
Autonomous province of Bolzano	5	2	2
Basilicata	3	2	1
Molise	3	1	3
Autonomous province of Trento	2	1	1
Valle d'Aosta	1	1	1
Total	**343**	**93** (27.11%)	**156** (45.48%)

CDU: compassionate drug use.

populations, i.e., Lazio and Campania, whose major centers are all located in Rome and Naples, respectively.

These findings are somewhat expected, reflecting the hub-and-spoke organizational model of the National Health System (NHS). Consistent with this concept is the fact that 40 out of the 93 centers dispensing 75% of all CDUs are academic hospitals and 20 out of 93 centers are research hospitals (IRCCS), with 8 centers being both academic hospitals and IRCCS.

Which are the drawbacks of this situation? One obvious consideration is that, since CDUs have been defined as an important manner to provide critical patients with innovative treatments, some inequity exists on this regard between the patients living near the major CDUs dispensing centers and those living in less served areas. Again, this condition can be conveyed within the general hub-and-spoke organization model of NHS.

Acknowledgements
We are grateful to Cosimo Paga for providing data from Bristol Myers Squibb (BMS). We kindly acknowledge Federico Pantellini and Claudia Arosio for full assistance in the procedure for obtaining Roche data.

Funding
This work received no financial support.

Ethics approval
Ethical approval was not required for this study.

Authors' contributions
DP analyzed the data and critically reviewed the manuscript. MEB analyzed the data. PN conceived the study, supervised data analysis and drafted the manuscript.

Conflicts of interest statement
The Authors declare no conflict of interest.

Received on 21 November 2023.
Accepted on 1 March 2024.

REFERENCES

1. Watson TA. Global perspective on compassionate use and expanded access. Ther Innov Regul Sci. 2017;51:143-5. doi: 10.1177/2168479017694848
2. Tarantola A, Otto MH, Armeni P, Costa F, Malandrini F, Jommi C. Early access programs for medicines: comparative analysis among France, Italy, Spain and UK and fo-

cus on the Italian case. J Pharm Policy Pract. 2023;16:67. doi: 10.1186/s40545-023-00570-z

3. European Medicines Agency. Guideline on compassionate use of medicinal products, pursuant to article 83 of Regulation (EC) n. 726/2004. Amsterdam: EMA; 2006. Available from: https://www.ema.europa.eu/en/documents/regulatory-procedural-guideline/guideline-compassionate-use-medicinal-products-pursuant-article-83-regulation-ec-no-726/2004_en.pdf.
4. Pilunni D, Daloisio V, Campopiano R, Pani M, Navarra P. Compassionate drug uses and saving for the national health system: The case study of Fondazione Policlinico Gemelli. Eur Rev Med Pharmacol Sci. 2021;25:6365-77. doi: 10.26355/eurrev_202110_27010
5. Pilunni D, Navarra P. Compassionate drug uses in Italy. Analysis of regional and local diffusion. Ann Ist Super Sanità. 2023;59:43-50. doi: 10.4415/ANN_23_01_07
6. Agenzia Italiana del Farmaco. Osservatorio Nazionale sull'impiego dei Medicinali. L'uso dei farmaci in Italia. Roma: AIFA; 2023. Available from: https://www.aifa.gov.it/uso-dei-farmaci-in-italia.

Ann Ist Super Sanità 2024 | Vol. 60, No. 2: 111-117
DOI: 10.4415/ANN_24_02_05

Driving under the influence of alcohol and alcohol use disorder: the relevance of early identification from an Italian retrospective outpatient study

Fabio Caputo[1*], Lisa Lungaro[2*], Giorgia Palamara[2], Raimondo Maria Pavarin[3], Samantha Sanchini[4], Anna Costanzini[2], Giacomo Caio[2], Roberto De Giorgio[2], Gianni Testino[5] and Emanuele Scafato[6]

[1]*Centro Universitario per lo Studio ed il Trattamento delle Patologie Alcol-Correlate, Dipartimento di Medicina Traslazionale e per la Romagna, Università di Ferrara, Ferrara, Italy*
[2]*Dipartimento di Medicina Traslazionale e per la Romagna, Università di Ferrara, Ferrara, Italy*
[3]*Open Group, Bologna, Bologna, Italy*
[4]*ASL Pesaro (Pesaro e Urbino), Pesaro, Italy*
[5]*Struttura Complessa Patologie delle Dipendenze ed Epatologia Alcol correlata, ASL3 c/o Ospedale Policlinico San Martino, Genoa, Italy*
[6]*Osservatorio Nazionale Alcol, Centro Nazionale Dipendenze e Doping, Istituto Superiore di Sanità, Rome, Italy*
**Shared first co-authorship*

Abstract

Introduction. Worldwide, almost 1.2 million people drive under the influence of alcohol. However, early identification of alcohol use disorder (AUD) in subjects driving under the influence (DUI) of alcohol is seldom achieved.

Aim. The aim of our retrospective study is to investigate the presence of AUD in a population of DUI subjects who had their driving license suspended, and if they were following a specific rehabilitation program.

Methods and results. 750 subjects were retrospectively enrolled from 2018 to 2021. DSM-V to assess AUD was used. Forty-eight (6.4%) subjects presented a diagnosis of AUD, after one month they showed a statistically significant reduction of carbohydrate-deficient transferrin (CDT) ($p<0.0001$); however, none were following a program for the treatment of AUD.

Conclusions. This outpatient setting may be considered a place of primary and secondary prevention where DUI subjects with a diagnosis of AUD may be entrusted to a Centre in order to follow rehabilitation treatment.

Key words
- drinking
- driving
- alcohol use disorder
- early diagnosis
- outpatient's setting

INTRODUCTION

Alcohol consumption is a major public health risk, and accounts for 5.9% of all deaths (7.6% of deaths in men and 4% of deaths in women) and 5.1% of all global diseases; it is responsible for over 200 diseases and 14 different types of cancer involving every medical discipline [1]. Worldwide, the diagnosis of alcohol use disorder (AUD) ranges between 3% and 15% [1-3]. However, only 30% of patients affected by AUD attending a medical setting are clearly diagnosed [1, 2] and less than 10% of subjects with AUD are treated in specific Centers for Alcohol Addiction [1, 2]. One reason for this underestimation is the fact that subjects with AUD tend to be in denial, often not considering their drinking habit a problem that needs to be resolved, and rarely asking practitioners or specialists for help.

In addition to the purely medical consequences, alcohol also has very serious consequences at the social level with episodes of violence, domestic and otherwise, and reckless conduct in the workplace or while driving. Road accidents due to drunk driving are one of the areas of greatest concern, given the often-fatal consequences. In Europe in 2018 alcohol consumption

Address for correspondence: Fabio Caputo, Centro per lo Studio e il Trattamento delle Patologie Alcol-Correlate, Dipartimento di Medicina Traslazionale e per la Romagna, Università di Ferrara, Via Luigi Borsari 46, 44121 Ferrara, Italy. E-mail: fabio.caputo@unife.it.

was responsible for 25% of deaths due to traffic accidents [1], and in 2019 almost 1.2 million people drove under the influence of alcohol, with 10% of all traffic deaths related to alcohol use [4]. Moreover, in Italy in 2022, almost 10% of crashes were related to alcohol consumption [5]. Therefore, despite the serious consequences driving under the influence (DUI) of alcohol is a widespread phenomenon. As a consequence, driving licenses are often suspended in DUI subjects and every country has specific protocols for the termination of this suspension for subjects failing breathalyzer or involved in road accidents.

Several studies [6-10] have investigated the use of alcohol in social contexts outside medical settings (i.e., workplaces or drivers involved in traffic accidents). However, early identification of AUD in drivers who have had their driving license suspended after exceeding the legal limit of alcohol use is seldom achieved [11-13]. In particular, previously we investigated the presence of harmful drinking in a population of subjects who had their driving license suspended due to DUI [11]. Therefore, the aim of our retrospective study is to investigate the presence of AUD in a population of DUI subjects, and if they were following a specific rehabilitation program.

MATERIALS AND METHODS

750 subjects were retrospectively enrolled from 2018 to 2021 at the University Center for the Study and Treatment of Alcohol-Related Diseases located in the Department of Internal Medicine in the SS. Annunziata Hospital of Cento (Ferrara, Italy). All subjects had been stopped at a checkpoint by the Traffic Police while driving, and their driving license withdrawn after breathalyzer showing they were over the legal limit for alcohol of 0.5 mg/dl. Following withdrawal of the driving license, subjects reported the Local Medical Commission for Driving Licenses (LMCDL) to see if they could once again be allowed [11]. When the LMCDL found some critical issues – evidence of alcohol-related diseases, alteration of the laboratory tests of alcohol misuse, high breath ethylometer level >1.5 g/l (under Italian law this is the limit above which the driver's vehicle is impounded), recidivism, DUI causing an accident, newly licensed individuals – it required further investigation to be carried out [11]. All 750 subjects in our study were checked into our Centre for a medical examination by an expert in alcohol-related problems.

During the examination, to identify problems related to the use of alcohol, a detailed medical history was taken together with blood chemistry analyses in relation to laboratory parameters of alcohol misuse: gamma-glutamyl-transpeptidase (GGT; normal value: 5-55 UI/L); aspartate aminotransferase (AST) (normal value: 5-50 UI/L), alanine aminotransferase (ALT) (normal value: 5-59 UI/L), and mean cellular volume (MCV) (normal value: 88-99 fL), carbohydrate-deficient transferrin (CDT) [2]. Scores for the administration of the alcohol use disorder identification test (AUDIT) [14] were also recorded, and DSM-V [15] was used to assess a diagnosis of AUD. Moreover, the amount of alcohol intake in the 4 weeks before suspension of the driving license was recorded, expressed in units of alcohol (1 unit=10-12 g of pure alcohol which corresponds to 125 ml of wine, 330 ml of beer, or 40 ml of spirits) [1] per day or per occasion. All subjects attended a brief intervention consisting of counseling for 5-10 minutes aimed at educating the subjects about problematic drinking, increasing motivation to change behavior, and reinforcing skills to address problematic drinking [16, 17]. Specifically this included: a) do not drink before driving or during work; b) if you decide to drink, do it moderately (not more than 2 units of alcohol per day, and not more than 4 units per occasion for men; no more than 1 unit a day, and no more than 3 units per occasion for women) [18]; c) do not drink alcohol on an empty stomach, do not use alcohol during pregnancy, and do not use alcohol if you are in chronic pharmacological therapy. From the 750 subjects investigated, we then selected those with a diagnosis of AUD, planning a further examination one month later.

The following study is approved by the Ethics Committee (number: 704/2020/Oss/AUSLFe).

Statistical analysis

Results are expressed as mean ± standard deviation. The analysis included continuous variables (age, average number of cigarettes per day, average daily and occasional alcohol consumption, average AUDIT score, blood alcohol level, average values of laboratory data), category variables (occupation, smoking, road accidents, recidivism, diagnosis of AUD, and in care in centre for addiction treatment) between males and females and the difference in the laboratory parameters of alcohol misuse between the first and the second examination in AUD patients with student's T and chi-square tests. A $p<0.05$ was considered significant. Data analyses were conducted using STATA 15.1 statistical software.

RESULTS

The total sample consists of 750 subjects, 61 (8.1%) females and 689 (91.9%) males: the characteristics of DUI subjects are shown in *Table 1*. The mean age of the entire group was 39.2±10.8 years. Stratification of subjects according to the various age groups shows that the most were between 30 and 49 years old. Regarding employment, a statistically significant difference emerges between males and females (88.4% *vs* 72.1%: $p<0.0001$). In addition, 73.9% were smokers and a statistically significant difference in mean daily use of cigarettes between males and females was found (17.2±9 *vs* 14.3±7: $p<0.03$). Mean and occasional use of alcohol consumption and AUDIT score did not differ between males and females. Furthermore, even though not statistically significant between males and females, almost 50% of subjects showing a breath ethylometer level of >1.5 g/l. One hundred seventeen (15.6%) subjects were involved in road crashes, and 174 (23.2%) had already had their license suspended for DUI (recidivism).

Subsequently, out of the whole sample we identified 702 (93.6%) subjects without a diagnosis of AUD;

Table 1
Characteristics of the whole sample, and gender differences

		Whole sample	Females	Males	p
Subjects	N subjects (%)	750 (100)	61 (8.1)	689 (91.9)	
Age	Mean age (mean±SD)	39.2±10.8	37.7±10.5	39.3±10.9	0.249
	<30 years	158 (21.1)	17 (27.9)	141 (20.5)	0.498
	30/39	251 (33.5)	17 (27.9)	234 (34.0)	
	40/49	207 (27.6)	18 (29.5)	189 (27.4)	
	50/59	100 (13.3)	7 (11.5)	93 (13.5)	
	>=60	31 (4.1)	1 (1.6)	30 (4.4)	
Employment	Yes	653 (87.1)	44 (72.1)	609 (88.4)	<0.0001
	No	93 (12.4)	17 (27.9)	76 (11.0)	
Smoking	Yes	554 (73.9)	48 (78.7)	506 (73.4)	0.371
	No	196 (26.1)	13 (21.3)	183 (26.6)	
N of cigarettes	Mean daily use (mean±SD)	16.9±8.9	14.3±7	17.2±9	0.033
≥10 cigarettes per day	N subjects	476 (63.5)	38 (62.3)	438 (63.6)	0.843
Units of alcohol (grams)	N of subjects and mean daily use (mean±SD)	212 (28.3) 2.3±1.1	13 (21.3) 1.8±0.7	199 (28.9) 2.4±1.1	0.660 0.105
	N of subjects and mean occasional use (mean±SD)	489 (65.2) 2.2±0.7	43 (70.5) 2±0.5	446 (64.7) 2.2±0.7	0.365 0.119
Binge drinkers	N of subjects (%)	4 (0.5)	0 (0)	4 (0.6)	-
AUDIT score	N of subjects (%)				
	<8 points	657 (87.6)	57 (93.4)	600 (87.1)	0.174
	8-13 points	50 (6.7)	1 (1.6)	49 (7.1)	
	>13 points	8 (1.1)	0 (0)	8 (1.2)	
Breath ethylometer value	Mean age (mean±SD)	1.69±0.61	1.73±0.56	1.69±0.62	0.686
	N subjects (%)	519 (69.2)	45 (73.8)	474 (68.8)	
	<1.5 g/l	164 (21.9)	13 (21.3)	151 (21.9)	0.682
	≥1.5 g/l	355 (47.3)	32 (52.5)	323 (46.9)	
Traffic crashes	Yes	117 (15.6)	14 (23.0)	103 (14.9)	0.099
	No	633 (84.4)	47 (77.0)	586 (85.1)	
Recidivism	Yes	174 (23.2)	9 (14.8)	165 (23.9)	0.103
	No	576 (76.8)	52 (85.2)	524 (76.1)	

N: number; SD: standard deviation; AUDIT: alcohol use disorder identification test.

with our certification they returned to the LMCDL for the final decision on their license. Forty-eight (6.4%) subjects were diagnosed with AUD (*Table 2*) and were asked to undergo a second medical examination one month later, with the results of the new laboratory parameters for alcohol misuse. After one month a trend in the reduction of laboratory parameters, for AUDIT and alcohol consumption was observed, and a statistically significant reduction of CDT parameters was found (2.02±0.98 *vs* 1.41±0.51: p<0.0001) (*Table 3*). Moreover, some interesting results emerged (*Table 2*): the 48 subjects with AUD were middle-aged men, 12.5% were recidivist, heavy smokers, and 33.3% had a breath ethylometer level of >1.5 g/dl. None were following a treatment program, so that the final certification for the LMCDL recommended a treatment in a Centre for detoxification and a rehabilitation program for the treatment of AUD. No comparison was made between the AUD group and the remaining subjects or between males and females in the AUD group due to the low number of patients and women.

DISCUSSION

This study shows that 6.4% of DUI subjects were affected by AUD, and none were undergoing treatment for alcohol-related problems. Most were males, with

Table 2
Characteristic of patients with alcohol use disorder (AUD)

Subjects	N subjects (%)	48 (6.4)
	Males	40 (83.3)
Age	Mean age (mean±SD)	46.2±11.5
	<30 years	2 (4.2)
	30/39	12 (25.0)
	40/49	13 (27.1)
	50/59	16 (33.3)
	>=60	5 (10.4)
Employment	Yes	41 (85.4)
	No	7 (14.6)
Traffic crashes	Yes	9 (18.8)
	No	39 (81.3)
Recidivism	Yes	6 (12.5)
	No	42 (87.5)
Following a rehabilitation treatment for AUD	Yes	0 (0)
	No	48 (100)
Smoking	Yes	36 (75.0)
	No	12 (25.0)
N of cigarettes	Mean daily use (mean±SD)	23.8±10.1
≥10 cigarettes per day	N subjects	35 (72.9)
Units of alcohol (grams)	N of subjects and mean daily use	21 (43.8)
	(mean±SD)	2.8±1.1
	N of subjects and mean occasional use	23 (47.9)
	(mean±SD)	2.7±1.4
Binge drinkers	N of subjects (%)	2 (4.2)
Bretah ethylometer value	Mean (mean±SD)	1.8±0.8
	N subjects (%)	24 (50.0)
	<1.5 g/l	8 (16.7)
	≥1.5 g/l	16 (33.3)
AUDIT score	N of subjects (%)	46 (95.8)
	<8 points	29 (60.4)
	8-13 points	14 (29.2)
	>13 points	3 (6.3)

N: number; SD: standard deviation; AUDIT: alcohol use disorder identification test.

Table 3
Difference between medical check 0 and medical check 1 (after one month) in the AUDIT score, laboratory markers of alcohol intake, and mean daily drinking of subjects diagnosed with alcohol use disorder (AUD)

	Medical check 0	**Medical check 1**	
	Mean±SD	**Mean±SD**	**p**
AUDIT score	7.04±6.69	5.18±3.53	0.067
AST (UI/L)	34.21±21.88	33.52±47.38	0.464
GGT (UI/L)	86.29±104.20	71.47±72.67	0.212
MCV (fl)	87.63±13.14	88.84±8.04	0.704
CDT (%)	2.02±0.98	1.41±0.51	0.000
Units of alcohol (units/day)	2.81±1.10	2.28±0.93	0.057

SD: standard deviation; AUDIT: alcohol use disorder identification test; AST: aspartate aminotransferase; GGT: gamma-glutamyl-transpeptidase; MCV: mean cellular volume; CDT: carbohydrate-deficient transferrin.

the largest percentage in the 50-59-year-old range, employed, heavy smokers and with high occasional and daily use of alcohol. Many subjects had breath ethylometer level of >1.5 g/l.

The data for the diagnosis of AUD in DUI subjects are higher than in our previous study where 1.7% of DUI subjects were diagnosed with AUD [11]. However, in our previous paper DSM-V was not used and, it is likely that 4.1% of subjects considered harmful drinkers may have had a mild or moderate DSM-V diagnosis; if so, the number of DUI subjects with AUD was similar in the two studies. DSM-V is suitable in this context since it has been shown to be the most accurate tool for the diagnosis of AUD in DUI subjects [19].

Generally males drink more than women as shown in the literature, although recently there has been an increase in the numbers of females [5]. The correlation between the use of alcohol and smoking is well-known and, in this regard, as is the synergism of the two factors in determining a state of disease [20, 21]. Close to 50% of subjects declare that they use alcohol daily and the other half occasionally. Regarding daily use, risky consumption exceeds [1]: 2 units per day for men and 1 unit per day for women.

Furthermore, a worrying percentage of subject (12%) with DUI and AUD experience episodes of recidivism demonstrating that more has to be done since the risk of consuming alcohol before driving continued to be underestimated. In addition, 33% of subjects showed a level of breath ethylometer of >1.5 g/l. This is a lower percentage than in another Italian study carried out some years ago, where 50% of positive samples showed BAC concentrations above 1.5 g/L [12]. This confirms the efficacy of prevention strategies are although a lot of work remains to be done.

Regarding the AUDIT for patients with AUD, 60% had a normal score (<8 points). This may seem strange, since laboratory markers exceed normal values, but reflects the fact that subjects completing the questionnaire tried to mask their drinking habits. Indeed, it is worth noting that AUDIT is a self-administered questionnaire and the participant can deny or minimize habitual alcohol consumption, consequently we were cautious about the scores. The AUDIT questionnaire alone should not be considered an adequate tool for detection of AUD and needs to be combined with a clinical evaluation, DSM-V, and the results of blood markers for alcohol misuse. On the other hand, during the second examination a trend in the reduction of the AUDIT scores and for laboratory markers of alcohol use, particularly for CDT, was recorded. This indicates a change in the subject's previous consumption habits. It is not surprising to note that considering the very short half-life of CDT (10-12 days) compared all the other parameters (2-3 weeks for GGT and AST, and 2-3 months for MCV) [2, 22, 23], the values of CDT were significantly lower indicating complete alcohol abstinence or a substantial decrease in consumption. This result is likely related to the effect of counselling, but the lack of a control group may limit the scientific validity of this assertion. These results are in line with our previous study [11] since in subjects with harmful drinking an improvement of alcohol habits in the short-term period was found, as demonstrated by the significant reduction in the laboratory markers of alcohol misuse.

From the overall analysis of the entire sample, the majority of patients are male, mostly aged between 30 and 39, in employment with a higher percentage for men, and heavy smokers. This is in line with our previous experience [11] where harmful drinkers were heavy smokers. Breath ethylometer level has a worrying average value (1.69±0.61), with 47.9% at the level of ≥1.5 g/l; women recorded the highest values. This is worth focusing on; the same amount of alcohol produces more harmful effects for women who have a less efficient enzymatic set for metabolizing alcohol [24]. Another relevant finding concerns recidivism, present in 23% of the sample.

Our study has some limitations. First, subjects had their driving licenses withdrawn, a measure that is indispensable to maintain their autonomy. This involves a bias due to the strong motivation to change drinking habits in order to return to driving; this may explain the reduction of laboratory markers and AUDIT in AUD patients. Second, our study lacks a control group to compare with AUD patients and this may have shown the efficacy of our counselling intervention during the first examination. Third, our study cannot be compared with worldwide studies since the legal consumption limit in the US and other European countries is different from Italy.

CONCLUSIONS

To sum up, the number of DUI subjects with AUD in this context was high and not specialist Centre for the treatment of alcohol addiction was involved. This is in line with the literature since only <10% of patients in Italy are treated for AUD [5]. Thus, this outpatient setting may be considered a place of primary and secondary prevention where a brief intervention may be undergone by all DUI subjects with or without a diagnosis of AUD. Those diagnosed with AUD may be entrusted to a centre and follow a rehabilitation program. As already demonstrated both in the European Union [6, 25] and in Anglo-Saxon countries [9, 10, 26-28], prevention policies have been efficient in reducing the risk of traffic accidents and deaths associated with alcohol use.

This approach needs to be continued in order to fill the gap in the treatment of the serious problem of AUD. In particular, a monitoring program involving a network of professionals (policy makers, lawyers, police, experts in forensic medicine, and experts in the diagnosis and treatment of AUD) for the detection, and treatment of subjects with AUD could be set up [29]. Controlled studies to investigate AUD and the efficacy of brief intervention with a population of DUI subjects with AUD are warranted.

Authors' contributions

The Authors confirm their contribution to the paper as follows: study conception and design: FC, GP; papers collection: FC, GP, LL, AC, GC, RDG, GT, ES;

analysis and interpretation of results: RMP, SS, FC, GP, LL. All Authors reviewed the results and approved the final version of the manuscript. All Authors approved the final manuscript.

Conflict of interest statement

Authors declare no conflict of interest.

Received on 31 January 2024.
Accepted on 12 March 2024.

REFERENCES

1. WHO Team Alcohol, Drugs and Addictive. Global status report on alcohol and health 2018. Geveva: World Health Organization; 2018.
2. Carvalho AF, Heilig M, Perez A, Probst C, Rehm J. Alcohol use disorders. Lancet. 2019;394(10200):781-92. doi: 10.1016/S0140-6736(19)31775-1
3. Grant BF, Goldstein RB, Saha TD, et al. Epidemiology of DSM-5 alcohol use disorder: Results from the National Epidemiologic Survey on Alcohol and Related Conditions III. JAMA Psychiatry. 2015;72(8):757-66. doi: 10.1001/jamapsychiatry.2015.0584
4. World Health Organization. Global status report on road safety 2023. Geneva: WHO; 2023.
5. Ministero della Salute. Relazione del Ministro della Salute al Parlamento sugli interventi realizzati ai sensi della legge 30.3.2001 n. 125 in materia di alcol e problemi alcol correlati: anno 2022.
6. Allamani A, Voller F, Pepe P, Baccini M, Massini G, Cipriani F. Italy between drinking culture and control policies for alcoholic beverages. Subst Use Misuse. 2014;49(12):1646-64. doi: 10.3109/10826084.2014.913386
7. Fell JC, Voas RB. The effectiveness of a 0.05 blood alcohol concentration (BAC) limit for driving in the United States. Addiction. 2014;109(6):869-74. doi: 10.1111/add.12365
8. Christophersen AS, Mørland J, Stewart K, Gjerde H. International trends in alcohol and drug use among vehicle drivers. Forensic Sci Rev. 2016;28(1):37-66.
9. Scherer M, Fell JC. Effectiveness of lowering the blood alcohol concentration (BAC) limit for driving from 0.10 to 0.08 grams per deciliter in the United States. Traffic Inj Prev. 2019;20(1):1-8. doi: 10.1080/15389588.2018.1508836
10. Rehm J, Manthey J, Lange S, et al. Alcohol control policy and changes in alcohol-related traffic harm. Addiction. 2020;115(4):655-65. doi: 10.1111/add.14796
11. Caputo F, Pavarin RM, Lungaro L, et al. Identification of harmful drinking in subjects who have had their driving license suspended due to alcohol use: A retrospective Italian study. Eur Rev Med Pharmacol Sci. 2020;24(20):10720-8. doi: 10.26355/eurrev_202010_23432
12. Leporati M, Salvo RA, Pirro V, Salomone A. Driving under the influence of alcohol. A 5-year overview in Piedmont, Italy. J Forensic Leg Med. 2015;34:104-8. doi: 10.1016/j.jflm.2015.05.017
13. Roberts W, Moore KE, Pittman BP, Fillmore MT, McKee SA. High risk of alcohol-impaired driving in adults with comorbid alcohol and substance use disorders in the US population. J Stud Alcohol Drugs. 2019;80(1):114-9. doi: 10.15288/jsad.2019.80.114
14. Saunders JB, Aasland OG, Babor TF, de la Fuente JR, Grant M. Development of the alcohol use disorders identification test (AUDIT): WHO Collaborative Project on Early Detection of Persons with Harmful Alcohol Consumption--II. Addiction. 1993;88(6):791-804. doi: 10.1111/j.1360-0443.1993.tb02093.x
15. American Psychiatric Association. Diagnostic and statistical manual of mental disorders. Fifth edition. Washington, DC: American Psychiatric Publishing; 2013.
16. Fleming MF, Manwell LB, Barry KL, Adams W, Stauffacher EA. Brief physician advice for alcohol problems in older adults: A randomized community-based trial. J Fam Pract. 1999;48(5):378-84.
17. Whitlock EP, Polen MR, Green CA, Orleans T, Klein J. Behavioral counseling interventions in primary care to reduce risky/harmful alcohol use by adults: A summary of the evidence for the US Preventive Services Task Force. Ann Intern Med. 2004;140(7):557-68. doi: 10.7326/0003-4819-140-7-200404060-00017
18. World Health Organization (WHO). International classification of diseases (ICD) 11th revision. The global standard for diagnostic health information 2018. Geneva: WHO; 2018.
19. McCutcheon VV, Agrawal A, Heath AC, et al. Functioning of alcohol use disorder criteria among men and women with arrests for driving under the influence of alcohol. Alcohol Clin Exp Res. 2011;35(11):1985-93. doi: 10.1111/j.1530-0277.2011.01550.x
20. Falk DE, Yi HY, Hiller-Sturmhöfel S. An epidemiologic analysis of co-occurring alcohol and tobacco use and disorders: Findings from the National Epidemiologic Survey on Alcohol and Related Conditions. Alcohol Res Health. 2006;29(3):162-71.
21. Gapstur SM, Bouvard V, Nethan ST, et al. The IARC perspective on alcohol reduction or cessation and cancer risk. N Engl J Med. 2023;389(26):2486-94. doi: 10.1056/NEJMsr2306723
22. Helander A, Carlsson AV, Borg S. Longitudinal comparison of carbohydrate-deficient transferrin and gamma-glutamyl transferase: Complementary markers of excessive alcohol consumption. Alcohol Alcohol. 1996;31(1):101-7. doi: 10.1093/oxfordjournals.alcalc.a008106
23. Gough G, Heathers L, Puckett D, et al. The utility of commonly used laboratory tests to screen for excessive alcohol use in clinical practice. Alcohol Clin Exp Res. 2015;39(8):1493-500. doi: 10.1111/acer.12780
24. Baraona E, Abittan CS, Dohmen K, et al. Gender differences in pharmacokinetics of alcohol. Alcohol Clin Exp Res. 2001;25(4):502-7.
25. Novoa AM, Pérez K, Santamariña-Rubio E, et al. Impact of the penalty points system on road traffic injuries in Spain: A time-series study. Am J Public Health. 2010;100(11):2220-7.
26. Morrison CN, Kwizera M, Chen Q, Puljevic C, Branas CC, Wiebe DJ, Peek-Asa C, McGavin KM, Franssen SJ, Le VK, Keating M, Ferris J. The geography of sobriety checkpoints and alcohol-impaired driving. Addiction. 2022;117(5):1450-7.
27. Mun EY, Li X, Lineberry S, Tan Z, Huh D, Walters ST, Zhou Z, Larimer ME; in collaboration with Project INTEGRATE Team. Do brief alcohol interventions reduce driving after drinking among college students? A two-step meta-analysis of individual participant data. Alcohol Alcohol. 2022;57(1):125-35.
28. Lenk KM, Erickson DJ, Joshi S, Calvert C, Nelson TF, Toomey TL. An examination of how alcohol enforcement

strategies by sheriff and police agencies are associated with alcohol-impaired-driving fatal traffic crashes. Traffic Inj Prev. 2021;22(6):419-24.
29. Scholz N, Lenk KM, Erickson DJ, Toomey TL, Jones-Webb R, Nelson TF. Alcohol-impaired driving enforcement priorities and strategies in a nationwide sample of US law enforcement agencies. Traffic Inj Prev. 2023;24(1):1-6.

Ann Ist Super Sanità 2024 | Vol. 60, No. 2: 118-125
DOI: 10.4415/ANN_24_02_06

ORIGINAL ARTICLES AND REVIEWS

Mortality in an Italian cohort of former asbestos cement workers

Amerigo Zona[1], Caterina Bruno[1*], Achille Cernigliaro[2], Marco De Santis[1], Salvatore Scondotto[3] and Lucia Fazzo[1]

[1]*Dipartimento Ambiente e Salute, Istituto Superiore di Sanità, Rome, Italy*
[2]*Unità Operativa Complessa di Patologia Clinica, Dipartimento dei Servizi e delle Scienze Radiologiche, Ospedale Sant'Antonio Abate, Azienda Sanitaria Provinciale di Trapani, Trapani, Italy*
[3]*Dipartimento di Medicina e Chirurgia, Università degli Studi Kore, Enna, Italy*
**retired*

Abstract

Background. A pooled study on Italian asbestos cement plant cohorts observed mortality risk for asbestos-related diseases. This study analysed the mortality of workers cohort of an asbestos cement plant in Syracuse, Italy.

Methods. Workers' vital status and causes of death, during 1970-2018, were identified in regional health databases. Standardized mortality ratios (SMRs) by sex and temporal variables were calculated.

Results. Of the 900 cohort's subjects (636 men, 259 women, 5 unknown sex), for 867 the vital ascertainment was possible: 505 died during study period. All-cause mortality is similarly to the expected among men and lower among women. Pleural and lung malignant neoplasms (MN) exceeded in men (SMR=27.1, SMR=1.95), retroperitoneal and peritoneal MN in both sexes, no cases of larynx MN were observed. Mortality excess for ovarian MN (SMR=1.5) and asbestosis in both sexes (men: SMR=431.9, women: SMR=116.6) were found.

Conclusions. Exceeding mortality from asbestos-related diseases, particularly in men was highlighted.

Key words

- asbestos
- occupational exposure
- crocidolite
- mesothelioma
- lung neoplasms

INTRODUCTION

Exposure to asbestos (a group of naturally occurring fibrous minerals) causes malignant neoplasms, as confirmed by the International Agency for Research on Cancer (IARC), in its update on the health effects of asbestos. Asbestos has been recognized as a human carcinogen (Group 1), causing malignant mesothelioma and lung, larynx and ovarian cancers with sufficient evidence. For malignant neoplasms of the pharynx, stomach and colorectum, IARC found limited evidence (Group 2A) [1]. Asbestos exposure also causes asbestosis, a fibrotic disease affecting the lung parenchyma, and benign pleural effusions, pleural plaques, diffuse pleural fibrosis, and rounded atelectasis.

Commercial use of asbestos began in the second half of the 19th century. Modern industry began in Italy and the United Kingdom after 1860, and was augmented by the exploitation of extensive chrysotile asbestos deposits in Quebec, Canada, in the 1880s. Due to its tensile and heat-resistant properties, asbestos has been widely used in a wide range of industries. In 1972, asbestos consumption in the United States was prevalent in the following industries: construction (42%); friction materials, felts, packaging, and gaskets (20%); floor tiles (11%); paper (9%); insulation and textiles (3%); and other uses (15%) [2].

In 1997 worldwide, global consumption began to decline to a stable level of about 2 million tons of asbestos per year [3]. Robust ecological correlations have been demonstrated between the incidence of malignant pleural mesothelioma in a country and the per capita amount of asbestos imported (or consumed) in that country, 40 years earlier, due to the latency period [4]. Italy was a major European producer and importer of raw asbestos until the 1992 ban [5] as part of a restriction on asbestos use in Western Europe and North America.

In Italy, national asbestos consumption gradually increased to 132,358 tons in 1970, peaking at 180,528 tons in 1980, and then declined [6]. The largest use was in asbestos cement production, followed by thermal insulation in ship and rail car construction. The asbestos cement industry used 85 percent of the asbestos produced or imported to European countries [7]. It employed a large number of workers: asbestos cement workers in Italy were estimated at 9,000 in

Address for correspondence: Achille Cernigliaro, Unità Operativa Complessa di Patologia Clinica, Dipartimento dei Servizi e delle Scienze Radiologiche, Ospedale Sant'Antonio Abate, Azienda Sanitaria Provinciale di Trapani, via Cosenza 82, 91016 Erice (Trapani), Italy.
E-mail: cernigliaro.achille@gmail.com.

1979 and 5,000 in 1987, active in a large number of plants [8, 9].

According to the European database on exposure to carcinogens (CAREX), the estimated number of Italian workers exposed to asbestos was 352,691 in 1990-1993; in an update referring to 2000-2003, the number dropped to 76,100 [8].

The most recent report of the Italian mesothelioma registry (Registro nazionale dei mesoteliomi, ReNaM) documented 27,356 incident cases of malignant mesothelioma from 1993-2015, mainly due to occupational exposure; domestic and environmental cases were also reported [10].

A study of the Italian pool of 43 cohorts of asbestos-exposed workers (42 occupational cohorts and one of workers' wives) showed excesses in mortality from asbestos-related diseases [11]. In August 2019, a pooled study of Italian cohorts of workers in asbestos cement companies (12,578 workers, 10,275 men and 2,303 women) observed an increased risk of mortality from asbestos-related diseases: asbestosis and malignant neoplasms of pleura, peritoneum, lung, and ovary [12].

Both studies did not include the Syracuse-Eternit cohort [11, 12], due to the lack of available data at the beginning of the studies. This study analyzed, for the first time, mortality data from the cohort of former asbestos cement workers from the Eternit plant located in the municipality of Syracuse, Italy.

Established in the early 1950s, the Syracuse plant went into full production of asbestos cement products in 1955. It was finally closed in 1991, a year before asbestos was banned in Italy [5]. A detailed description of the production cycle can be found in the *Supplementary Material section available online*.

The cohort was reconstructed using information received in January 2013 from the Turin Public Prosecutor's Office as part of an investigation. On that occasion, the Istituto Superiore di Sanità, ISS (Italian National Institute of Health) had provided the Prosecutor's Office with a technical report with an analysis of mortality for specific diseases, for the period from 1/1/1970 to 12/09/2012, calculating the standardized mortality ratios (SMRs) for all causes, malignant tumours of the trachea, bronchus and lung, pleural, peritoneal, and unspecified mesothelioma, malignant tumours of the ovary, and asbestosis (unpublished data).

To the Authors' knowledge, there has been only one previous study related to this plant, an epidemiological survey presented in 1991 in Siena, Italy, at an international conference [13]. Carried out in 1990 by the Local Health Unit 26 of Syracuse, the study found that among 358 Eternit workers with at least 5 years of employment, the prevalence of asbestosis recognized by the National Institute for Insurance against Accidents at Work (Istituto Nazionale Assicurazione contro gli Infortuni sul Lavoro, INAIL) was 12.29%, with an increasing trend depending on the duration of exposure.

This study aims to assess broadly, and not only for asbestos-related diseases, the mortality of workers employed during the company's years of operation.

This study was carried out within the framework of the "Organic intervention plan in areas at environmental risk in Sicily", promoted by the Sicily Regional Health Department, Italy.

The protocol was submitted and approved by Ethical Review Board of Messina Medicine University, Italy.

MATERIALS AND METHODS

Mortality for a wide spectrum of causes was analysed in a 49 year-period (1/1/1970-31/12/2018). Causes of death were selected consistently with the study of pooled 21 cohorts of asbestos cement workers in Italy [12]. The analyses' restriction from 1970 onwards was related to the availability of reference mortality rates [14].

As the Italian National Institute for Health (ISS) technical consultancy had analysed data up to 12/09/2012, an update was necessary: vital status, and causes of death up to 31/12/2018 were ascertained through a record linkage between workers' identification data and health information routinely collected and coded for administrative purpose (Cause of Death Register, Syracuse Provincial Health, ReNCaM-ASP), operated by the Health Authority of the Sicilian Region - Department for Health Activities and Epidemiological Observatory (DASOE), in charge of these information flows. The regional law n. 2 (08/02/2007), such as the national law of 03/03/2017, established the mortality data collection system for the purpose of health surveillance as a public health tool.

After collection, data were pseudonymized, shared with the ISS, and integrated with dataset already available.

Two expert researchers (AZ, CB) double-blindly coded causes of death according to the International Classification of Disease (ICD), 8th, 9th, and 10th revisions, taking into account the date of death. ICD 10th revision in Italy has been used since 2003.

They discussed the reasons for their choices in case of discrepancies, in order to reach an agreement.

To analyse the data for the entire period, it was necessary to examine the codes of the selected causes in the three revisions of ICD, which were then reported in *Supplementary Material* (*Table S1 available online*). Following this step, a variable with specific values for each cause was created for each row of the table. Considering that before 2003, when the 10th revision ICD came into use in Italy, a specific code for malignant mesotheliomas was not available, the analyses were performed for all malignant neoplasms of pleura, including also malignant pleural mesotheliomas.

To calculate the reference regional mortality rates, we used the ISS mortality database, which is in turn based on the Italian National Institute of Statistics (Istituto Nazionale di Statistica, Istat) population data, stratified by sex, five-year age classes and calendar period.

Statistical analysis

Person-years at risk (PYs) were computed from date of employment or 01/01/1970, which ever was most recent, and stopped at 31/12/2018 (the more recent data available at the beginning of the present investigation)

or date of death, which ever occurred earlier. Time since the first exposure (TSFE) was calculated from the beginning date of first employment.

PYs and standardized mortality ratios (SMRs) for the whole study period were calculated, by sex, five-year age classes (15-19 to 95+), calendar period duration of employment (sum of all working periods) and TSFE; moreover, PYs were computed by age at hiring.

The SMRs, with the corresponding 95% confidence intervals (CIs), were computed under the assumption that the observations were distributed according to a Poisson distribution and the ratios were estimated respect to the regional figures. The data were processed according to the European Union General Data Protection Regulation (https://gdpr-info.eu/) and the analyses were performed using software STATA 11 (StataCorp. *Stata statistical software: release 11*. College Station, TX: StataCorp LP; 2009).

RESULTS

The cohort was constituted of 900 subjects (636 men, 259 women, 5 sex unknown). Vital status ascertainment at 31/12/2018 was possible for 867 subjects (96.3%), among which 505 subjects resulted died (392 men, 113 women). Thirty-three subjects (3.6% of the entire cohort), 29 males and 4 females, were excluded from the analysis, due to the unknown vital status or insufficient information on duration of working activity: ten deceased before 01/01/1970, the beginning of follow-up period, six subjects had the same date of hiring and exit from the industry or only one day of employment; for seventeen we were unable to determine the vital status at the end of the follow-up period.

Finally, the analyses included 867 subjects for which it was possible to calculate, among other things, age at hiring and at the end of follow-up, and TSFE; the analyses by duration of the working activity were performed for 830 ex-workers, for whom this information was available.

The person-years (PYs) for men and women were respectively 22,213.6 and 11,009.4. *Table 1* shows the distribution of PYs at risk, by period- and age-class and by sex (A: men; B: women); *Table 2* reports details on the PYs by TSFE and employment duration.

The causes of death investigated are presented in *Table S1 available online* as *Supplementary Material*: mortality for all causes and for all malignant tumours, for groups and single malignant neoplasms, for benign diseases of apparatuses and systems were explored.

Mortality for all causes did not diverge from the expected among men (*Table 3*) and was lower than the expected among women. Statistically significant excess of mortality for all malignant causes was observed among men, and lower than the expected among women (not statistically significant).

With regard to the asbestos related diseases, malignant tumours of the pleura (proxy for pleural mesothelioma) were in excess in men, and no cases were found among women: 16 cases were observed (SMR 27.06, 95% CI 16.58-44.17), starting from a working duration

Table 1
Person-years at risk, computed from the beginning of follow-up, by calendar period- and age-class, among men (A) and women (B)

(A) MEN

Age-class	Calendar period									
	1970-1974	1975-1979	1980-1984	1985-1986	1990-1994	1995-1999	2000-2004	2005-2009	2010-2014	2015-2018
≤ 15	7.702943	5.281314	0.069815							
20-24	47.6256	40.73169	18.22519	0.069815	4.861054					
25-29	169.3018	87.94798	96.10335	20.68173	19.51266	5.460643				
30-34	365.4572	203.9035	123.0041	108.0452	28.25941	22.03149	5.460643			
35-39	505.6277	377.8056	222.5599	125.3888	108.0452	28.25941	22.03149	5.460643		
40-44	511.4627	508.9836	390.6188	223.9781	125.3888	108.0452	28.25941	22.03149	5.460643	
45-49	399.603	524.9008	512.2444	385.7858	220.0876	125.3888	108.0452	28.25941	22.03149	5.460643
50-54	344.3025	402.3498	524.3854	497.4709	381.4298	215.1834	125.3888	108.0452	28.25941	18.63244
55-59	144.5736	344.9562	403.6988	501.9179	480.3224	378.6468	200.5715	123.3621	106.9172	23.15195
60-64	93.0835	133.5305	330.2464	391.4634	480.4148	466.204	357.373	191.3326	109.5537	88.6167
65-69	46.75565	90.54415	122.2669	315.9357	364.3682	418.6626	430.603	324.23	172.7734	81.77892
70-74	14.6653	43.90418	76.72485	104.4983	287.0062	313.9514	343.7817	370.0048	275.3847	131.9699
75-79	5.988364	7.743326	29.30048	57.64476	70.17728	219.8275	252.9767	286.6715	294.7611	195.1875
80-84		3.982204	2.971937	21.74196	33.94114	44.72964	157.1047	184.1355	226.0253	200.538
85-89			3.982204	0.247091	6.901437	23.57358	23.08624	108.8029	135.6208	109.6653
90-94						1.030801	6.912389	6.92334	42.12115	70.36961
95+									0.952772	21.76249

Continues

Table 1
Continued

	(B) WOMEN									
Age-class	**Calendar period class**									
	1970-1974	**1975-1979**	**1980-1984**	**1985-1986**	**1990-1994**	**1995-1999**	**2000-2004**	**2005-2009**	**2010-2014**	**2015-2018**
≤ 15	1.089665	2.431211								
20-24	9.802875	6.138261	5.728953	3.976044	3.78987					
25-29	58.07803	19.21424	9.71937	6.557837	5.381246	3.78987				
30-34	314.9274	65.07734	23.42779	9.71937	6.557837	5.381246	3.78987			
35-39	373.1472	318.4045	68.73785	23.42779	9.71937	6.557837	5.381246	3.78987		
40-44	242.0698	374.36	316.5229	68.73785	23.42779	9.71937	6.557837	5.381246	3.78987	
45-49	147.3635	242.0698	371.2957	313.9322	68.73785	23.42779	9.71937	6.557837	5.381246	3.78987
50-54	71.13142	146.5654	236.3039	368.1567	313.9322	68.73785	23.42779	9.71937	6.557837	4.203285
55-59	18.24709	68.51335	140.4736	228.7071	358.7625	313.9322	68.73785	23.42779	9.71937	5.493498
60-64	4.100616	16.70773	66.93635	134.7611	218.8522	351.3546	308.9076	68.73785	23.42779	7.681725
65-69		4.100616	16.70773	65.27447	132.0787	214.1253	331.5784	290.4997	68.73785	20.56605
70-74			4.100616	16.70773	56.21013	124.6674	194.1889	302.4983	268.5044	62.32854
75-79				4.100616	14.90486	52.04517	105.2539	169.7385	265.6516	213.5715
80-84					1.002738	4.954141	46.26831	92.72348	134.1198	175.3628
85-89						0.926078	0.748118	35.07461	66.59274	77.08282
90-94									22.18207	40.05818
95+										11.32307

Table 2
Person-years (PYs) distribution by sex, time since the first exposure (TSFE) and duration of employment

Sex	**PYs**
Men	22,213.6
Women	11,009.4
Total	33,222.9
TSFE	
<10	12.2
10-19	125.0
20-29	987.3
30-39	3,447.3
40-49	8,683.0
50-59	9,718.3
≥60	10,249.8
Duration of employment	
<10	20,057.2
10-19	7,798.5
20-29	3,153.1
≥30	2,214.1

lower than 10 years, TSFE from 20-29 years, and age at hiring lower than 20 years (*Table 4*).

Statistically significant excesses for retroperitoneal and peritoneal malignant tumours were found in both sexes (men 2 cases, SMR 4.39, 95% CI 1.10-17.54; women 2 cases, SMR 8.96, 95% CI 2.24-5.82). Cases begin to appear from a working life lower than 10 years, TSFE from 40-49 years, and age at hiring less than 20 years (*Table 4*).

No cases of malignant tumour of the larynx were found in both sexes.

In men, there was a statistically significant excess for lung cancer (40 cases, SMR 1.95, 95% CI 1.43-2.66). For these cases, the minimum values for working duration, TSFE and age at recruitment were less than 10 years, in the 10-19 years class, and less than 20 years, respectively (*Table 4*).

In women there is a higher risk than expected for ovarian malignant tumours (3 cases, SMR 1.48, 95% CI 0.48-4.59), not statistically significant.

Cases of malignant stomach cancer were lower than expected in men and higher in women, both not statistically significant (men 4 cases, SMR 0.65, 95% CI 0.24-1.73; women 4 cases, SMR 1.42, 95% CI 0.53-3.78).

Among men there were a statistically significant excess of malignant neoplasms of the rectum (7 cases, SMR 2.66, 95% CI 1.27-5.59) and a higher risk for malignant neoplasms of colon, not statistically significant (11 cases, SMR 1.40, 95% CI 0.78-2.73). Reduced risks for both malignancies were observed among women, not statistically significant.

Regarding pneumoconiosis, 13 cases were observed, entirely attributable to asbestosis (men 11 cases, SMR 431.92, 95% CI 239.20-779.91; women 2 cases, SMR 116.57, 95% CI 29, 15-466.10) (*Table 3*). Cases began to appear from a working life of less than 10 years, TSFE from 20-29 years, and age at hiring between 20-29 years (*Table 4*).

Table 3
Causes of death, by sex. Observed (OBS) and expected cases (EXP), standardized mortality ratios (SMRs) and their 95% confidence intervals (95% CIs); regional reference population (1970-2018)

	Men			Women		
Cause of death	**OBS**	**EXP**	**SMR (95% CIs)**	**OBS**	**EXP**	**SMR (95% CIs)**
All causes	392	383.87	1.02 (0.92-1.13)	113	181.77	0.62 (0.52-0.75)
Malignant neoplasms (MN)	142	98.10	1.45 (1.23-1.71)	37	49.84	0.74 (0.54-1.02)
MN of the lip, oral cavity, and pharynx	2	1.45	1.38 (0.35-5.52)	0	0.72	
MN digestive organs (peritoneum included)	41	33.21	1.23 (0.91-1.68)	18	16.61	1.08 (0.68-1.72)
MN of the stomach	4	6.14	0.65 (0.24-1.73)	4	2.82	1.42 (0.53-3.78)
MN of the small intestine	0	0.15		0	0.08	
MN of the colon	11	7.85	1.40 (0.78-2.53)	4	4.16	0.96 (0.36-2.56)
MN of the rectum	7	2.63	2.66 (1.27-5.59)	0	1.26	
MN of the liver and intrahepatic bile ducts	10	7.36	1.36 (0.73-2.52)	6	3.60	1.67 (0.75-3.71)
MN of the retroperitoneum and peritoneum	2	0.46	4.39 (1.10-17.54)	2	0.22	8.96 (2.24-35.82)
MN of the respiratory organs	57	22.85	2.50 (1.93-3.24)	0	12.04	
MN of the larynx	0	1.42		0	0.69	
MN of the lungs	40	20.47	1.95 (1.43-2.66)	0	10.86	
MN of the pleura	16	0.59	27.06 (16.58-44.17)	0	0.32	
MN of the uterus				5	1.18	4.24 (1.77-10.19)
MN of the ovaries				3	2.03	1.48 (0.48-4.59)
MN of the prostate	11	6.62	1.66 (0.92-3.00)			
MN of the bladder	8	4.58	1.75 (0.87-3.49)	0	2.31	
MN of the kidney, ureter, and other unspecified urinary organs	6	1.63	3.69 (1.66-8.21)	0	0.90	
MN unspecified sites	6	2.55	2.36 (1.06-5.25)	1	1.33	0.75 (0.11-5.34)
Laeukaemias and lymphomas	8	7.85	1.02 (0.51-2.04)	1	4.09	0.24 (0.03-1.73)
Psychiatric diseases	4	5.45	0.73 (0.28-1.96)	2	2.95	0.68 (0.17-2.71)
Neurological diseases	11	9.46	1.16 (0.64-2.10)	4	5.11	0.78 (0.29-2.09)
Cardiovascular diseases	128	163.63	0.78 (0.66-0.93)	40	73.03	0.55 (0.40-0.75)
Respiratory diseases	33	27.77	1.19 (0.85-1.67)	8	12.75	0.63 (0.31-1.26)
Chronic and obstructive respiratory diseases	17	17.29	0.98 (0.61-1.58)	5	7.93	0.63 (0.26-1.52)
Pneumoconiosis	11	0.46	23.96 (13.27-43.27)	2	0.21	9.39 (2.35-37.55)
Asbestosis	11	0.03	431.92 (239.20-779.91)	2	0.02	116.57 (29.15-466.10)
Digestive diseases	17	17.86	0.95 (0.59-1.53)	5	8.17	0.61 (0.25-1.47)
Genitourinary diseases	11	7.95	1.38 (0.77-2.50)	2	3.80	0.53 (0.13-2.10)
Poorly specified causes	24	8.56	2.81(1.88-4.19)	7	3.72	1.88 (0.90-3.94)
Accident and violence	4	12.76	0.31 (0.12-0.84)	3	6.17	0.49 (0.16-1.51)

Malignant neoplasms of the kidney and unspecified malignant neoplasms were statistically significantly in excess among men. Risk of diseases of the circulatory system was statistically significantly reduced in both sexes.

DISCUSSION

The results of this study contribute to filling a knowledge gap regarding the studied cohort, which, as previously mentioned, had not been the subject of publications in scientific journals.

Data relating to the completeness of the vital status ascertainment (867 subjects, 96.3% of the cohort), and the subjects excluded from the analysis (33 subjects, 3.6% of the cohort), are one point of strength of the study. Another one is represented by the length of follow-up (49 years).

The observed results relating to all-cause mortality, chronic respiratory and circulatory diseases could in part be influenced by the presence of the healthy worker's effect, the phenomenon observed in occupational health studies where employed individuals tend to exhibit a lower morbidity and mortality compared to the general population [15].

Table 4
Mortality for malignant neoplasms (MN) of the pleura, retroperitoneum and peritoneum, lung and asbestosis, by duration of employment, age at hiring and time since the first exposure (TSFE). Two sexes combined

	Duration of employment				Age at hiring				TSFE			
	Years	OBS	EXP	SMR (95% CIs)	Years	OBS	EXP	SMR (95% CIs)	Years	OBS	EXP	SMR (95% CIs)
MN of the pleura	<10	7	0.55	12.80 (6.10-26.84)	<20	4	0.17	22.88 (8.59-60.96)	<10	0	0.00	
	10-19	4	0.23	17.67 (6.63-47.07)	20-29	7	0.40	17.72 (8.45-37.16)	10-19	0	0.00	
	20-29	3	0.09	32.46 (10.47-100.63)	30-39	4	0.26	15.10 (5.67-40.24)	20-29	1	0.01	90.36 (12.73-641.45)
	≥30	2	0.05	41.59 (10.40-166.30)	40-49	1	0.06	15.86 (2.23-112.61)	30-39	7	0.06	120.50 (57.45-252.76)
	-	-	-	-	50-59	0	0.01		40-49	6	0.18	32.62 (14.66-72.62)
	-	-	-	-	≥60	0	0.00		50-59	2	0.30	6.64 (1.66-26.56)
	-	-	-	-	-	-	-		≥60	0	0.36	
MN of the retroperitoneum and peritoneum	<10	2	0.40	5.04 (1.26-20.16)	<20	3	0.12	25.36 (8.18-78.62)	<10	0	0.00	
	10-19	1	0.17	5.76 (0.81-40.86)	20-29	0	0.29		10-19	0	0.00	
	20-29	0	0.07		30-39	1	0.20	5.08 (0.72-36.08)	20-29	0	0.01	
	≥30	1	0.03	28.63 (4.03-203.26)	40-49	0	0.06		30-39	0	0.06	
	-	-	-	-	50-59	0	0.01		40-49	2	0.16	12.41 (3.11-49.63)
	-	-	-	-	≥60	0	0.00		50-59	2	0.21	9.40 (2.35-37.59)
	-	-	-	-	-	-	-	-	≥60	0	0.23	
MN of the lungs	<10	21	18.31	1.15 (0.75-1.76)	<20	4	5.02	0.80 (0.30-2.12)	<10	0	0.01	
	10-19	9	7.84	1.15 (0.60-2.21)	20-29	22	14.41	1.53 (1.01-2.32)	10-19	2	0.05	41.46 (10.37-165.79)
	20-29	7	3.56	1.97 (0.94-4.13)	30-39	8	9.27	0.86 (0.43-1.73)	20-29	4	0.43	9.21 (3.45-24.53)
	≥30	3	1.63	1.85 (0.60-5.72)	40-49	6	2.12	2.83 (1.27-6.31)	30-39	9	2.12	4.25 (2.21-8.17)
					50-59	0	0.49		40-49	18	6.49	2.77 (1.75-4.40)
					≥60	0	0.03		50-59	7	10.31	0.68 (0.32-1.42)
					-	-	-		≥60	0	11.93	
Asbestosis	<10	3	0.03	115.23 (37.17-357.29)	<20	0	0.01		<10	0	0	
	10-19	4	0.01	399.21 (149.83-1,063.65)	20-29	10	0.02	475.09 (255.63-882.99)	10-19	0	0	
	20-29	4	0	950.32 (356.67-2,532.03)	30-39	3	0.01	263.17 (84.88-815.97)	20-29	1	0	7,387.30 (1,040.60-52,442.80)
	≥30	2	0	846.86 (211.80-3,386.12)	40-49	0	0.00		30-39	1	0	1,122.20 (158.10-7,966.50)
					50-59	0	0.00		40-49	5	0	1,075.60 (447.70-2,584.10)
					≥60				50-59	6	0.01	406.50 (182.60-904.90
									≥60	0	0.02	

OBS: number of observed subjects; EXP: number of expected subjects; SMR: standardized mortality ratio; CIs: confidence intervals.

In men, statistically significant excesses related to mortality are observed for all malignant tumours, and for several specific malignant diseases. Female population shows a different pattern, and a statistically significant reduced all-causes mortality.

For asbestos-related malignancies, several statistically significant excesses are observed in men (malignant tumours of the pleura, retroperitoneum and peritoneum, lung, rectum). These findings support evidence of prior exposure to asbestos fibres. A no significant increased risk for colon cancer is also present in men.

Among women, statistically significant excesses are observed for retroperitoneal and peritoneal malignancies. Non-statistically significant increased risk is observed for malignancies of the ovary and stomach. No cases of pleural, lung, and rectal malignancies are documented in women.

Cases of laryngeal cancer are absent in both sexes.

Mortality from asbestosis is in excess, statistically significant in both sexes, representing a clue of high exposure. Considering the low mortality rate of this pathology, it is reasonable to hypothesize that the total (alive and deceased) cases of asbestosis were higher. Our results show malignant tumours of the pleura starting after 20 to 29 years since the first exposure (TSFE), retroperitoneal and peritoneal malignant tumours after 40 to 49 years, and lung tumours after 10 to19 years. Asbestosis starts to appear after 20 to 29 years of TSFE. These figures are in agreement with the results reported by Luberto *et al.*, in the pooled analyses of Italian asbestos cement plant workers [12].

Another important point of discussion is the use of malignant neoplasm of the pleura code as a proxy for malignant mesothelioma of the pleura. It is well known that in similar situations, especially when data from death certificates are used, overestimation of the true cases of malignant mesothelioma of the pleura can occur. However, a good correspondence between mesothelioma and malignant neoplasm of pleura has been observed in Italy [16, 17] and this proxy has been used in our country for mesothelioma mortality surveillance [18].

Regarding double-blind coding of causes of death, the two researchers showed agreement in 85% of cases. Discussing the remaining ones, they reached a complete agreement.

The lack of information on job qualification and exposure levels prevented comparisons between subgroups of ex-workers to evaluate the role of different levels of asbestos exposure. Moreover, the risk estimates of asbestos-related diseases recognizing other risk factors besides asbestos, such as lung and ovary cancers and smoking habits, were not controlled for confounding factors due to unavailability of information. However, the presence of asbestos-related diseases (asbestosis, peritoneal and retroperitoneal pathologies, although it is not possible to exclude misclassification phenomena for the latter) documents an exposure that cannot be underestimated. In favour of an important exposure there is also the description of the working cycle, described in the *Supplementary Material available online*.

The figure relating to lung cancer may indicate, also, a different smoking habit between the two sexes. In both sexes there is a statistically significant defect in cardiovascular diseases, and a not significant reduction in the risk of chronic and obstructive pulmonary diseases (COPD): these two groups of diseases are of interest, being cigarette smoking a common risk factor [19]. The healthy worker's effect, previously mentioned, and a reduced smoking habit could underlie these results, with varying, unanalyzable impact.

CONCLUSIONS

The present study shows excesses of mortality from asbestos-related causes in the investigated cohort of asbestos cement plant workers, particularly in men. Despite some limitations of the study, high asbestos exposure levels in workplace could be confirmed. These results could contribute to update the estimates of the health impact of occupational asbestos exposure in Italy and in the world and to draw up suitable public health interventions, including social security and welfare, at local level.

Conflict of interest statement

The Authors declare that there are no conflicts of interest.

Received on 19 September 2023.
Accepted on 25 March 2024.

REFERENCES

1. IARC International Agency for Research on Cancer. Arsenic, metals, fibres, and dusts. IARC Working Group on the Evaluation of Carcinogenic Risks to Humans. IARC Monogr Eval Carcinog Risks Hum. 2012;100(Pt C):11-465.
2. Selikoff IJ, Lee DHK. Asbestos and disease. New York, NY: Academic Press; 1978.
3. Stayner L, Welch LS, Lemen R. The worldwide pandemic of asbestos-related diseases. Annu Rev Public Health. 2013;34:205-16.
4. Lin RT, Takahashi K, Karjalainen A, et al. Ecological association between asbestos-related diseases and historical asbestos consumption: an international analysis. Lancet. 2007;369:844-9.
5. Italia. Legge 27 marzo 1992, n. 257. Norme relative alla cessazione dell'impiego dell'amianto. Gazzetta Ufficiale – Serie Generale n. 87, 13 aprile 1992, Suppl. Ordinario n. 64. Available from: https://www.gazzettaufficiale.it/eli/id/1992/04/13/092G0295/sg.
6. Virta RL. Worldwide asbestos supply and consumption trends from 1900 through 2003: US Geological Survey Circular 1298. Reston, VA: US Geological Survey; 2006. Available from: http://pubs.usgs.gov/circ/2006/1298/index.html.
7. Albin M, Magnani C, Krstev S, et al. Asbestos and cancer: An overview of current trends in Europe. Environ

Health Perspect. 1999;107(Suppl 2):289-98.
8. Mirabelli D, Kauppinen T. Occupational exposure to carcinogens in Italy: An update of CAREX database. Int J Occup Environ Health. 2005;11:53-63.
9. Mirabelli D, Cavone D, Luberto F, et al. Il comparto della produzione di cemento amianto. In: Marinaccio A, Binazzi A, Di Marzio D, et al. (Eds). Registro nazionale dei mesoteliomi: Terzo rapporto. Roma: Istituto Superiore per la Prevenzione e la Sicurezza sul Lavoro; 2010. p. 105-23.
10. Marinaccio A, Binazzi A, Bonafede M, et al. Il Registro nazionale dei mesoteliomi: Sesto rapporto. Milano: INAIL; 2018. Available from: https://www.inail.it/cs/internet/docs/alg-pubbl-registro-nazionale-mesoteliomi-6-rapporto.pdf.
11. Ferrante D, Chellini E, Merler E, et al. Italian pool of asbestos workers cohorts: Mortality trends of asbestos-related neoplasms after long time since first exposure. Occup Environ Med. 2017;74(12):887-98.
12. Luberto F, Ferrante D, Silvestri S, et al.; working group. Cumulative asbestos exposure and mortality from asbestos related diseases in a pooled analysis of 21 asbestos cement cohorts in Italy. Environ Health. 2019;18(1):71. doi: 10.1186/s12940-019-0510-6
13. Inserra A, Romano S, Ramistella EM, et al. Rischio amianto in una fabbrica di manufatti in eternit. In: Battista G, Giglioli S, Longini L. Atti del seminario internazionale aggiornamenti in tema di neoplasie di origine professionale: Siena 19-21 novembre 1991. Ospedaletto, Trento: Editrice Universitaria Litografia Felici, 1992. p.115-22.
14. Pirastu R, Ranucci A, Consonni D, et al. Reference rates for cohort studies in Italy: An essential tool in occupational and residential cohort studies. Med Lav. 2016;107:473-7.
15. Checkoway H, Pearce NE, Crawford-Brown DJ. Research methods in occupational epidemiology. New York: Oxford University Press; 1989. p. 78-9, 86-91.
16. Bruno C, Comba P, Maiozzi P, et al. Accuracy of death certification of pleural mesothelioma in Italy. Eur J Epidemiol. 1996;12:421-3.
17. Gorini G, Merler E, Chellini E, et al. Is the ratio of pleural mesothelioma mortality to pleural cancer mortality approximately unity for Italy? Considerations from the oldest regional mesothelioma register in Italy. Br J Cancer. 2002;86:1970-1.
18. Comba P, Merler E, Pasetto R. Asbestos-related diseases in Italy: Epidemiologic evidences and public health issues. Int J Occup Environ Health. 2005;11:36-44.
19. Eriksson B, Backman H, Ekerljung L, Axelsson M, Lindberg A, Rönmark E, Lundbäck B. Pattern of cardiovascular comorbidity in COPD in a country with low-smoking prevalence: Results from two-population-based cohorts from Sweden. COPD. 2018;15(5):454-63. doi: 10.1080/15412555.2018.1535580

Ann Ist Super Sanità 2024 | Vol. 60, No. 2: 126-133
DOI: 10.4415/ANN_24_02_07

ORIGINAL ARTICLES AND REVIEWS

The Italian National Institute of Health helpline to quit tobacco and nicotine dependence: 20 years of activity

Luisa Mastrobattista, Renata Solimini, Guido Mortali, Rosilde Di Pirchio, Graziella Lanzillotta, Piergiorgio Massaccesi, Claudia Mortali, Simona Pichini and Ilaria Palmi

Centro Nazionale Dipendenze e Doping, Istituto Superiore di Sanità, Rome, Italy

Abstract

Introduction. Tobacco use is one of the world's leading preventable causes of death and is a major preventable risk factor of non-communicable diseases. Although smokers are aware of the health risks, their attempts to quit often fail, primarily due to the strong nicotine and/or tobacco dependence. Antismoking helplines have become an integral part of tobacco control efforts in many countries. In Italy, the ISS Antismoking Helpine is active since 2000.

Material and methods. The professional staff of the ISS Antismoking Helpline have gathered socio-demographic and smoking-related data via an electronic form, related to the received calls. The collected data have been processed in a dedicated database and analyzed to monitor the use and the quality of the service. In this study, a descriptive statistical analysis was conducted to inform about the activity of the helpline over the years.

Results. From May 2003 to June 2023 the helpline received 99,423 calls. Most smokers called to receive "support to quit" (82.6%). Counselling was provided in 11.4% of cases, and in the last two years has been strongly increased (40.0% of cases). The percentage of users requesting information on emerging tobacco and nicotine products is 1.2%, even if in 2023 this percentage has risen significantly (6.0%). Two legislative measures (in 2012 and in 2016) required to add the helpline number to all packets of tobacco cigarettes. Accordingly, the offer of counselling increased from 2.6% to 12.2%.

Conclusions. The available resources in tobacco control, including the helpline, are still not sufficient to meet all the users needs. Adequate policies and stable funding to fight tobacco and nicotine dependence need increased commitment from government institutions to ensure equal access to treatments for all Italian citizens.

Key words

- tobacco dependence
- nicotine dependence
- smoking cessation
- antismoking helpline

INTRODUCTION

Tobacco smoking is the main cause of preventable mortality worldwide: every year more than 8 million deaths are attributed to tobacco smoking, including around 1.2 million deaths from exposure to second-hand smoke. There is no safe level of exposure to tobacco (https://www.who.int/news-room/fact-sheets/detail/tobacco). In Italy, 10.5 million people are smokers are (20.5% of the population): 6.3 million males (25.1%) and 4.4 million females (16.3%) [1]. It is estimated that 17% and 6% of the total amount of deaths were attributable to smoking in Italian males and females, respectively [2].

Because of the governments efforts in high-income countries, the last decade has witnessed some profound changes in the global market for tobacco products and many countries have seen a steady decrease in the prevalence of tobacco use [3]. Accordingly, new devices, such as electronic nicotine delivery systems (ENDS or e-cigarettes) or heated tobacco products (HTPs) have appeared on the market, becoming increasingly popular among consumers [4]. Users are attracted both by their design and by the tobacco industry's claims that such products contribute to "harm reduction" in current smokers. Unfortunately, the long-term health risks are still unknown and it is highly probable that they lead or maintain nicotine dependence [5]. Anyway, it is important to understand how they affect the behavior of smokers who wish to quit, adult non-smokers and the young people who never started to smoke. In Italy, e-cigarettes users (occasional+habitual) are 2.5% population (about 1,300,000 people). Instead, HTPs are used

Address for correspondence: Guido Mortali, Centro Nazionale Dipendenze e Doping, Istituto Superiore di Sanità, Viale Regina Elena 299, 00161 Rome, Italy. E-mail: guido.mortali@iss.it.

(regularly or occasionally) by 3.7% Italian population, approximately 1,900,000 people. These products are mainly used by smokers in association with the traditional cigarettes (dual users), adding to the harm of smoking, the health risk from the use of these new electronic devices [1].

Conventional cigarettes, e-cigarettes and HTPs contain nicotine. Nicotine is strongly addictive: it is estimated that a quarter of teenagers can become dependent upon it after smoking just three or four conventional cigarettes, and after smoking five packs, nearly 60% are dependent [6]. People addicted to nicotine, can greatly benefit from a range of effective tobacco cessation interventions. Without cessation support, only around 4% of attempts to quit tobacco are successful [7]. Tobacco/nicotine dependence may need persistent and repeated therapeutic interventions (either pharmacological or behavioural, even combined), as well as long- term follow-up until complete cessation is achieved [8].

The article 14 of the WHO Framework Convention on Tobacco Control (WHO FCTC) states that "each party shall take effective measures to promote cessation of tobacco use and adequate treatment for tobacco dependence" and "all parties should offer easily accessible and free quitlines in which callers can receive advice from trained cessation specialists" [9].

In many countries worldwide there are toll-free numbers known as "quitlines" or "helplines" to help smokers in quitting their dependence (https://www.who.int/campaigns/world-no-tobacco-day/2021/quitting-toolkit/toll-free-quitlines), providing easily accessible screening, counselling, call backs, mailing materials and referrals to community resources such as tobacco cessation services and support groups. Some quitlines also provide Internet and medication support, recorded messages, and automated responses via e-mail and text [10].

One important advantage of quitlines is their accessibility: they are particularly helpful for people with limited mobility and those who live in rural or remote areas [11].

Tobacco quitlines were developed during 1980s in UK, Australia and the United States [10]. In 1985 and 1988, call-in services were established in the Australian state of Victoria and in England, respectively. Quit Victoria and UK quit were the first broadly accessible telephone lines dedicated exclusively to helping smokers quit and had roles in the later development of quitlines in Australia and Europe [12].

From December 15, 2011 until May 31, 2013 (website maintained until June 20, 2015), the North American Quitline Consortium developed and implemented the pilot project Global Quitline Network, dedicated to supporting nations with new quitlines, and to implementing WHO FCTC cessation-related obligations (https://www.naquitline.org/page/GQN).

Currently, there are scores of publicly supported quitlines around the world. They exist in states as USA, Canada and Australia, in most European countries, and in several other parts of the world. As to Europe, according to the WHO, almost all 27 European Union Member States (EU MS) have a quitline, with the exception of Cyprus, Greece, Lithuania, and Portugal. The quitline in France is not toll-free (https://www.who.int/campaigns/world-no-tobacco-day/2021/quitting-toolkit/toll-free-quitlines). Smokers that use quitlines increase their absolute quit rate by 4 percentage points, which represents a doubling of success compared to those who attempt to quit without support [13]. This rate can be further increased if the quitline is "proactive" and counsellors make follow-up calls to potential tobacco quitters.

This paper describes the results of 20 years of activities of the Antismoking Helpline (Telefono Verde Fumo, TVF), of the National Centre on Addiction and Doping (Centro Nazionale Dipendenze e Doping) at the Italian National Institute of Health (Istituto Superiore di Sanità, ISS).

MATERIAL AND METHODS

The TVF service was established in 2000 and has been providing services that include current legislation information, counselling, cessation-related information and self-help quit tools to help smokers who wish to quit, to support the people in their fight against second-hand smoke, and to facilitate health promotion activities. ISS was the first public authority to use the toll-free helpline addressed to the population and specific targets with the aim to constitute a bridge between the citizen and the healthcare system [14]. The TVF has been set up not only to support smokers to quit, but also to provide counselling and information to no-smokers (with the aim to suggest the strategies for protection from second-hand smoke), health professionals, social workers, teachers, public institutions (the latter with the aim to cooperate in carrying out studies and health protection campaigns). Psychologists skilled in the telephone counselling and in the tobacco-related issues use the communicative-relational operating model of telephone communication, a specific method of telephone communication in public health, to provide evidence-based information or to help users in recognizing personal, familiar and environmental resources to make their own decisions and informed choices to modify their behavior. In this method, technical-scientific and relational-communication skills are combined to ensure a customized intervention on the individual needs, within a welcoming and not judgmental approach.

The TVF operates Monday to Friday, 10 am to 4 pm, with voicemail active outside these hours and on public holidays. The calls are anonymous and free of charge. Upon receiving a call, the professional staff gather socio-demographic and smoking-related data via an electronic form. The collected data are then processed in a dedicated database and analyzed to monitor the use and the quality of the service to inform policy decisions, and support practitioners and researchers in designing effective interventions.

Reference legislative framework

The actions of TVF have taken place within the context of two recent EU legislative measures. In 2012 Italy adopted the EU Directive 2012/9/EU, which required the inclusion on tobacco packets of additional warnings from the specific list of fourteen warnings set out in the Annex of the Directive [15]. As the specific warning

"Quit smoking stay alive for those close to you" had to be completed by a reference to the telephone number/web site of the helpline/cessation service, the TVF has been added in rotation on the packets. In 2016, Italy adopted the EU Tobacco Product Directive 2014/40/EU [16], which established that each unit packet must carry combined health warnings, including information on how to quit smoking (e.g., telephone numbers, e-mail addresses or websites). Therefore, the TVF has been added to all packets.

Reactive and proactive counselling

TVF offers the possibility of choosing a path to stop smoking, consisting of several telephone sessions, based on reactive or proactive counselling. In the reactive mode it is the smoker who calls back according to the shared calendar, maintaining anonymity. In the proactive mode the user has to leave anonymity to be called back and followed by the same professional throughout the support process. In both reactive and proactive modes, a schedule of phone sessions with the specialist is planned to develop the necessary skills in the individual to activate processes of change and empowerment, and to guide them through the stages of change preparation, abstinence, and maintenance. The protocol is an adaptation of the methodology proposed by the WHO [10] and combines elements of problem solving and coping strategies, with elements of emotional and motivational support.

Smoking cessation services (SCS) updates

Since 2000, the TVF has been taking a census and updating the network of SCS, to provide citizens with up-to-date information on the registry of services, the assistance provided, and how to access them. All the services belong to the National Health Service, to the Italian League Against Cancer (Lega Italiana per la Lotta contro i Tumori, LILT) or to the "private social" sector.

The SCS offer specialized and diversified paths to quit smoking mainly providing evidence-based intervention such as pharmacotherapies, individual and group counselling, with the assistance of a multidisciplinary team of professionals including physicians, nurses and psychologists.

Recently, the online platform "Smettodifumare" ("quitsmoking") website (https://smettodifumare.iss.it/it/) was launched, primarily dedicated to those ready to quit smoking and also to those who are still considering it. Thanks to this new platform, smokers can now use the updated geolocated map to identify the SCS that best meets their needs.

Collection of information on emerging tobacco and nicotine products

Recently TVF started to monitor how people perceive these emerging tobacco and nicotine products and how they affect the behaviour of smokers who wish to quit, adult non-smokers and the young people who have never started smoking, and to provide scientific information about their safety and health risks on the long-term.

RESULTS

Although TVF has been active since 2000, the following results cover the period 2003-2023, as callers data has been systematically collected since 2003. From May 2003 to June 2023 the helpline received 99,423 calls, excluding inappropriate calls (n=14,806). Therefore, our descriptive analysis concerned a total of 84,617 calls. Trend overtime of the calls is shown in *Figure 1*.

The calls came from all over the national territory, with the North being the most represented region in Italy (33.4% of total calls). Most callers were smokers themselves (86.4%), although other calls were from family and friends seeking help for their loved ones to quit smoking (5.7%) (*Table 1*).

Two-thirds of the users were male (62.4%) and all age groups were represented, although the 46-55 age group was the most represented (15.7%). Specifically, 25.2% of callers were up to 35 years old (4.7% young people <18 years old), 43.4% were adults 36-65 years old and 14.3% were over 65 years old (2.8% >75 years old).

Most smokers contacted the helpline to receive "support to quit smoking" (82.6%). The 7.7% callers asked for information about SCS (e.g., how to access them, their smoking cessation programs), while 2.3% requested health information, therapies and legislation. The 1.1% of callers asked for information about new tobacco and nicotine products.

The TVF number was found by 79.4% of the callers on the cigarette pack.

Reactive and proactive counselling

Among the services offered by the TVF, the direct intervention of the specialist (providing counselling and self-help material) concerned 23.3% of the users: in particular, counselling was provided in 11.4% of cases, although in the last two years has been significantly increased by 40.0%. Moreover, the offer of counselling increased from 2.6% (period 1) to 12.2% (period 2). Health information represented 18.0% of the total information provided by the helpline staff (*Table 2*). Reactive counselling has been implemented on an experimental basis from 2019, while proactive counselling has been implemented from 2020. Currently, the number of smokers enrolled is too small to proceed with an evaluation of the intervention. Since 2018, the number of calls per year has experienced a decrease (*Figure 1*), likely due to both the increase in the average duration of each call, i.e., from about 3 minutes (2003-2018) to approximately 7 minutes (2019-2023), and the implementation of reactive and proactive counseling.

Reference legislative framework

In order to assess the impact of the two legislative measures above described [15, 16], the TVF calls were divided into two periods, corresponding to the entry into force of the two acts: from 2nd of May 2003 to 31th of December 2012 (period 1) and from 1st of January 2013 to 30th of June 2023 (period 2) (*Table 1* and *Table 2*).

A significant increase in the number of calls from smokers was observed: 65.6% in period 1, rising to 90.2% in period 2.

As regards to the gender, the male callers increased

Table 1
Italian Antismoking Helpline (Telefono Verde Fumo, TVF): main characteristics of the users (from the 2nd May 2003 to the 30th June 2023)

		Total period (2nd of May 2003-30th of June 2023)		Period 1 (2nd of May 2003-31th of December 2012)		Period 2 (1st of January 2013-30th of June 2023)	
		Number (N)	Percentage (%)	Number (N)	Percentage (%)	Number (N)	Percentage (%)
TOTAL CALLS*		84,617					
Gender	Male	52,787	62.4	6,272	48.1	46,515	65.0
	Female	31,830	37.6	6,762	51.9	25,068	35.0
Age	<18	3,984	4.7	98	0.8	3,886	5.4
	18-25	8,796	10.4	363	2.8	8,433	11.8
	26-35	8,563	10.1	1,216	9.3	7,347	10.3
	36-45	11,799	13.9	1,913	14.7	9,886	13.8
	46-55	13,298	15.7	1,417	10.9	11,881	16.6
	56-65	11,668	13.8	927	7.1	10,741	15.0
	66-75	8,050	9.5	271	2.1	7,779	10.9
	>75	2,390	2.8	30	0.2	2,360	3.3
	Not indicated	16,069	19.0	6,799	52.2	9,270	13.0
Geographic area of callers	North-west	18,697	22.1	3,222	24.7	15,475	21.6
	North-east	9,585	11.3	1,344	10.3	8,241	11.5
	Centre	16,403	19.4	2,720	20.9	13,683	19.1
	South	20,294	24.0	2,336	17.9	17,958	25.1
	Islands	9,863	11.7	1,160	8.9	8,703	12.2
	Not indicated	9,775	11.6	2,352	17.3	7,423	10.4
Type of callers	Smoker	73,086	86.4	8,548	65.6	64,538	90,2
	Relative/friend	4,784	5.7	1,538	11.8	3,246	4.5
	Former smoker	873	1.0	641	4.9	232	0.3
	Other	3,140	3.7	1,733	13.3	1,407	2.0
	Not indicated	2,734	3.2	574	4.4	2,160	3.0
Main areas of interest§	Quit smoking	75,687	82.6	11,469	88.0	64,218	81.7
	Smoking cessation services (SCS)	7,048	7.7	391	3.0	6,657	8.5
	Information (health, therapy, legislation)	2,115	2,3	312	2.4	1,803	2.3
	Emerging tobacco and nicotine products ***	980	1.1	Undetected	Undetected	980	1.2
	Other	2,841	3.1	338	2.6	2,503	3.2
	Not indicated	3,012	3.3	524	4,0	2,488	3.2
Source	Packet of cigarettes	67,203	79.4	1	0.01	67,202	93.9
	Health professional	732	0.9	348	2.7	384	0.5
	Relatives/friends	722	0.9	574	4.4	148	0.2
	Informational materials	941	1.1	701	5.4	240	0.3
	Internet	1,846	2.2	434	3.3	1,412	2.0
	Magazine/newspaper**	3,885	4.6	3,503	26.8	382	0.5
	Radio/TV**	1,192	1.4	1,104	8.5	88	0.1
	Other	674	0.8	162	1.2	512	0.7
	Not indicated	7,422	8.8	6,221	47.7	1,201	1.7

*The total number relates only to appropriate calls, counselling sessions or dropped phone calls; **Data collected up to 07/11/2022; ***Data collected from October 2015; §The user's request may include more than one area of interest.

Table 2
Italian Antismoking Helpline (Telefono Verde Fumo, TVF) offer, from the 2nd of May 2003 to the 30th June 2023*

		Total period (2nd of May 2003-30th of June 2023)		Period 1 (2nd of May 2003-31th of December 2012)		Period 2 (1st of January 2013-30th of June 2023)	
		Number (N)	Percentage (%)	Number (N)	Percentage (%)	Number (N)	Percentage (%)
Direct action	Counselling	14,082	11.4	260	2.6	13,822	12.2
	Self-help tools	14,633	11.9	1,824	18.2	12,809	11.3
Territory orientation	Smoking cessation services (SCS)	48,472	39.4	4,693	46.8	43,779	38.7
	Health professional	4,500	3.7	391	3.9	4,109	3.6
Information	Therapies	4,569	3.7	130	1.3	4,439	3.9
	Legislation	1,239	1.0	521	5.2	718	0,6
	Health	22,136	18.0	391	3.9	21,745	19.2
	Other	9,472	7.7	1,174	11.7	8,298	7.3
	Not indicated	3,918	3.2	651	6.5	3,267	2.9

*The offer can include more than one type of information.

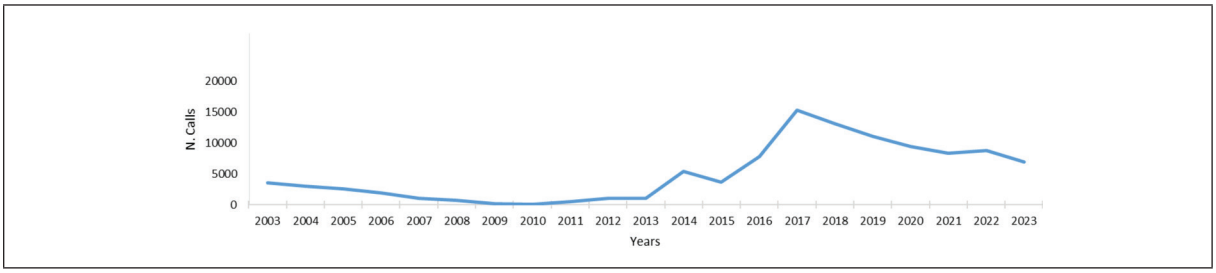


Figure 1
Trend in time of the number of calls (2003-2023).

from 48.1% to 65.0%, and female callers decreased from 51.9% to 35.0%.

With respect to the age, there was a significant increase of calls from young people <18 (from 0.8% to 5.4%) and from those aged 18-25 (from 2.8% to 11.8%). The number of calls from older users also increased in period 2: from 2.10% to 10.9% for those aged 66-75, and from 0.2% to 3.3% for those aged over 75.

Following the two legislative measures, the callers who found the telephone number on the cigarette packets increased from 0.01% to 93.9% in period 2, when the telephone number was added to all packets.

Smoking cessation services (SCS)

The first SCS began operating in the end of the 90s [17], although from 2000 the TVF has been taking a census and updating the network of SCS. Their number increased steadily between 2000 and 2010 but then they declined between 2011 and 2018. From 2019 onwards, there was a significant decrease in SCS, that reached the lowest number in 2022 (n=223).

The last census was concluded in May 2023 and 241 "services" were detected, that is an increasing number compared to the last year (*Figure 2*).

In the SCS multidisciplinary team, the most represented professionals are physicians (36%), psychologists (21%) and nurses (18%).

The SCS included integrated interventions: counselling was the first proposal (97.0%), followed by pharmacotherapy (91.0%), individual psychotherapy (39.0%), group psychotherapy (35.0%), and psychoeducational groups (32.0%).

The SCS can be accessed in several ways and through different forms of contributions: some of them are completely free of charge and others require the payment of the healthcare ticket.

Collection of information on emerging tobacco and nicotine products

The TVF has been collecting information on emerging products since October 2015. It was undetected in period 1 and considering only period 2, this percentage is 1.2%. In addition, the percentage of users requesting information on these products has risen significantly in the last year (6.0% in 2023). The most frequent questions are related to the safety of the devices, whether they are less harmful to health than conventional cigarettes, whether they help to quit smoking, their nicotine content. The latest survey (April 2022 - May 2023) about the callers, has shown that 57% of users have made at least one attempt to quit smoking. Among those who specified how they attempted to quit, nine out of ten did it on their own: the majority by discarding the cigarette pack (82.0%) or reducing the number

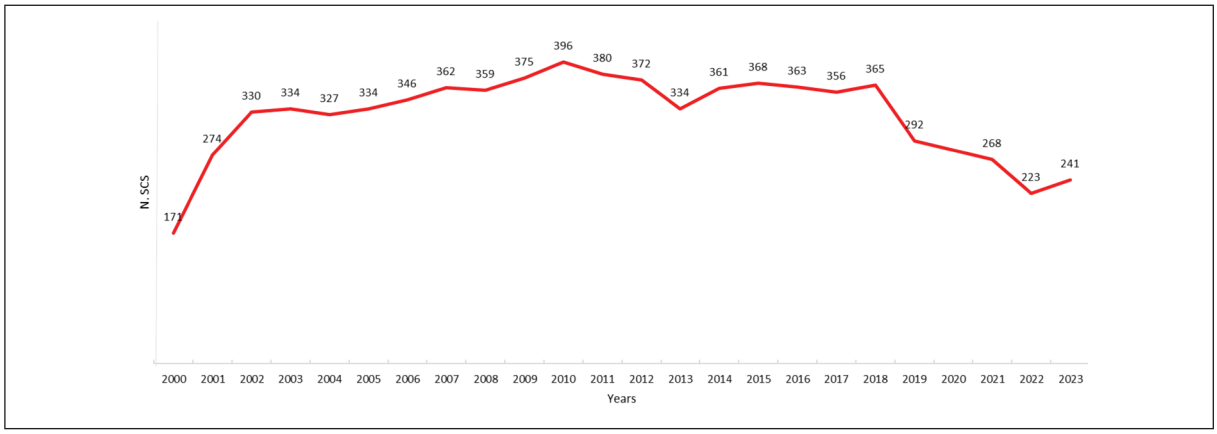


Figure 2
Trend of number of operative Italian smoking cessation services (2000-2023).

of smoked cigarettes (13.0%), 10.0% unsuccessfully attempted to quit using an electronic cigarette or a heated tobacco product (3.0%).

DISCUSSION

Among the treatments to quit smoking, pharmacotherapy combined with behavioural support has been shown to be effective [8]. In addition, toll-free helplines can provide information and support to smokers in quitting: people can use these services by calling or by signing up to receive calls from counsellors. Some tobacco cessation quitlines (such as in UK) have pioneered telephone support for smokers willing to quit. Indeed, according to the statistics on NHS stop smoking services in England (April 2022 to March 2023), among the reported number of quit attempts by smokers, the most common intervention is telephone support, with 53% of those setting a quit date utilizing this intervention (https://digital.nhs.uk/data-and-information/publications/statistical/statistics-on-nhs-stop-smoking-services-in-england/april-2022-to-march-2023-q4/part-2---stop-smoking-services). In 2021, the Tobacco Control Scale (TCS) [18] presented the findings of a survey on tobacco control efforts in 37 European countries [19]. The TCS assessed the implementation of tobacco control policies at the country level, assigning points to each policy, with a maximum score of 100. Cessation support has a maximum score of 10 points, with quitlines contributing a score of 2 points. Italy achieved an overall score of 6 for this policy, accordingly the expected score for the quitline indicator is 2/2, including an additional point for counsellors responding for at least 30 hours a week. Several EU MS have not yet implemented a quitline, along with some non-EU countries such as Norway, Serbia, Bosnia & Herzegovina.

All these helplines have their own specific characteristics that depend on the geographical place, on the professionals involved and on the specific objectives of the service. Indeed, most helplines provide services through proactive counselling and in this case the counsellors use outbound calls. The outbound service, which often entails multiple follow-up sessions, is typically scheduled by agreement with the smoker. In this concern, the efficacy of such proactive interventions has been established by randomized controlled trials. The TVF provides services through reactive counselling, in which the smoker calls back for assistance and since 2020 has provided outbound counselling calls.

One of the strengths of the TVF, like most of the quitlines, is the anonimity and that is free of charge. Although most quitlines in Europe are free, some of them are not, such as in the case of the Queensland Quitline in Australia (https://www.quithq.initiatives.qld.gov.au/how-to-quit/get-help-from-quitline/about-quitline-services/success-rate).

ISS TVF targets not only smokers willing to quit, but also all stakeholders related to tobacco and nicotine dependence as well as health professionals, educators, people concerned about the effects of second-hand smoke or parents seeking help for their teens.

The type of TVF callers has changed over the years: while smokers represented the 86.4% users during the reporting period (2003-2023), it is evident how they have significantly increased following the introduction of legislation requiring tobacco companies to include the toll-free number on all cigarette packs. Indeed in the years 2013-2023, smokers increased by 24.6 percentage points compared to the previous period (2003-2012). The widespread diffusion of the TVF number on cigarette packs motivated smokers to call. Users' requests about how to stop smoking and how to contact SCS amount to 90.3%: this percentage remains relatively constant both before and after the enforcement of the two legislative measures (91.0% period 1; 90.2 period 2).

TVF callers are mainly men, probably because of the higher prevalence of male smokers in Italy [1].

Interventions to prevent and treat tobacco and nicotine dependence are more difficult to implement in young people and the elderlies due to their specific characteristics: the former are less inclined to quit, the latter have more difficulties to access the SCS. The TVF number on cigarette packet has widened the target group also to these "extreme" age groups, i.e., young people <18 and the elderly r >65: the number of calls of these age groups increased fivefold.

The TVF number on cigarette packets has fundamentally changed the way users access helpline information: while until 2012 newspapers, radio and/or television accounted for 26.8% and 8.5% respectively, these percentages became residual from 2013 (0.5% and 0.1% respectively), so that this data were no longer collected from 2022 onwards. This fact shows how the way in which the same information is provided (cigarette packs *vs* media), influences the type of users of the service (smokers, young people and the elderly, more males than females).

The TVF offers counselling to about 11.4% of callers. This type of direct intervention has increased in period 2 (12.2%) compared to period 1 (2.6%), although this increase is mainly in the last two years (40%). Unfortunately, this activity is not sufficient to meet all the users needs. Hence, the continuity between the TVF and the local healthcare units, in particular the SCS, is a fundamental part of continuity of care.

Smoking prevalence [20] and use of e-cigarettes [21] substantially changed due to the COVID-19 lockdown in Italy. During the lockdown period (March 1, 2020, to April 30, 2020), the total number of calls was 1,457 (33 a day) and the duration of calls increased from 8 minutes to 15 minutes, with users expressing concerns about the combined effects of smoking and COVID-19. Moreover, smokers followed by the SCS asked for support from the TVF as the SCS suspended their activity, while other smokers considered the lockdown as an opportunity to take care of themselves and try to stop smoking.

Since the beginning SCS increased considerably between 2000 and 2010. However, despite the constant activation of new SCS, others are being closed, resulting in an overall decrease of their number in the last years. The recent COVID-19 pandemic has redirected most healthcare professionals towards its battle. In 2022, SCS reached the lowest number since 2001.The distribution of SCS is not homogeneous across the Italian territory: 61.0% of services are in the North, 17.0% in the Centre and 22% in the South and the Islands [22], which makes it difficult for many citizens to access treatment. SCS are not always free of charge but sometimes require some kind of payment (e.g., healthcare ticket), the economic commitment represents another discriminating factor to access treatment. The diffusion and the use of emerging products is strongly increasing in the last few years. This is reflected in a significant increase in the number of calls requesting information about them. Many users ask whether they are useful for smoking cessation: the currently available scientific evidence does not allow a definitive sentence. The Italian clinical practice guideline for the treatment of tobacco and nicotine dependence suggests that e-cigarettes (with or without nicotine) should not be used compared to pharmacotherapy (e.g., nicotine replacement therapy or NRT, varenicline) or counselling. In addition, due to the lack of a scientific reference literature, the guideline has introduced a specific note for HTPs, advising that they should not be used for the treatment of tobacco and nicotine dependence [8].

CONCLUSIONS

The TVF is a complementary strategy to an overall tobacco and nicotine control policy and its effectiveness is related to the extent to which it provides accessible and acceptable quality services for smokers willing to quit. Besides, it can provide correct and scientific information for non-smokers, health care professionals, teachers, social workers, and users of emerging products. TVF is broadly accepted by the public, because it eliminates barriers to access, such as transportation issues and the inability to afford treatments. TVF has the fundamental characteristics of removing socio-economic barriers that affect people and of being linked to the territory, with a direct channel with SCS. The TVF is set up in a Public Institution and the counsellors are employed to provide information and to support smokers to quit, by offering reactive or proactive telephone counselling. Unfortunately, the available resources are still not sufficient to meet all the users needs.

TVF could better respond to the numerous requests for help by increasing the number of counsellors able to promptly take care of the user and reduce telephone waiting times. Moreover, SCS are steadily declining and are unequally distributed throughout the country to address the multiple requests from users. Pharmacotherapy is not free of charge, and SCS sometimes require some kind of payment as healthcare ticket, making difficult for several citizens to have access to treatment.

Policies to fight tobacco and nicotine dependence are complex and multifactorial, and they need increased commitment from government institutions to ensure equal access to treatments for all Italian citizens.

Authors' contributions

IP and LM conceptualized the study, GM analysed the data and IP wrote the first draft of the manuscript; RD particularly took care of the introduction; CM, GL, RD, PM and RS provided important contributions for the interpretation of findings; RS and SP carefully revised the final draft of the manuscript. All Authors have read and approved the last version of the manuscript.

Conflict of interest statement

The Authors declare no conflict of interest.

Received on 9 February 2024.
Accepted on 10 April 2024.

REFERENCES

1. Mastrobattista L, Mortali C, Solimini S, Pichini S, Palmi I. The national report on tobacco use 2023. Tabaccologia. 2023;21(2):22-6. doi: 10.53127/tblg-2023-A011

2. Carreras G, Battisti F, Borzoni L, Cortini B, Lachi A, Giovannetti L, Minardi V, Masocco M, Ferrante G, Marchetti S, Piccinelli C, Chellini E, Gorini G. Deaths from

noncommunicable diseases attributable to behavioral risk factors in Italy and Italian regions, 2016. Epidemiol Prev. 2019;43(5-6):338-46. doi: 10.19191/EP19.5-6.P338.103
3. GBD 2019 Risk Factors Collaborators. Global burden of 87 risk factors in 204 countries and territories, 1990-2019: A systematic analysis for the Global Burden of Disease Study 2019. Lancet. 2020;396(10258):1223-49. doi: 10.1016/S0140-6736(20)30752-2
4. World Health Organization. WHO report on the global tobacco epidemic 2019: Offer help to quit tobacco use. Geneva: World Health Organization; 2019.
5. WHO Framework Convention on Tobacco Control. Challenges posed by and classification of novel and emerging tobacco products. Geneva: WHO FCTC; 2021. (FCTC/COP/9/10). Available from: https://iris.who.int/bitstream/handle/10665/368642/fctc-cop9-10-en.pdf?sequence=1.
6. Ursprung WW, DiFranza JR. The loss of autonomy over smoking in relation to lifetime cigarette consumption. Addictive Behav. 2010;35(1):14-8.
7. Cohen S, Lichtenstein E, Prochaska JO, Rossi JS, Gritz ER, Carr CR, Orleans CT, Schoenbach VJ, Biener L, Abrams D et al. Debunking myths about self-quitting. Evidence from 10 prospective studies of persons who attempt to quit smoking by themselves. Am Psychol. 1989;44(11):1355-65. doi: 10.1037//0003-066x.44.11.1355
8. Pacifici R, Iannone P, Davoli M, Petrini C, Pichini S, Panel di esperti della Linea Guida, Solimini R, Palmi I, Mastrobattista L, Mortali C, Martucci P, Sciotti M, Martucci L, Fraioli C, Fauci AJ, Napoletano A, Coclite D, Amato L, Vecchi S, Cruciani F, Saulle R, Camposeragna A, Minozzi S, Mitrova Z, Ruggeri M. Linea guida per il trattamento della dipendenza da tabacco e da nicotina. Roma: Istituto Superiore di Sanità; 2023. Available from: https://www.iss.it/documents/20126/8398221/LG%20Dipendenze_Tabacco_Nicotina_v6.6.23.
9. World Health Organization. WHO Framework Convention on Tobacco Control: Guidelines for implementation Article 5.3; Article 8; Articles 9 and 10; Article 11; Article 12; Article 13; Article 14, 2013 edition. Geneva: WHO; 2013.
10. World Health Organization (WHO). Developing and improving national toll-free tobacco quit line services: A World Health Organization manual. Geneva: World Health Organization; 2011.
11. European Network for Smoking and Tobacco Prevention (ENSP). Guidelines for treating tobacco dependence 2020. Brussels: ENSP; 2020.
12. Anderson CM, Zhu SH. Tobacco quitlines: Looking back and looking ahead. Tob Control. 2007;16(Suppl. 1):i81-6.
13. Stead LF, Hartmann-Boyce J, Perera R, Lancaster T. Telephone counselling for smoking cessation. Cochrane Database Syst Rev. 2013;12(8):CD002850.
14. Luzi AM, Colucci A, Gallo P, De Mei B, Mastrobattista L, De Santis M, Pacifici R, Taruscio D, Gallo C. The communicative-relational operating model of the Italian National Institute of Health for an effective telephone intervention in public health, structured on basic counselling skills. Ann Ig. 2023;35(4):379-402. doi: 10.7416/ai.2023.2555
15. Italia. Decreto legislativo 25 ottobre 2012. Recepimento della direttiva 2012/9/UE della Commissione, relativa alle nuove avvertenze sanitarie sui prodotti di tabacco. Gazzetta Ufficiale – Serie Generale n. 274, 23 novembre 2012.
16. Italia. Decreto legislativo 12 gennaio 2016, n. 6. Recepimento della direttiva 2014/40/UE sul ravvicinamento delle disposizioni legislative, regolamentari e amministrative degli stati membri relative alla lavorazione, alla presentazione e alla vendita dei prodotti del tabacco e dei prodotti correlati e che abroga la direttiva 2001/37/CE. Gazzetta Ufficiale – Serie Generale n. 13, 18 gennaio 2016.
17. Di Pucchio A, Pizzi E, Carosi G, Mazzola M, Mattioli D, Pacifici R, Pichini S. National survey of the smoking cessation services in Italy. Int J Environ Res Public Health. 2009;6: 915-26.
18. Joossens L, Olefir L, Feliu A, Fernandez E. The tobacco control scale 2021 in Europe. Brussels: Smoke Free Partnership, Catalan Institute of Oncology; 2022.
19. Joossens L, Raw M. The tobacco control scale: A new scale to measure country activity. Tob Control. 2006;15(3):247-53. doi: 10.1136/tc.2005.015347
20. Carreras G, Lugo A, Stival C, Amerio A, Odone A, Pacifici R, Gallus S, Gorini G. Impact of COVID-19 lockdown on smoking consumption in a large representative sample of Italian adults. Tob Control. 2022;31(5):615-22. doi: 10.1136/tobaccocontrol-2020-056440
21. Gallus S, Stival C, Carreras G, Gorini G, Amerio A, McKee M, Odone A, van den Brandt PA, Spizzichino L, Pacifici R, Lugo A. Use of electronic cigarettes and heated tobacco products during the Covid-19 pandemic. Sci Rep. 2022;12(1):702. doi: 10.1038/s41598-021-04438-7
22. Palmi I, Mortali C, Solimini R, Mortali G, Pacifici R, Mastrobattista L. The national report on tobacco use 2022. Tabaccologia 2022;20(2):10-4.

Ann Ist Super Sanità 2024 | Vol. 60, No. 2: 134-144
DOI: 10.4415/ANN_24_02_08

Dangerous exposures to chemicals managed by Poison Centers all around the world during the COVID-19 pandemic: a systematic review and proportional meta-analysis

Lucrezia Lanciotti[1*], Felice Giordano[1], Rosanna Maria Fidente[1], Carolina Ferranti[1], Roberta Lavalle[1], Marco Famele[1], Denise Pires Marafon[2] and Rosa Draisci[1]

[1]*Centro Nazionale delle Sostanze Chimiche, Prodotti Cosmetici e Protezione del Consumatore, Istituto Superiore di Sanità, Rome, Italy*
[2]*Sezione di Igiene, Dipartimento di Scienze della Vita e Sanità Pubblica, Università Cattolica del Sacro Cuore, Rome, Italy*

Abstract

Introduction. During COVID-19 pandemic, cleaning/disinfection activities were highly recommended. This study summarizes the state of art and estimates the prevalence of dangerous exposures to specific chemicals managed by Poison Centers (PCs) from all over the world during 2020 *vs* 2019, trying to overcome the critical aspects of the product categorization systems used by PCs.

Materials and methods. A systematic research was conducted in 3 major databases and 2 websites of PCs associations. Proportional meta-analyses were performed to estimate the prevalence of exposures to disinfectants, household products and hand sanitizers in 2020 *vs* 2019.

Results. The pooled prevalence of exposures to disinfectants, household products and hand sanitizers were respectively 5.9% (95% CI 4.9-7.0) (2019: 4.4% *vs* 2020: 7.8%; p=0.22), 25.9% (95% CI 24.0-27.7) (2019: 25.0% *vs* 2020: 28.6%; p=0.71) and 1.6% (95% CI 1.3-1.9) (2019: 0.6% *vs* 2020: 2.8%; p<0.001).

Conclusions. This study detected overall increases of exposures to specific chemicals in 2020, suggesting that the awareness on topics related to the safe use of these products should be improved, especially during health emergencies, highlighting the need to develop standardized systems to better compare data coming from PCs all over the world.

Key words

- Poison Control Centers
- COVID-19
- disinfectants
- hand sanitizers
- household products

INTRODUCTION

On 2020, the whole world became aware of the COVID-19 health emergency, declared by WHO as a pandemic on 11 March 2020 (https://www.who.int/director-general/speeches/detail/who-director-general-s-opening-remarks-at-the-media-briefing-on-covid-19---11-march-2020). To fight the virus transmission, worldwide Health Authorities (e.g., WHO, CDC) issued a series of guidelines such as: physical distancing and/or strong restrictive measures (lockdown), use of face masks, adequate ventilation of indoor places, environmental cleaning and disinfection (e.g., using products containing sodium hypochlorite, ethanol, or hydrogen peroxide), and a good hand hygiene (e.g., using soap and water or, if soap and water are not available, using hand sanitizers with at least 60% alcohol). All these recommendations have been systematically repeated through the main mass media channels and, riding the wave of fear of such an emergency, have led to an uncontrolled and sometimes unaware use of cleaning and disinfection products [1]. As of today, several studies published by Poison Centers (PCs) from all over the world on this feature can be found in literature, varying a lot from each other in terms of PC characteristics (e.g., catchment area), lockdown periods, variables reported, and product categorization systems used.

The aim of this study is to summarize the state of art of dangerous exposures to specific Chemicals man-

Address for correspondence: Lucrezia Lanciotti, Centro Nazionale delle Sostanze Chimiche, Prodotti Cosmetici e Protezione del Consumatore, Istituto Superiore di Sanità, Viale Regina Elena 299, 00161 Rome, Italy. E-mail: lucrezia.lanciotti@iss.it.

aged by PCs during the first year of COVID-19 pandemic and to estimate their prevalence in 2020 *vs* the same period of 2019, to understand the global phenomena and to identify possible evidence-based preventive strategies. This study also tries to overcome the critical aspects of the product categorization systems used by PCs, which may lead to inhomogeneous categorizations, by providing three main product categories: disinfectants, household products and hand sanitizers. All data used to estimate the prevalence (2020 *vs* 2019) were extracted by articles during the review process.

MATERIALS AND METHODS

This review was conducted according to a predefined protocol registered on PROSPERO (CRD42023389781) and it is reported according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines [2].

Search and selection process

To be included in this review, studies had to:

- be based on data coming from PCs all over the world;
- describe dangerous exposures to specific chemicals (ascribable to disinfectants and/or household products and/or hand sanitizers) occurred in 2020 – whole year or fractions – *vs* the same period of 2019;
- include all subjects exposed to disinfectants and/or household products and/or hand sanitizers;
- be published in English;
- be published from January 2020 to August 2023;
- provide the sufficient numerical data to estimate the prevalence, i.e. each study must provide the exact information on the number of calls per each product category (numerator) divided by the total number of calls received (denominator).

The decision to include studies specifically based on PCs data is motivated by the fact that PCs databases usually assess similar variables. To conduct this study an electronic search was made on PubMed, Web of Science, Google Scholar, the European Association of Poisons Centers and Clinical Toxicologists (EAPCCT) website and the American Association of Poison Control Centers (AAPCC) NPDS website. The following filters were applied: language "English", publication date "2020/01/01 - 2023/08/31", type of work "Publications".

Key words for article searches were: poison center/centre, poison control center/centre, COVID-19 exposures, disinfectants, hand, sanitizer, household product, cleaner. A comprehensive list of studies was created by one researcher and duplicates were removed. A screening based on Title and Abstract according to the inclusion and exclusion criteria was conducted by two researchers. In the eligibility step, all articles were evaluated through a full reading of the text.

The selection process was conducted and reviewed by two researchers.

Quality appraisal

All thirteen articles included in this review [3-15] are descriptive studies on subjects with a known exposure over a period of time. To assess the quality of the articles included, the JBI critical appraisal tool for assessing the quality of case series studies was used [16]. This scale provides 10 questions by which each study is judged *(Table 1)*. The possible answers are "Yes", "No", "Unclear", "Not Applicable". Any "No" response negatively affects the overall quality of the study.

The assessment of the methodological quality per each study is reported in *Table 1*. This step was conducted by one researcher and reviewed by two researchers.

Data collection

Data from all studies were exported to Microsoft® Excel by one researcher and reviewed by a second researcher. Data were extracted to assess the following variables: article, authors, journal, country, period of exposure (Period), total calls received (Total calls), calls disinfectants, calls hand sanitizers, calls household products. The characteristics of all studies included in this review are described in *Table 2*.

With reference to chemicals exposures, the categorization system used to identify products can vary between each PC, leading to a possible heterogeneity among categories (e.g., some products can be considered borderline between disinfectants/cleaners/medical devices/cosmetics).

At EU level, the European Product Categorization System (EuPCS) has been proposed by the European Chemical Agency (ECHA). The EuPCS is a system finalised by ECHA to support industries in submitting information on a mixture they put on the market and to assist the statistical analyses of related poisoning cases (Art. 45 of Reg. (EC) No. 1272/2008 (CLP) [17]). As stated on European Chemical Agency's (ECHA) Poison Centers website, the EuPCS is used to describe 'the intended use of a mixture' for which a submission must be made according to Article 45 and Annex VIII of the CLP Regulation (https://poisoncentres.echa.europa.eu/it/eu-product-categorisation-system). A first version of the EuPCS was published on 20 March 2018 on ECHA's Poison Centers website. As of today, the last version is the 4.0 published in February 2023.

A clear advantage of this tool is the product assignment according to the intended use, which is certainly easier to identify in comparison with other categorizations based, for example, on chemical structures or antimicrobial activities. Furthermore, some product categories driven by specific regulations (e.g., Reg. (EU) No. 528/2012 for biocidal products [18], Reg. (EC) No. 1107/2009 for plant protection products [19]) maintain their original categorization in the EuPCS, so that a full transferability is guaranteed. Moreover, this harmonized system could allow a comparison between statistical analyses of poisoning incidents at EU level, also helping to identify the need for new risk management measures.

Doubtlessly, this system presents limitations as well. Despite its accuracy, ambiguous categorizations are still possible. Moreover, all potentially toxic agents not covered by CLP Regulation (e.g., cosmetics, animals, plants, food, drugs, tobacco) are not included.

Although this system seems to be useful and to bring advantages, it is not currently used by all EU authors in-

Table 1
Methodological quality assessment according to JBI tool

Article	Clear inclusion criteria	Standard and reliable condition measurement	Valid methods to identify condition	Consecutive inclusion of participants	Complete inclusion of participants	Clear reporting of participants' demographics	Clear reporting of clinical information	Outcome results clearly reported	Clear reporting of presenting sites'/ clinics' demographic information	Appropriate statistical analysis
Soave PM *et al.*, 2021 [3]	Yes	Yes	Yes	Yes	Yes	No	NA	Yes	Yes	Yes
Mahmoud NF *et al.*, 2021 [4]	Yes	Yes	Yes	Yes	Yes	Yes	NA	Yes	Yes	Yes
Le Roux G *et al.*, 2021 [5]	Yes	Yes	Yes	Yes	Yes	Yes	NA	Yes	Yes	Yes
Du Plessis CE *et al.*, 2022 [6]	Yes	Yes	Yes	Yes	Yes	Yes	NA	Yes	Yes	Yes
Babić Z *et al.*, 2020 [7]	Yes	Yes	Yes	Yes	Yes	Yes	NA	Yes	Yes	Yes
Giordano F *et al.*, 2022 [8]	Yes	Yes	Yes	Yes	Yes	Yes	NA	Yes	Yes	Yes
Raffee L *et al.*, 2021 [9]	Yes	Yes	Yes	Yes	Yes	Yes	NA	Yes	Yes	Yes
Crescioli G *et al.*, 2022 [10]	Yes	Yes	Yes	Yes	Yes	Yes	NA	Yes	Yes	Yes
Gummin DD *et al.*, 2020 [11]	Yes	Yes	Yes	Yes	Yes	Yes	NA	Yes	Yes	Yes
Gummin DD *et al.*, 2021 [12]	Yes	Yes	Yes	Yes	Yes	Yes	NA	Yes	Yes	Yes
Milella MS *et al.*, 2021 [13]	Yes	Yes	Yes	Yes	Yes	Yes	NA	Yes	Yes	Yes
Casey P, Duggan E, 2021 [14]	Yes	Yes	Yes	Yes	Yes	No	NA	Yes	Yes	Yes
Vandijck D *et al.*, 2022 [15]	Yes	Yes	Yes	Yes	Yes	No	NA	Yes	Yes	Yes

NA = Not applicable

cluded in the study: among eight EU studies included in this work, only one specifically refers to the EuPCS [8].

Categorization criteria reported by authors and the related categorization assigned in this review are summarized in *Table 3*.

The three product categories used in this review were conceived as follows:

- *Disinfectants.* All biocidal products included in the Main Group of Disinfectants of Reg. 528/2012 [18] or included in the EuPCS categories from PP-BIO-1 to PP-BIO-5 (same categories). According to Reg. (EU) No. 528/2012, a "biocidal product" is "any substance or mixture, in the form in which it is supplied to the user, consisting of, containing or generating one or more active substances, with the intention of destroying, deterring, rendering harmless, preventing the action of, or otherwise exerting a controlling effect on, any harmful organism by any means other than mere physical or mechanical action; any substance or mixture, generated from substances or mixtures which do not themselves fall under the first indent, to be used with the intention of destroying, deterring, rendering harmless, preventing the action of, or otherwise exerting a controlling effect on, any harmful organism by any means other than mere physical or mechanical action". The definition of "disinfectants" excludes cleaning products that are not intended to have a biocidal effect, including washing liquids, powders, and similar products. All products named "disinfectants" without any other detail allowing to better identify the categorization are included in this category.
- *Household products.* Cleaners according to the definition of Reg. (EC) No. 648/2004 on detergents (the Regulation is now under revision according to the European Commission proposal of April 28th, 2023 [21]): "any substance or preparation containing soaps and/or other surfactants intended for washing and cleaning processes. Detergents may be in any form (liquid, powder, paste, bar, cake, moulded piece, shape, etc.) and marketed for or used in household, or institutional or industrial purposes. Other products to be considered as detergents are:
  - "Auxiliary washing preparation", intended for soaking (pre-washing), rinsing or bleaching clothes, household linen, etc.;
  - "Laundry fabric-softener", intended to modify the feel of fabrics in processes which are to complement the washing of fabrics;
  - "Cleaning preparation", intended for domestic all purposes cleaners and/or other cleaning of surfaces (e.g.: materials, products, machinery, mechanical appliances, means of transport and associated equipment, instruments, apparatus, etc.);
  - "Other cleaning and washing preparations", intended for any other washing and cleaning processes."

Table 2
Characteristics of included studies

Article	Country	Journal	Period 2020 vs 2019	Total calls		Calls disinfectants		Calls hand sanitizers		Calls household products	
				2019	2020	2019	2020	2019	2020	2019	2020
Soave PM *et al.*, 2021 [3]	Italy	Eur Rev Med Pharmacol Sci	30/01 18/05	1,862	1,972	160	250	22	50	-	-
Mahmoud NF *et al.*, 2021 [4]	Saudi Arabia	International Journal of Toxicology	01/01 30/06	2,300	2,431	215	496	10	83	-	-
Le Roux G *et al.*, 2021 [5]	France	Clinical Toxicology	01/03 30/04	30,488	32,182	1,535	2,860	257	870	4,840	5,513
Du Plessis CE *et al.*, 2022 [6]	South Africa	SAJID	01/03 31/08	5,508	5,137	262	274	6	156	1,268	1,280
Babić Z *et al.*, 2020 [7]	Croatia	Arh Hig Rada Toksikol	01/01 30/06	1,165	1,206	26	87	-	-	-	-
Giordano F *et al.*, 2022 [8]	Italy	BMC Public Health	01/03 31/05	2,096	2,526	186	265	6	52	1,007	1,118
Raffee L *et al.*, 2021 [9]	Jordan	BMJ Open	21/03 21/05	285	544	-	-	12	37	32	83
Crescioli G *et al.*, 2022 [10]	Italy	Internal and Emergency Medicine	01/01 30/04	451	410	-	-	-	-	242	267
Gummin DD *et al.*, 2020 [11]	USA	Clinical Toxicology	01/01 31/12	2,148,141	-	12,058	-	2,1729	-	172,344	-
Gummin DD *et al.*, 2021 [12]	USA	Clinical Toxicology	01/01 31/12	-	2,128,198	-	20,010	-	37,460	-	194,950
Milella MS *et al.*, 2021 [13]	Italy	Journal of Medical Toxicology	09/03 31/05	408	366	-	-	-	-	109	131
Casey P, Duggan E, 2021 [14]	Ireland	Clinical Toxicology	01/03 31/07	4,844	5,165	-	-	21	130	-	-
Vandijck D *et al.*, 2022 [15]	Belgium	Clinical Toxicology	01/01 31/12	60,668	65,308	728	2,578	-	-	-	-

The act of cleaning is related to the process by which "an undesirable deposit on the surface and/or within the substrate is dislodged from the substrate and brought into a state of solution or dispersion" (UNI EN ISO 862:2006. Surface active agents). All products named "household products", "home cleaning products", "household cleaners", "cleaning substances" without any other detail allowing to better identify the categorization are included in this category.

- *Hand sanitizers.* With the outbreak of COVID-19, the need of alcohol-based hand cleaning/sanitizing products quickly increased. To respond to this increasing demand, not only pharmaceutical companies but also chemical and cosmetic companies massively produced these items. As a result, a huge amount of different hand cleansers/sanitizers in various formulations (e.g., liquid, gel, or foam) appeared on the market, paving the way for ambiguities in terms of Regulation [22]. In fact, when the primary function stated as a claim on products is clearly referred to a biocidal activity (e.g., "kill bacteria/disinfect/proven effective against viruses"), these products can be considered biocides for human hygiene (PT1) [18], thus intending "sanitizer" as a synonym of "disinfectant" (https://www.theregulatorycompany.com/insights-2/insight-hand-sanitiser-cleanser-cosmetic-or-biocide). When the primary function refers to cleaning/cleansing for personal hygiene, these products can be considered cosmetics [23], still containing denatured alcohol and still being used to contrast COVID-19 transmission. In the context of COVID-19 emergency, these items were demanded with urgency, so the shortest way in terms of compliance and market access could have been chosen.

Given the above, the categorization of these products could be strongly different at global level. In order to identify as rigorously as possible all products intended to be used on hands with cleaning/sanitizing purposes, the category of "hand sanitizers" was provided. All products named "hand sanitizers" or "alcohol-based hand sanitizers" without any other detail are included in this category.

When authors reported a clear reference to PT1 Biocides, these products were included in the "disinfectants" category.

Table 3
Categorization criteria of all studies included and related categorization assigned in review

Article	Categorization criteria reported	Categorization assigned in review
Soave PM *et al.*, 2021 [3]	Household disinfectants = Household chemicals classified according to their antimicrobial properties (including hand sanitizers)	Disinfectants = household disinfectants (excluding hand sanitizers) Hand sanitizers = extracted from the total of "household disinfectants"
Mahmoud NF *et al.*, 2021 [4]	Disinfectants = surface disinfectants Hand sanitizers	Disinfectants Hand sanitizers
Le Roux G *et al.*, 2021 [5]	Home cleaning products = -not containing biocides -containing bleach -containing other biocides than bleach Alcohol-based hand sanitizers	Disinfectants = home cleaning products containing all biocides (bleach and other) Household products = home cleaning products not containing biocides Hand sanitizers = alcohol-based hand sanitizers
Du Plessis CE *et al.*, 2022 [6]	Antiseptic and disinfectants = environmental disinfectants + skin or wound antiseptics (including hand sanitizers) and unknown antiseptics Household chemicals = including cosmetics, household products and handyman products	Disinfectants = environmental disinfectants + skin or wound antiseptics (excluding hand sanitizers) and unknown antiseptics Household products = household chemicals Hand sanitizers = extracted from the total of "skin or wound antiseptics"
Babić Z *et al.*, 2020 [7]	Surface disinfectants = PT2 Reg. (EU) No. 528/2012 Hand sanitizers = PT1 Reg. (EU) No. 528/2012	Disinfectants = surface disinfectants (PT2) + hand sanitizers (PT1)
Giordano F *et al.*, 2022 [8]	Disinfectants = EuPCS categories from PP-BIO-1 to PP-BIO-5 Cleaning, care, and maintenance products (excludes biocidal products) = EuPCS categories PC-CLN Detergents and auxiliaries for laundry and dishwashing (excludes biocidal products) = EuPCS category PC-DET Handwashing gel products (excludes biocidal products)	Disinfectants Household products = EuPCS categories PC-CLN + PC-DET Hand sanitizers = handwashing gel products (excludes biocidal products)
Raffee L *et al.*, 2021 [9]	Household cleaners = products containing ammonia, hydrochloric acid, sodium hypochlorite or alkaline cleaning products, drain and oven cleaners, etc. Alcohol = ethanol-based cleaning solutions, hand sanitizers or pure ethanol as spray (not for intake).	Household products = household cleaners Hand sanitizers = alcohol (the exact number of hand sanitizers could not be extracted)
Crescioli G *et al.*, 2022 [10]	Toxic agents = sanitizer/cleaners, acids/caustic sodas, bleaches, machine detergents, hand washing detergents, other home cleaning products	Household products = toxic agents
Gummin DD *et al.*, 2020 [11]	Cleaning substances (household) = including disinfectants Hand sanitizers = ethanol based, isopropanol based, non-alcohol based, unknown - considered as a subgroup of cosmetics	Disinfectants = extracted from the total of cleaning substances Household products = cleaning substances (excluding disinfectants) Hand sanitizers
Gummin DD *et al.*, 2021 [12]	Cleaning substances (household) = including disinfectants Hand sanitizers = ethanol based, isopropanol based, non-alcohol based, unknown - considered as a subgroup of Cosmetics	Disinfectants = extracted from the total of cleaning substances Household products = cleaning substances (excluding disinfectants) Hand sanitizers
Milella MS *et al.*, 2021 [13]	Household and cleaning products	Household products
Casey P, Duggan E, 2021 [14]	AHS = Alcohol-based hand sanitizers	Hand sanitizers
Vandijck D *et al.*, 2022 [15]	Type 1 biocides (PT1 according to Reg. (EU) No. 528/2012) = human hygiene products including alcohol-based hand sanitizers Type 2 biocides (PT2 according to Reg. (EU) No. 528/2012) = disinfectants and algaecides not intended for direct application to humans or animals	Disinfectants = type 1 + type 2

Data synthesis

Three proportional meta-analyses were conducted to estimate the prevalence of exposures to disinfectants, household products and hand sanitizers reported by PCs during a specific period of 2020 *vs* the same period of 2019 (*Table 2,* the Period variable refers both to 2020 and 2019). In one study, data of exposures occurred before 2020 were reported as 2018-2019 exposure period [5]. In this case, a mean of the exposure data in 2018-2019 was calculated and used as comparison to 2020.

The results of meta-analyses are presented as pooled point estimates of prevalence with a 95% confidence interval. An I^2 statistic quantifying between-studies heterogeneity was estimated. The "metaprop" routine was conducted in Stata Version 17.

RESULTS

According to the inclusion and exclusion criteria and given the results obtained by the quality appraisal (at least 8/10 positive answers per study), all thirteen articles [3-15] were included to conduct the analyses. A flow diagram of the study selection process is reported in *Figure 1*.

Among all, n. 8 studies contributed to estimate the prevalence of exposures to disinfectants and hand sanitizers and n. 7 studies to household products.

As shown in *Table 3*, the product categories reported in all studies vary a lot from each other. For example, data on disinfectants provided by Du Plessis CE *et al.* [6] is affected by the presence of "wound antiseptics", which could belong to pharmaceutical agents taking into consideration the activity on injured skin. This data could not be extracted from the category "skin or wound antiseptics". Regarding Raffee L *et al.* findings [9], both "household cleaners" and "alcohol" categories could lead to differences in the results: the first category does not include the alcohol-based household products for surfaces, which are instead included in the "alcohol" category, combined with alcohol-based hand sanitizers.

Given the above, a great effort was made to provide categories as comprehensive and rigorous as possible.

For each product category, a sensitivity analysis was conducted excluding the main outlier (disinfectants: Mahmoud NF *et al.* [4]; household products: Crescioli G *et al.* [10]; hand sanitizers: Raffee L *et al.* [9]). The results obtained still confirmed a higher percentage of exposures detected in 2020 for each product category (disinfectants - 2019: 3.8%, 2020: 6.4%; household products - 2019: 20.9%, 2020: 23.3%; hand sanitizers - 2019: 0.6%, 2020: 2.5%).

Considering the small sample (less than 10 studies included per each analysis), the publication bias was not formally assessed according to the recommendations of the *Cochrane Handbook* [24].

Disinfectants

Soave PM *et al.* [3], Mahmoud NF *et al.* [4], Le Roux G *et al.* [5], Du Plessis CE *et al.* [6], Babić Ž *et al.* [7],

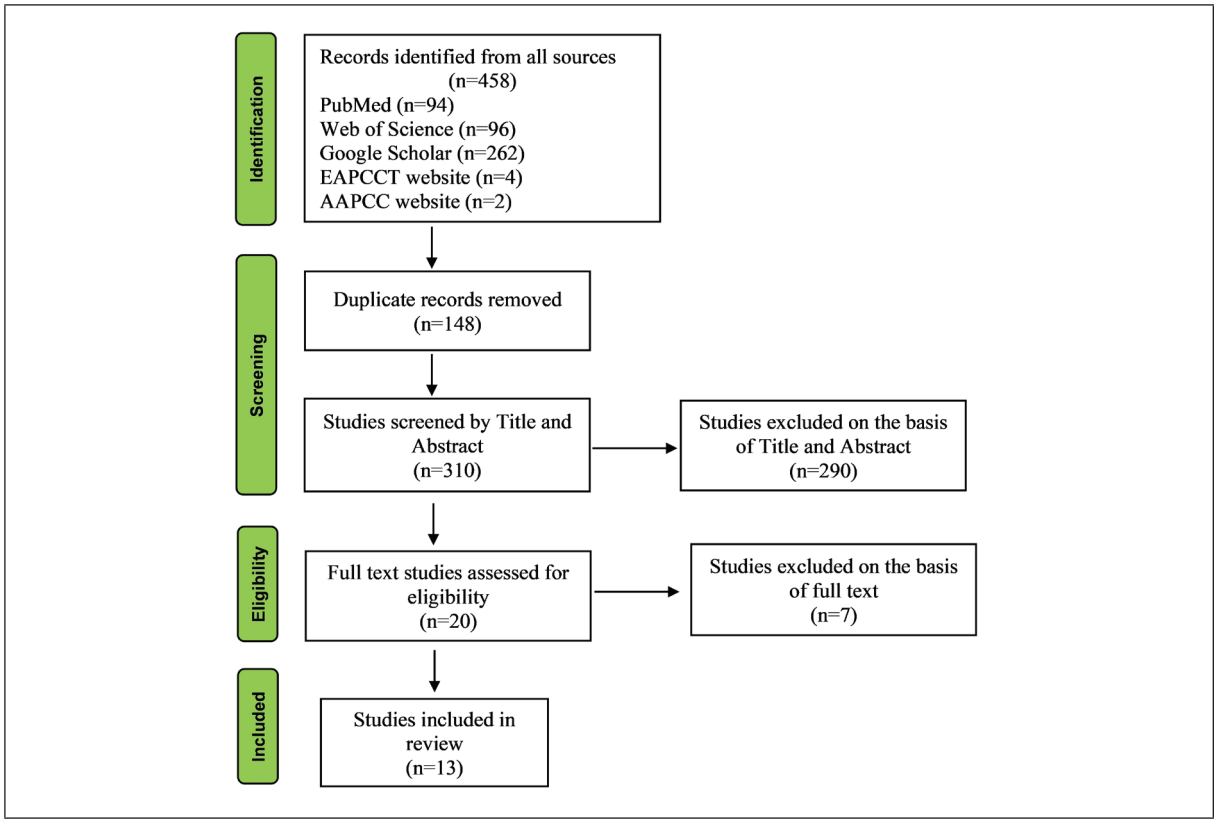


Figure 1
Study selection process flow diagram.

Giordano F *et al.* [8], Gummin DD *et al.* [11, 12] and Vandijck D *et al.* [15] contributed to estimate this value *(Figure 2)*. An increase of exposures to disinfectants was observed in 2020 (2019: 4.4%; 95% CI 2.5-6.8 *vs* 2020: 7.8%; 95% CI 4.2-12.5), although the value does not reach the statistical significance (p=0.22). Mahmoud NF *et al.* [4] show the highest difference from 2019 to 2020, with an increase of 11 percent point (pp) (2019: 9.4% *vs* 2020: 20.4%). A strong heterogeneity between studies is observed (I^2=99.9%; p<0.0001) *(Figure 2)*.

Household products

For household products exposures, a non-statistically significant increase of 3.6 pp can be pointed out in 2020 (2019: 25.0%; 95% CI 17.1-34.0 *vs* 2020: 28.6%; 95% CI 20.4-37.6; p=0.71) by analyzing data of Le Roux G *et al.* [5], Du Plessis CE *et al.* [6], Giordano F *et al.* [8], Raffee L *et al.* [9], Crescioli G *et al.* [10], Gummin DD *et al.* [11, 12], Milella MS *et al.* [13] (*Figure 3)*. Prevalence values for 2019 and 2020 vary a lot from each other, shifting from values under 10% in 2019 and 2020 (Gummin DD *et al.* [11, 12]) to values over 50% in 2019 and 2020 (Crescioli G *et al.* [10]).

The I^2 statistics of 99.9% (p<0.0001) *(Figure 3)* indicates strong heterogeneity between studies.

Hand sanitizers

The prevalence of exposures to hand sanitizers was estimated by analyzing data of Soave PM, *et al.* [3], Mahmoud NF *et al.* [4], Le Roux G *et al.* [5], Du Plessis CE *et al.* [6], Giordano F *et al.* [8], Raffee L *et al.* [9], Gummin DD *et al.* [11, 12], Casey P, Duggan E [14] *(Figure 4),* observing a statistically significant increase of 2.2 pp in 2020 (2019: 0.6%; 95% CI 0.4-0.9 *vs* 2020: 2.8%; 95% CI 2.2-3.5; p<0.001). The results obtained in 2019 and in 2020 seem to be generally similar across studies, except for Raffee L *et al.* [9] (2019: 4.2% *vs* 2020: 6.8%). The I^2 statistics of 99.7% (p<0.0001) *(Figure 4)* indicates strong heterogeneity between studies.

DISCUSSION

To our knowledge, this is the first meta-analysis based on PCs data from all over the world with the aim of estimating the prevalence of dangerous exposures possibly related to COVID-19 pandemic by providing three main product categories (disinfectants, household products and hand sanitizers) as inclusive and precise as possible.

An increase of exposures to the three product categories in 2020 was detected, though reaching the statistical significance only for hand sanitizers (p<0.001). Some studies show higher prevalence with respect to others (e.g., disinfectants: Mahmoud NF *et al.* [4]; household products: Giordano F *et al.* [8], Crescioli G *et al.* [10]; hand sanitizers: Raffee L *et al.* [9]). This evidence is mainly explained by the different categorization system used, based either on active ingredients, antimicrobial

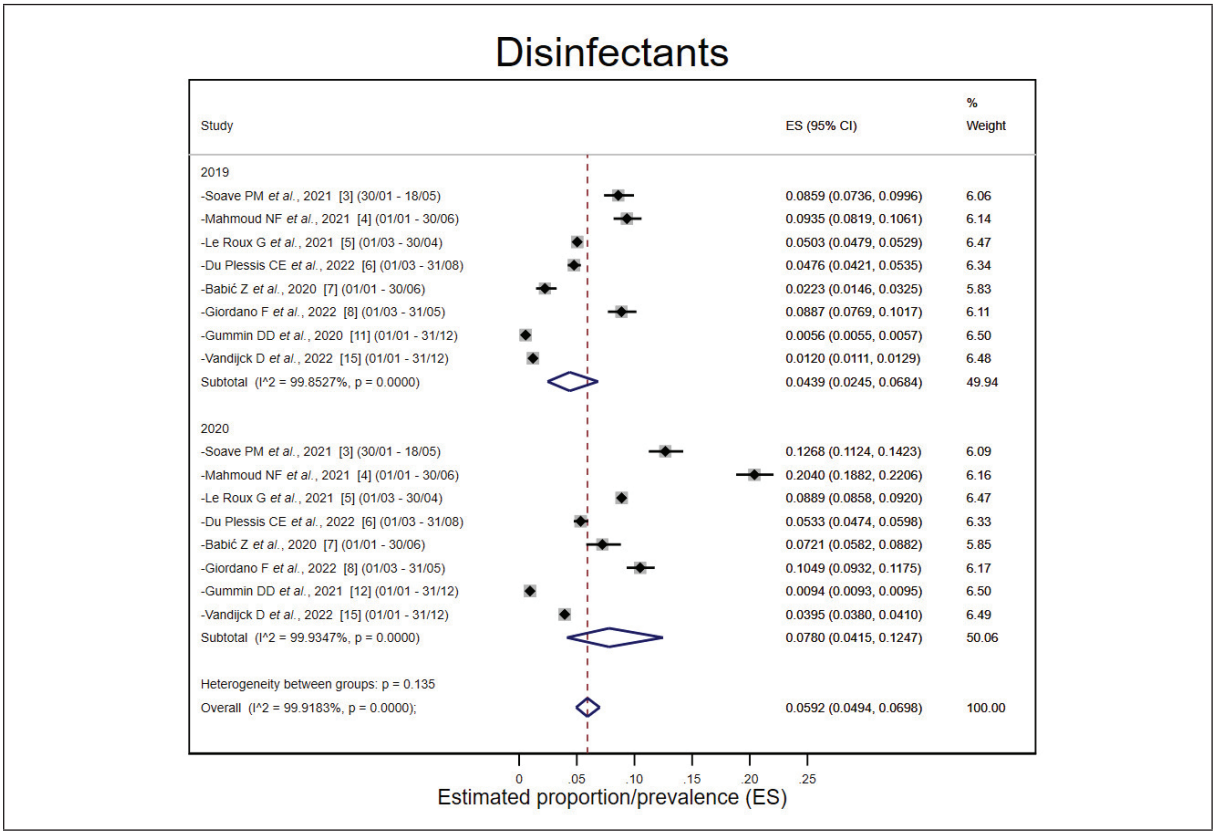


Figure 2
Prevalence of exposures to Disinfectants (2020 *vs* 2019).

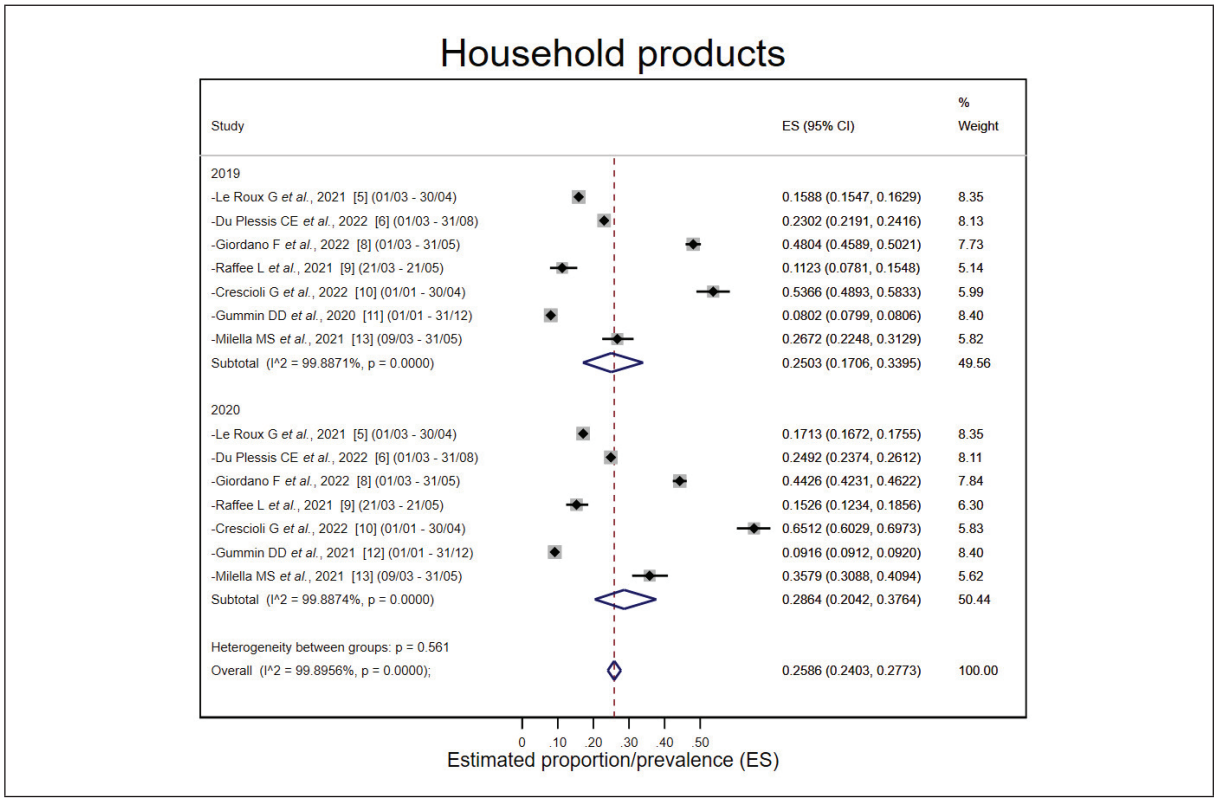


Figure 3
Prevalence of exposures to Household products (2020 *vs* 2019).

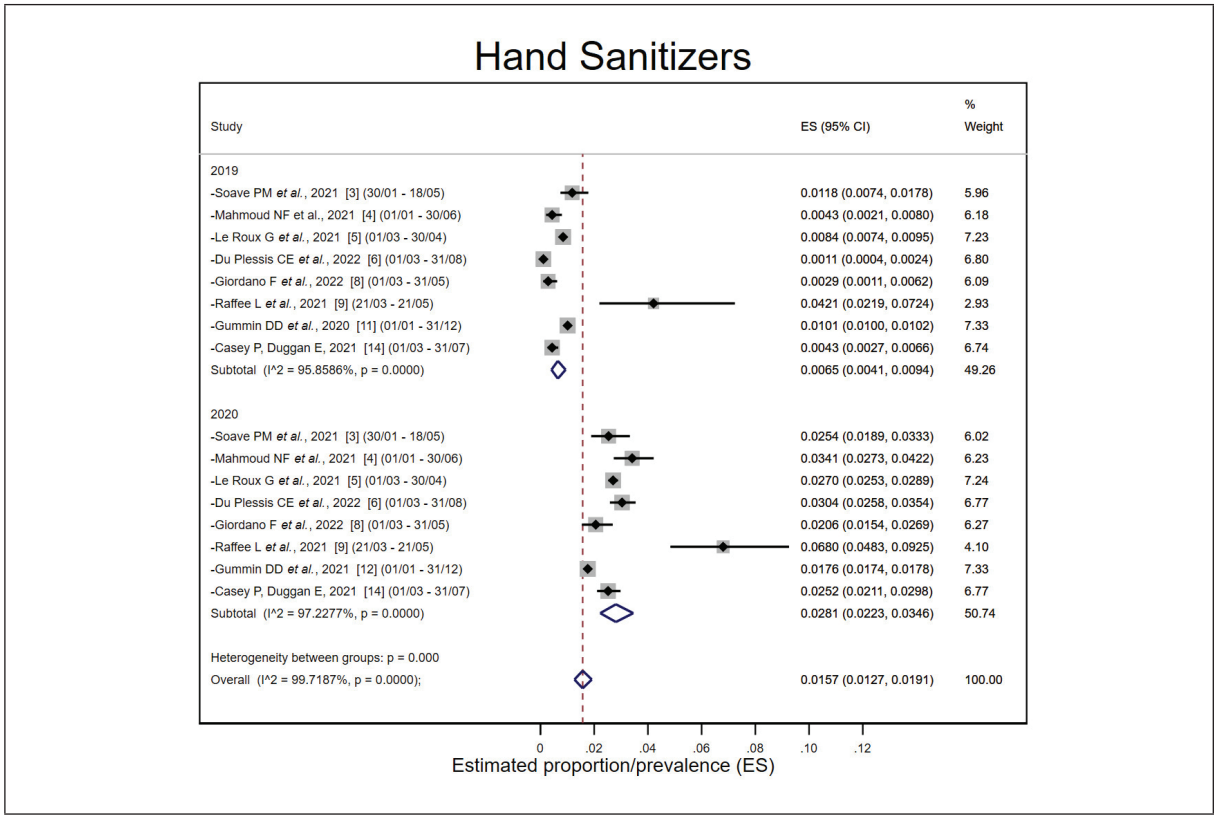


Figure 4
Prevalence of exposures to Hand Sanitizers (2020 *vs* 2019).

properties and/or on the main intended use of a mixture, leading to a possible overestimation of some values.

Despite PCs differences, comprehensive studies starting to appear in literature proved that COVID-19 strongly changed calls volume and characteristics managed in 2020 [25]. The fear of such an unexpected health emergency doubtlessly promoted wrong behaviors, posing health at risk [26]. On May 2020, an opt-in Internet panel survey aimed at characterizing knowledge and practices regarding household cleaning and disinfection during COVID-19 pandemic was conducted by Radhika Gharpure *et al.* [27]. This survey involved 502 US adults and highlighted knowledge gaps in several areas, such as: safe preparation of cleaning and disinfectant solutions, use of recommended Personal Protective Equipment (PPE), safe storage of hand sanitizers, cleaners, and disinfectants. The 39% of respondents reported to have implemented at least one of non-recommended high-risk practices with the intent of preventing SARS-CoV-2 transmission. All these practices, like washing food products with bleach, applying household cleaning or disinfectant products to bare skin and intentionally inhaling or ingesting these products, seriously pose health at risk and must be avoided. Analyzing data coming from the NPDS, Chang *et al.* [1] found that, among all cleaner products, bleaches accounted for the largest percentage of the increase detected in 2020. The American study also describes a case report of a woman who mixed a 10% bleach solution, vinegar, and hot water to wash her food. As a result, she immediately noted a "chlorine" smell, she developed difficulty in breathing, coughing, and wheezing and had to be transported to the Emergency Department. Dindarloo *et al.* [28] performed a descriptive-analytical study involving 1,090 participants with the aim of investigating the pattern of disinfectants use within outbreak of COVID-19 and estimating the adverse effects on public health. This study highlighted that around 60% of participants used to mix different kind of substances (e.g., sodium hypochlorite and alcohol with water) at home to create a disinfectant solution. The reaction of these substances could lead to the production of secondary compounds harmful to health. Only 10% of participants declared to follow the right way to mix chemicals, indicating an alarming trend that puts health at risk without even leading to effective solutions. It should be noted that two previous European surveys conducted in 2014 (http://data.europa.eu/88u/dataset/S872_74_3_EBS360) and 2018 [29] already highlighted a lack of knowledge about chemicals, both in correctly identifying the type of chemical in use and in understanding and reading the instructions on labels, that however should report clear and true information. For example, it is known that active ingredients in hand sanitizers are usually ethanol, isopropyl alcohol, and n-propanol, and their bactericidal and virucidal activity mainly depends on the concentration of alcohol [30]. Therefore, the name of the alcohol and its percentage should be correctly declared on labels, to inform consumers and ensure quality, effectiveness, and safety. A survey conducted in Dubai [31] proved that 6 of the 102 tested alcohol-based hand sanitizers contained undeclared methanol (which should be avoided in such products because of its high toxicity [32]) or a percentage of alcohol lower than 60%, in contrast with the indication given on labels. Moreover, since hand sanitizers are also sold in colorful packaging and seem to have pleasant flavors, children may be attracted to these products and try to lick it [33]. To avoid accidental exposure of unaware children that can lead to adverse effects, hand sanitizers should always be stored safely by adults [34].

CONCLUSIONS

This study confirms that COVID-19 strongly modified lifestyle habits and the exposure profile to specific categories of chemicals all around the world. Considering the diversity of PCs studies, a great effort was made to synthesize data and provide comprehensive results, showing non-statistically significant increases of exposures to disinfectants and household products and a statistically significant increase for hand sanitizers in 2020 at global level. The results obtained suggest the need to better understand how much consumers are aware of benefits and risks related to the use of chemicals and to what extent they know how to protect themselves. This evidence could represent an encouragement for worldwide competent authorities to improve public health by increasing the awareness on specific topics, such as: safe use of chemicals (right and wrong behaviors), how to read and interpret labels, what a PPE is and how to use it, the necessity of keeping chemicals out of the reach of children. This work also highlights the need to develop standardized systems with the aim of comparing data from PCs all over the world and allowing reliable epidemiological comparison.

COVID-19 emergency has certainly increased the attention towards the scientific community. Therefore, this could represent a precious opportunity for Institutions to establish even more fruitful dialogues with the general population, aiming at understanding difficulties and needs of citizens and providing increasingly clear and reliable answers on public health related issues.

Limitations of the study and further improvements

This work surely presents some limitations. First, the heterogeneity between studies in terms of sample sizes, variables reported, different period of interest and different categorization systems. The lockdown period due to COVID-19 was not always similar among countries, so a consistent variability of the exposure data can be observed. It should be also noted that the profile exposure to specific product categories could be affected by seasonality.

Doubtlessly, some improvements could be proposed in future. The Authors could be asked for more accurate data to refine the analyses reported and to include additional studies. A greater knowledge of the categorization criteria used in each study could lead to more precise analyses.

Authors' contributions

LL, FG, and RD worked on the study design. LL performed the identification of studies. LL and PMD conducted the screening and eligibility step. LL con-

ducted the quality analysis. LL, PMD and FG reviewed the selection and quality-check process. PMD organized the dataset to conduct the statistical analysis and performed the meta-analysis with the contribution of LL. LL and PMD worked on the results. LL and FG worked on the discussion, limitations, and conclusion with the contribution of FRM, FC, LR and FM. All authors made edits and contributions to the final draft. The Authors read and approved the final manuscript.

Conflict of interest statement

The Authors declare they have no competing interests.

Received on 1 February 2024.
Accepted on 10 April 2024.

REFERENCES

1. Chang A, Schnall AH, Law R, Bronstein AC, Marraffa JM, Spiller HA, Hays HL, Funk AR, Mercurio-Zappala M, Calello DP, Aleguas A, Borys DJ, Boehmer T, Svendsen E. Cleaning and disinfectant chemical exposures and temporal associations with COVID-19 - National Poison Data System, United States, January 1, 2020-March 31, 2020. MMWR Morb Mortal Wkly Rep. 2020;69(16):496-8. doi: 10.15585/mmwr.mm6916e1.
2. Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews BMJ. 2021;372:n71. doi:10.1136/bmj.n71
3. Soave PM, Grassi S, Oliva A, Romanò B, Di Stasio E, Dominici L, Pascali V, Antonelli M. Household disinfectant exposure during the COVID-19 pandemic: a retrospective study of the data from an Italian poison control center. Eur Rev Med Pharmacol Sci. 2021;25(3):1738-42. doi: 10.26355/eurrev_202102_24884
4. Mahmoud NF, Al-Mazroua MK, Afify MM. Toxicology practice during COVID-19 pandemic: experience of the Dammam Poison Control Center-Eastern Province, Saudi Arabia. Int J Toxicol. 2021;40(4):388-94. doi: 10.1177/10915818211017128
5. Le Roux G, Sinno-Tellier S, Puskarczyk E, Labadie M, von Fabeck K, Pélissier F, Nisse P, Paret N; French PCC Research Group; Descatha A, Vodovar D. Poisoning during the COVID-19 outbreak and lockdown: retrospective analysis of exposures reported to French poison control centres. Clin Toxicol (Phila). 2021;59(9):832-9. doi: 10.1080/15563650.2021.1874402
6. Du Plessis CE, Mohamed F, Stephen CR, Reuter H, Voigt G, van Hoving DJ, Marks CJ. A retrospective review of calls to the Poisons Information Helpline of the Western Cape during the first 6 months of the COVID-19 pandemic in South Africa. S Afr J Infect Dis. 2022;37(1):391. doi: 10.4102/sajid.v37i1.391
7. Babić Ž, Turk R, Macan J. Toxicological aspects of increased use of surface and hand disinfectants in Croatia during the COVID-19 pandemic: a preliminary report. Arh Hig Rada Toksikol. 2020;71(3):261-4. doi: 10.2478/aiht-2020-71-3470
8. Giordano F, Petrolini VM, Spagnolo D, Fidente RM, Lanciotti L, Baldassarri L, Moretti FL, Brambilla E, Lonati D, Schicchi A, Locatelli CA, Draisci R. Significant variations of dangerous exposures during COVID-19 pandemic in Italy: a possible association with the containment measures implemented to reduce the virus transmission. BMC Public Health. 2022;22(1):441. doi: 10.1186/s12889-022-12860-3
9. Raffee L, Daradkeh HM, Alawneh K, Al-Fwadleh AI, Darweesh M, Hammad NH, Almasarweh SA. Impact of COVID-19 lockdown on the incidence and patterns of toxic exposures and poisoning in Jordan: a retrospective descriptive study. BMJ Open. 2021;11(12):e053028. doi: 10.1136/bmjopen-2021-053028
10. Crescioli G, Lanzi C, Gambassi F, Ieri A, Ercolini A, Borgioli G, Bettiol A, Vannacci A, Mannaioni G, Lombardi N. Exposures and suspected intoxications during SARS-CoV-2 pandemic: preliminary results from an Italian poison control centre. Intern Emerg Med. 2022;17(2):535-40. doi: 10.1007/s11739-021-02774-0
11. Gummin DD, Mowry JB, Beuhler MC, Spyker DA, Brooks DE, Dibert KW, Rivers LJ, Pham NPT, Ryan ML. 2019 Annual Report of the American Association of Poison Control Centers' National Poison Data System (NPDS): 37th Annual Report. Clin Toxicol (Phila). 2020;58(12):1360-541. doi: 10.1080/15563650.2020.1834219
12. Gummin DD, Mowry JB, Beuhler MC, Spyker DA, Bronstein AC, Rivers LJ, Pham NPT, Weber J. 2020 Annual Report of the American Association of Poison Control Centers' National Poison Data System (NPDS): 38th Annual Report. Clin Toxicol (Phila). 2021;59(12):1282-501. doi: 10.1080/15563650.2021.1989785
13. Milella MS, Boldrini P, Vivino G, Grassi MC. How COVID-19 lockdown in Italy has affected type of calls and management of toxic exposures: a retrospective analysis of a Poison Control Center Database from March 2020 to May 2020. J Med Toxicol. 2021;17(3):250-6. doi: 10.1007/s13181-021-00839-2
14. Casey P, Duggan E. Unintended consequences of public health measures: exposures to alcohol-based hand sanitisers during the COVID-19 pandemic 2020. In: 41st International Congress of the European Association of Poisons Centres and Clinical Toxicologists (EAPCCT) 25-28 May 2021, Virtual Meeting. Clinical Toxicology. 2021;59(6):537-602. doi: 10.1080/15563650.2021.1906080
15. Vandijck D, Bekaert E, De Smet E, Moens J, Selway P, Van Baelen J, Wallemacq P, Descamps AM. Impact of COVID-19 on the number and type of calls to the Belgian Poison Centre. In: 42nd International Congress of the European Association of Poisons Centres and Clinical Toxicologists (EAPCCT) 24-27 May 2022, Tallinn, Estonia. Clinical Toxicology. 2022;60(S1):1-108. doi: 10.1080/15563650.2022.2054576
16. Munn Z, Barker TH, Moola S, Tufanaru C, Stern C, McArthur A, Stephenson M, Aromataris E. Methodological quality of case series studies: an introduction to the JBI critical appraisal tool. JBI Evid Synth. 2020;18(10):2127-33. doi: 10.11124/JBISRIR-D-19-00099
17. Europe. Regulation (EC) No 1272/2008 of the European Parliament and of the Council of 16 December 2008 on classification, labelling and packaging of substances and mixtures, amending and repealing Directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No 1907/2006. Gazzetta Ufficiale L 353/1, 31.12.2008.
18. Europe. Regulation (EU) No 528/2012 of the European Parliament and of the Council of 22 May 2012 concern-

ing the making available on the market and use of biocidal products. Gazzetta Ufficiale L 167/1, 27.6.2012.
19. Europe. Regulation (ec) No 1107/2009 of the European Parliament and of the Council of 21 October 2009 concerning the placing of plant protection products on the market and repealing Council Directives 79/117/EEC and 91/414/EEC. Gazzetta Ufficiale L 309/1, 24.11.2009.
20. Europe. Regulation (EC) No 648/2004 of the European Parliament and of the Council of 31 March 2004 on detergents. Gazzetta Ufficiale L 104, 8.4.2004.
21. European Commission. Proposal for a Regulation of the European Parliament and of the Council on detergents and surfactants, amending Regulation (EU) 2019/1020 and repealing Regulation (EC) No 648/2004, Brussels, 28.4.2023.
22. Berardi A, Perinelli DR, Merchant HA, Bisharat L, Basheti IA, Bonacucina G, Cespi M, Palmieri GF. Hand sanitisers amid CoViD-19: A critical review of alcohol-based products on the market and formulation approaches to respond to increasing demand. Int J Pharm. 2020;584:119431. doi: 10.1016/j.ijpharm.2020.119431
23. Europe. Regulation (EC) No 1223/2009 of the European Parliament and of the Council of 30 November 2009 on cosmetic products. Gazzetta Ufficiale L 342/59, 22.12.2009.
24. Page MJ, Higgins JPT, Sterne JAC. Chapter 13: Assessing risk of bias due to missing results in a synthesis. In: Higgins JPT, Thomas J, Chandler J, Cumpston M, Li T, Page MJ, Welch VA (Eds). Cochrane Handbook for systematic reviews of interventions. Version 6.4 (updated August 2023). Cochrane; 2023.
25. Hondebrink L, Zammit M, Høgberg LCG, Hermanns-Clausen M, Lonati D, Faber K; EAPCCT COVID-19 Research Group; EAPCCT COVID-19 Research Group authors. Effect of the first wave of COVID-19 on Poison Control Centre activities in 21 European countries: an EAPCCT initiative. Clin Toxicol (Phila). 2022;60(10):1145-55. doi: 10.1080/15563650.2022.2113094
26. Ghafoor D, Khan Z, Khan A, Ualiyeva D, Zaman N. Excessive use of disinfectants against COVID-19 posing a potential threat to living beings. Curr Res Toxicol. 2021; 2:159-68. doi: 10.1016/j.crtox.2021.02.008
27. Gharpure R, Hunter CM, Schnall AH, Barrett CE, Kirby AE, Kunz J, Berling K, Mercante JW, Murphy JL, Garcia-Williams AG. Knowledge and practices regarding safe household cleaning and disinfection for COVID-19 prevention – United States, May 2020. MMWR Morb Mortal Wkly Rep. 2020;69(23):705-9. doi: 10.15585/mmwr.mm6923e2
28. Dindarloo K, Aghamolaei T, Ghanbarnejad A, Turki H, Hoseinvandtabar S, Pasalari H, Ghaffari HR. Pattern of disinfectants use and their adverse effects on the consumers after COVID-19 outbreak. J Environ Health Sci Eng. 2020;18(2):1301-10. doi: 10.1007/s40201-020-00548-y
29. Wieck S, Olsson O, Kümmerer K. Consumers' perceptions of biocidal products in households. Int J Hyg Environ Health. 2018;221(2):260-8. doi: 10.1016/j.ijheh.2017.11.005
30. Saha T, Khadka P, Das SC. Alcohol-based hand sanitizer – composition, proper use and precautions. Germs. 2021;11(3):408-17. doi: 10.18683/germs.2021.1278
31. Jairoun AA, Al-Hemyari SS, Shahwan M. The pandemic of COVID-19 and its implications for the purity and authenticity of alcohol-based hand sanitizers: The health risks associated with falsified sanitizers and recommendations for regulatory and public health bodies. Res Social Adm Pharm. 2021;17(1):2050-1. doi: 10.1016/j.sapharm.2020.04.014
32. Holzman SD, Larsen J, Kaur R, Smelski G, Dudley S, Shirazi FM. Death by hand sanitizer: syndemic methanol poisoning in the age of COVID-19. Clin Toxicol (Phila). 2021;59(11):1009-14. doi: 10.1080/15563650.2021.1895202
33. Prajapati P, Desai H, Chandarana C. Hand sanitizers as a preventive measure in COVID-19 pandemic, its characteristics, and harmful effects: a review. J Egypt Public Health Assoc. 20228;97(1):6. doi: 10.1186/s42506-021-00094-x
34. Hakimi AA, Armstrong WB. Hand sanitizer in a pandemic: wrong formulations in the wrong hands. J Emerg Med. 2020;59(5):668-72. doi: 10.1016/j.jemermed.2020.07.018

Ann Ist Super Sanità 2024 | Vol. 60, No. 2: 145-153
DOI: 10.4415/ANN_24_02_09

Organizational Health Literacy as a supportive tool for the effective implementation of the 2013/59/EURATOM Directive in Italy

Martina Giusti[1], Cosimo Nardi[2], Guglielmo Bonaccorsi[3], Chiara Lorini[3] and Niccolò Persiani[1]

[1]*Dipartimento di Medicina Sperimentale e Clinica, Università degli Studi di Firenze, Florence, Italy*
[2]*Dipartimento di Scienze Biomediche, Sperimentali e Cliniche "Mario Serio", Università degli Studi di Firenze, Florence, Italy*
[3]*Dipartimento di Scienze della Salute, Università degli Studi di Firenze, Florence, Italy*

Abstract

Introduction. Since 2013, European countries have transposed the 2013/59/EURATOM Directive that lays down basic safety standards for protection against dangers arising from exposure to ionising radiation. In the years between the issuance of the European Directive and its formal transposition, Italian researchers investigated solutions to renew the technological, educational, and organizational culture in radiology departments.

Scope. This article proposed a reflection on the contribution of Organizational Health Literacy (OHL) to implement Legislative Decree 101/2020 in the practice of Italian radiology departments.

Results. By implementing OHL principles, examinations with exposure to ionizing radiation and related informative processes could be personalized based on patients' knowledge, abilities, and competencies, as well as on the services' provision. These principles can be in fact integrated with the organizational, training, and management requirements set by the Directive.

Conclusions. According with the state-of-the-art, decision-makers and health managers could support the application of OHL principles in Italian radiology departments.

Key words

- 2013/50/EURATOM
- radioprotection
- training
- health literacy
- health organizational

INTRODUCTION

The operative implementation of the regulations reported in the European Directive 2013/59/EURATOM is still ongoing in some European countries. This Directive aimed to lay down basic safety standards for protection against the dangers arising from exposure to ionising radiation. In the medical context, this Directive has led to focus on the technological, organizational, and professional implications since Member States were compliant with national regulations, transposition of the European Directive 2013/59/EURATOM requirements. These requirements control and contain radiation doses while achieving optimal diagnostic quality examinations [1-3] and define the general criteria for radiology diagnostic examinations, recommending the introduction of dedicated technologies for dose monitoring [4, 5]. The interventions pay especially attention on the improvement of population's knowledge about the risks connected with exposure to ionizing radiation. In fact, radiological risk has been usually underestimated by the population due to the difficulty of understanding the consequence of stochastic risk [6-8].

Due to the wide field of action of the European Directive and the slowness of national legislations, nowadays the practical and operational transposition of the Directive has not yet occurred in radiology departments.

European Directive and, consequently, national transpositions encouraged to start sharing all information related to medical exposure to ionizing radiation with patients because it is mandatory, but is it possible to provide adequate information without European shared guidelines on how to do it in the best way? Which could be the consequences of giving information to European patients by health professionals without specific competencies in patient education? Does

Address for correspondence: Martina Giusti, Dipartimento di Medicina Sperimentale e Clinica, Università degli Studi di Firenze, Largo Brambilla 3, 50134 Florence, Italy. E-mail: martina.giusti@unifi.it.

it really ensure to lay down basic safety standards for protection against the dangers arising from exposure to ionising radiation if European health professional working in radiology departments have different training paths? Patients are currently informed, but not educated to understand the full meaning of complex health information such as the dose index in accordance with the principles of radiation protection (justification, optimization, and limitation of dose). Still, health professionals are not trained to educate the patient using a communicative register tailored to their educational levels. Furthermore, there are no guidelines on how to do it. The same European Society of Radiology underlined the importance of upgrading the academic training of health professionals working in radiology departments since that the professionals involved in radiology departments will require these specific competences and skills [9]. Radiologists, to whom the responsibility of ionizing radiation exposure is mainly attributed, as well as radiographers and other health professionals employed in radiology departments, must be adequately trained on communication and education [10, 11]. All radiology workforces are responsible for educating patients and caregivers about the benefits and risks associated with exposure to ionizing radiation. A relevant contribution to the debate is given by OHL studies. The application of OHL principles can offer important support in reorganizing radiology departments to be more patient-oriented, according to the 2013/59/EURATOM Directive. The concept of Health Literate Healthcare Organisations (HLHOs) aims to align health care organization performance with patients' Health Literacy (HL) levels [12]. Nowadays, HL is a multidimensional concept with a public health perspective [13] that describes the degree to which individuals can obtain, process, and understand the basic health information to make appropriate health decisions [14, 15]. HL is progressively being recognised as a characteristic related to families, communities, and organisations providing health services [16]. In HLHOs, it is easier for people to navigate health services and to understand and use health information to take care of their health because of the presence of specific attributes owned by literate healthcare organisations [17]. Until now, little attention has been given in literature review to the effect of environmental support on health professionals and few outcomes related to staff satisfaction/perception of helpfulness have been reported. The most common types of interventions and outcomes reported have been related to the patients [18].

This paper aimed to suggest a reflection about the contribution of HL intervention toolkits for health care organizations [14, 19], especially radiology departments, for implementing the Directive 2013/59/EURATOM in European countries. In line with the principles of the HLHOs, in fact, radiology activities should be personalized to the health needs and knowledges of patient, who should have an active role not only in decision-making but also in the managerial and organizational processes of radiology departments to improve the quality of radiology services.

METHODOLOGY

The methodology of the country case study was considered the most suitable for pursuing the goal of this research [20, 21]. Italy was chosen as relevant country case study because of the mismatching between the formal transposition of the European Directive 2013/59/EURATOM by mean of the Italian law 101/2020 and the practise into the Italian radiology departments.

The case analysis was conducted in three phases [22]:

- *Within case analysis.* Data about the Italian pathway toward the implementation of European Directive 2013/59/EURATOM were acquired through narrative literature review to collect Italian reflections and suggestions on the implementation of the European Directive regulations. The literature review was conducted querying biomedical databases (PubMed, Web of Science, and Scopus) to select the most relevant studies on the topic, or rather the operative applications of regulation reported within the European Directive 2013/59/EURATOM in the Italian radiology department and by Italian scientific society in the field of radiology. The research group decided to include researched since 2013. In fact, the scientific community started to pay attention to the implementation of the Directive regulations before the formal transposition of the Directive at national level with the Italian Legislative Decree 101/2020. There was still no structured and coordinated implementation of the European Directive at national level in Italian radiology departments. This challenge is still ongoing for the different implementation at regional level due to the regional health governance in Italy.
- *Data acquisition.* Literature review showed that Italian professionals working in radiology departments discussed and acted to directly implement Directive's recommendations since its enactment. This paragraph focused especially on the actions applied by Italian radiological workforce to prepare the reference cultural and organizational context offering an overview on the state-of-art about the pathway just done for the Directive implementation in the practise and all the ongoing commitments related to the legislation to be kept. Attention was paid by Italian professionals working in radiology departments to higher social impact sectors, especially in paediatric radiology, computed tomography, nuclear medicine and radiology screening programs. Here the strategic role of the sensibilisation and the education both of health professionals and patients emerged to ensure the appropriateness of requests and the joint decision making.
- *Data discussion.* Depending on the state-of-art about the implementation of European Directive 2013/59/EURATOM recommendations in Italian radiology departments, the initiatives of sensibilization and education promoted in radiology departments were essentially and indirectly related with the improvement of HL level of all the stakeholder involved in the radiological examinations. The research group composed by expert in the field of HL, radiology, and health management focused on the required integrations among all these three perspectives. So, the achievement of better health outcomes in radiology

departments is deeply influences by the technological progression/innovation and the timely adaptation of organization model, and the improvement of HL levels of every possible stakeholder involved in the diagnostic process. It establishes the pre-conditions to effectively apply the HL intervention toolkits for making the healthcare organizations more literate and, consequently, for sustaining the operative implementation the Italian law 101/2020.

RESULTS

The Italian pathway toward the implementation of European Directive 2013/59/EURATOM started by Italian scholars investigating the degree of knowledge of the risks related to exposure to ionizing radiations by the population to plan and implement actions to engage patients in improving their understanding of radiology departments. Bastiani, *et al* [23] showed that most users were not fully aware of the dangers linked to exposure to ionizing radiations, mostly in the medical context. In particular, the differences between the various radiology methods (traditional radiology *vs* computer tomography, CT) and the type of ionizing radiation sources (external *vs* internal) were unclear. These uninformed patients usually did not know where to find more information or who to contact to have clarifications. Initiatives for improving their understanding of the risks associated with exposure to ionizing radiations by radiology professionals were essential. On the other side, well-informed users, who ask for additional information to learn more about the possible health-related consequences in relation to the performed radiology examination (protocol used, professionals involved, dose delivered, and report), must be managed. The engagement of these patients and caregivers must be enhanced over time in relation to the introduction of innovations, more stringent rules about dose containment, and improvement of practice [24].

In the last few years, algorithms for the modulation of the dose in relation to the patient's mass, dose control software, and artificial intelligence systems became increasingly widespread to progressively reduce the delivered dose for adequate radiology diagnostic imaging and to control the cumulative dose over time [25]. The revision and updating of practice in radiology departments were direct consequences of these adaptations. The continuous training of health professionals working and of colleagues of other medical branches, who have been using these technologies as diagnostic tools, was mandatory.

The European Directive required enhancing communication and comparison between radiology specialists and colleagues of other medical branches to evaluate together the appropriateness of a radiological examination according to radioprotection principles and clinical queries. Radiology professionals have had and are having the role of promoters, teachers, and controllers of good practice in radiology departments. Therefore, they are responsible for the discussion of justification criteria in relation to new available technologies and practices in the medical community [26].

At the same time, the progressive evolution of the radiology sector must be shared with patients using adequate communication because they are the main actor of the radiology pathway, signing the informed consent [27].

The challenge of dual training of health professionals working in radiology departments, therefore, was and still is in technical and educational areas. Health professionals must be able to adapt their practice, taking full advantage of new available technologies and their communication register according to knowledge, competence, abilities, and skills of each stakeholder.

The possible different configurations of these two variables significantly influenced and are influencing the balancing between risk factors and achievable benefits and, consequently, the justification or not of a radiological examination.

For these reasons, studies have paid attention to the health outcomes obtained by stronger adherence to protocols and more effective information, especially in the following radiology sectors, with higher social impact:

- paediatric radiology: babies, children, and young adults have an increased risk of adverse effects as they are more sensitive to ionizing radiations and have longer life expectancy. These factors have led to the adoption of strict protocols for dose containment [28]. In addition, parents or legal guardians must assume responsibility for minors' exposure to ionizing radiation [29];
- computed tomography, that is the radiological diagnostic examination which delivers the highest level of dose [30];
- nuclear medicine, which presents challenges due to the complex nature of inside-out ionizing radiations and the emergence of hybrid imaging procedures [31];
- radiology screening programs, such as mammography and low-dose lung CT, which enrols asymptomatic individuals [32, 33].

Paediatric radiology

Over the years, more stringent operating procedures have been implemented in paediatric radiology. The continuous updating of international guidelines in paediatric radiology reform practices at the national level [34, 35] to limit as much as possible the medical exposure to ionizing radiations in the prenatal and postnatal period. The paediatric population has a higher sensitivity to ionizing radiation exposure and a longer life expectancy than the adult population. Nowadays dose containment of exposure to ionizing radiations for new-borns, infants, children, and young adults has been enforced by the widespread availability of dose control technologies [36, 37] and increased focus on the choice of the most appropriate imaging techniques, such as echography, conventional radiology, magnetic resonance imaging, computer tomography, or nuclear medicine [28]. Dose containment in paediatric radiology also depends on the full awareness of the risks associated with exposure to ionizing radiations by both guardians of minors [28 19] and doctors of other medical branches [38]. Numerous campaigns have been conducted towards guardians of minors. Their better understanding of the risks associated with ionizing

radiations effectively have contributed to ensuring respect for radioprotection principles. They must sign the consent for the execution of radiology examination of a paediatric patient only if they are able to critically judge risks and benefits after specific education [39]. For these reasons, research groups have worked hard to increase the HL levels of guardians of minors to reduce the influence of social, educational, and economic variables in the decisional process leading to the signature of the informed consent for the medical exposure to ionizing radiations of paediatric patients [40, 41].

At the same time, dose containment has been linked with the number of prescriptions of radiological examinations to paediatric patients by practitioners and paediatricians [38, 42]. The joint development of protocols on how to assess the justification of a radiology examination by radiation protection experts and colleagues of other medical branches reduced inappropriate prescriptions, improve the accuracy of evaluation, and make the communication to patients and caregivers of the risk associated with exposure to ionizing radiations more effective [42]. These good practices must then be extended to all patient targets.

Computed tomography

Computed tomography is still the diagnostic radiology technique that delivers the highest dose. Since the advent of this technique, particular attention has been paid to the development of effective communicative strategies to inform patients about the higher risks associated with this kind of radiology examination [30]. According to the findings of Bastiani and colleagues [23], personalized communication has been essential. Patients must be enabled to achieve an adequate comprehension of health processes, in this case, the execution of a computer tomography examination, with their own knowledge and abilities. Effective communication between patients and radiology healthcare professionals encourages asking questions, prevents excessive fear and limited collaboration, reduces the incidence of unnecessary or unjustified radiology examinations, and empowers patients to personally monitor the overall radiation dose they receive. Patients were able to decide autonomously [30].

It was necessary to measure health competences for patients to tailor the communication according to their needs. The measurement of HL levels helped. HL "entails people's knowledge, motivation, and competences to access, understand, appraise, and apply health information in order to make judgments and take decisions in everyday life concerning healthcare, disease prevention, and health promotion to maintain or improve quality of life during the life course" [43]. Patients should possess competencies and information to comprehend the conveyed information (functional HL), understand how to reprocess information (interactive HL), and use available information for navigating health care services (critical HL). Applying these abilities in radiology departments, patients should be able to understand information provided on the risks related to medical exposure to ionizing radiations (functional HL). With the available information, patients can make an informed decision about risk-taking and sign informed consent for a radiology examination (interactive HL). Finally, patients should use health and organizational information to develop their own global vision of the services provided (critical HL), which enables them to judge the quality and effectiveness of radiology departments [44].

Nonetheless, solid knowledge of available technologies and continuous updates of their competences are prerequisites for health professionals working in radiology departments to guarantee the best performance according to radioprotection principles, especially for patients with low HL levels [45, 46].

Nuclear medicine

In diagnostic nuclear medicine, patient information and education have already been extensively discussed because the patient is the source of ionizing radiation due to the administration of radioactive material.

Risks associated with exposure to ionizing radiation are not only for the patient, but also for others during the decay and washing phase of the injected radioisotope. Therefore, patients must be well-educated to exhibit the best behaviour to minimize unintended exposure to third parties [23, 47]. All phases of the diagnostic path are characterized by specific risks, which can be predominantly managed through patient education. From the moment of examination booking, patients must be informed and educated so they can understand, arrange, and adopt precautions to limit exposure to ionizing radiation of third parties, both inside and outside nuclear medicine departments. The use of personalized communication by health professionals is crucial to maximize the patient's understanding. The 2013/59/EURATOM Directive stresses the importance of adequate health professional training to improve the safety of all stakeholders, particularly the health workforce and patients. Particular attention should be paid to additional training on communication for health professionals employed in nuclear medicine departments. They must be directly involved in improving operational professional competences to optimize dose and indirectly in acquiring communication skills to reduce occupational, organizational, and population risks associated with unintended exposure to ionizing radiation through patients. The effective channelling of different and complex health information to patients in nuclear medicine departments has been, is, and will be guaranteed only by the commitment of the nuclear medicine department staff to adapt their communication register to overcome anxiety, fear, and stress due to forced isolation for the containment of unintended exposure or constriction for imaging acquisition [31, 48]. At the end of the examination, the informative and educational role of health professionals was not concluded because it was necessary to verify for the last time the patient's understanding and voluntary application of the required cautions to minimize unintended exposure. The informative right of the patient obligates the staff of nuclear medicine departments and the patient's general practitioner to explain the information included in the final report so that the patient has a full understanding of the obtained diagnosis result [49]. Health

professionals must accompany, inform, educate, and support patients throughout their entire engagement with nuclear medicine departments, which finishes only with the delivery of the examination report.

Screening programs

At the international level, campaigns for secondary prevention aim to improve patient education on screening programs, personalizing communication according to everyone's abilities. This is particularly important when radiological examinations such as mammography for the preventive diagnosis of breast cancer [32] and low dose computed tomography for lung cancer screening [33] are involved. For each phase of the screening process, a specific communicative strategy has been defined to improve the quality of imaging and minimize ionising radiation exposure by fully collaborating with the patient. This has been including a warm welcome to help overcome anxiety and stress, clear and resolute communication during the examination, and a thorough and polite explanation of the report reception, possible additional examinations of the second level, and an invitation to the next control. The goal is not only to obtain a good quality examination but also to ensure that the patient will return for the next screening [50, 51].

From a literature review, it emerged that health professionals involved in breast cancer screening received *ad hoc* training in communication and patient information as part of their technical learning process [52]. The acquisition of communicative skills through experience has been not enough because consistent information from different health professionals at different appointments is crucial in screening programs. Only through joint informative, communicative, and educational strategies with the patient can this be achieved. The European Society of Breast Cancer Specialists has established standards for the training of specialized health professionals involved in breast cancer, including specific modules on communication to prepare all health professionals working in screening programs to inform patients and colleagues about adopted protocols [53].

Guidelines for lung cancer screening with low dose computed tomography focused mainly on organizational requirements and modalities for nodule characterization by radiologists. Informative aspects, such as specific indications on service adaptation or personnel training, were absent [54]. The practice of detailed explanation of protocols used for breast cancer screening must be extended to all radiological examinations, starting with screening, for good results regarding health outcomes and patient satisfaction.

These results evidenced how an integration among the different approaches developed and adopted within various radiological fields of action is necessary. In fact, the attention paid in patients and caregivers' orientation of the paediatric radiology service, the effective communication to patients and caregivers by health professionals before the provision of CT examinations for the acquisition of real consensus, the educative commitment of nuclear medicine's health professionals and the specific training session for the same health professionals in screening programs must be part of the core skill-mix of each health professional working in every kind of radiology departments. This represents a significant starting point for decision-makers in the healthcare sector who are seeking appropriate tools to plan, implement, and promote interventions aimed at improving the safety and quality of healthcare services. Specifically, this pertains to Italian radiology departments undergoing HL promotion interventions *(Figure 1)*.

DISCUSSION. OHL AS A TOOL TO IMPLEMENT THE 2013/59/EURATOM DIRECTIVE IN ITALIAN RADIOLOGY DEPARTMENTS

Until now, research on communication in Italian radiology departments primarily focused on patient engagement through spot initiatives. However, these initiatives did not propose effective and lasting solutions

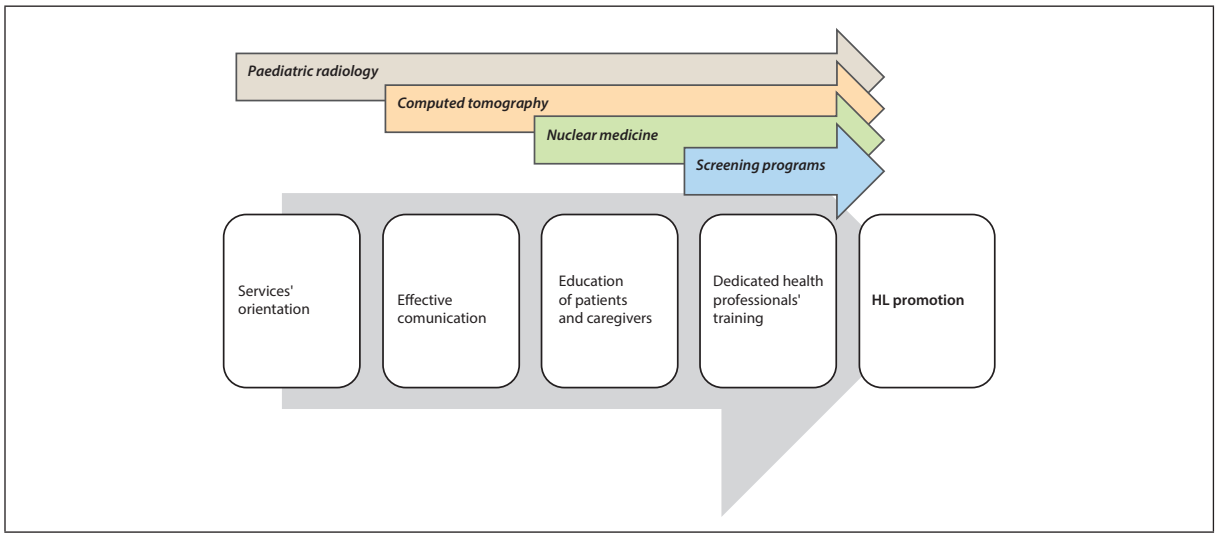


Figure 1
The contribution of different radiological areas to Health Literacy (HL) promotion.

for educating patients over time or meeting the informative and educative needs of health professionals in other medical branches. Radiologists and radiographers were and are still the only ones delegated to explain the justification principle, or the balance between the benefit of diagnosis and the possible risks associated with exposure to ionizing radiations, even though they have not received adequate training [10, 11]. The 2013/59/EURATOM Directive recommended *ad hoc* training for health professionals employed in radiology departments to acquire specific educative competences and adapt their communication strategies to the knowledge and abilities of the different stakeholders in their departments. These commitments must be integrated part of the daily activity of the radiology workforce. Primarily, radiologists and radiographers must acquire these skills as responsible for the application of the justification principle and the acquisition of informed consent. Then, anyone who works in the radiology department, including nurses, administrative staff, and support personnel, may be called upon to fulfil this commitment [26, 45].

The barycentre of radiology departments must return to being the patient, instead of the provision of service, according to the implementation of the 2013/59/EURATOM Directive. The required reorientation and reorganization of radiology departments could be sustained by the application of OHL principles in this specific context. The path for achieving the OHL attributes matched perfectly with the changes required by the implementation of the 2013/59/EURATOM Directive in Italy *(Table 1)* [17]. The final scope of both the Directive and OHL is the patient as the paradigm for thinking, renewing, and reorganizing the governance and management of health organizations, specifically radiology departments.

The impact related to the improvement of OHL levels has been studied in different health branches and healthcare settings [12, 55-57]. However, none of them was applied to radiology departments until now. The Italian Society of Medical Radiology only published recommendations for including the dose index level in radiology reports and a manual to assess the quality of radiological examinations and treatments. The mere partial and formal fulfilment of the implementation was done, moving from the evidence by literature review and the requirements of the 2013/59/EURATOM Directive.

In contrast, the implementation of the European Directive in practice could pass through making Italian radiology departments more health literate by following the indications given for the application of the OHL attributes. The application of OHL principles in Italian radiology departments could start with the training of health professionals [18, 19, 58, 59].

The 2013/59/EURATOM Directive required the acquisition of educative competences to tailor communicative information in relation to patients/caregivers' knowledge, or rather according to their HL level, and stresses the optimal use of available technologies for dose monitoring and containment by the radiology workforce (OHL principle 3, 5, 6, 7, 8, 10). These aspects enforced the respect of the principles of justification, optimization, and limitation of the delivered dose and the involvement of patients in the decision-making process related to their health (OHL principles 2 and 9).

Table 1. Comparison between the Italian transposition of the 2013/59/EURATOM Directive and the 10 Organizational Health Literacy (OHL) attribute

Law 101/2020 TITLE XIII – MEDICAL EXPOSURES (Art. 156-171)	**OHL attributes A Health Literate Health Organization**
EU Mandate	1. Has leadership that makes HL integral to its mission, structure, and operations.
Art. 157. Application of the principle of justification to medical exposures Art. 158. Application of the principle of optimization to medical exposures	2. Integrates HL into planning, evaluation measures, patient safety, and quality improvement.
Art. 162. Training	3. Prepares the workforce to be health literate and to monitor progress.
Art. 166. Special protection during pregnancy and breastfeeding Art. 168. Population dose assessment and clinical audits	4. Includes populations served in the design, implementation, and evaluation of health information and services.
Art. 159. Liability Art. 161. Procedures Art. 164. Documents	5. Meets the needs of populations with a range of HL skills while avoiding stigmatization. 6. Uses HL strategies in interpersonal communications and confirms understanding at all points of contact. 7. Provides easy access to health information and services, as well as navigation assistance. 8. Designs and distributes print, audio-visual, and social media content that is easy to understand and act on.
Art. 167. Incidental and undue exposure Art. 170. Supervision	9. Addresses HL in high-risk situations, including care transitions and communications about medicines.
Art. 162. Training Art. 161. Procedures	10. Communicates clearly what health plans cover and what individuals will have to pay for services.

In order to make this possible, the high and middle management of Italian radiology departments should work together to establish OHL [60]. Implementation of OHL should be easier and faster with adequate governmental and organizational support. It can be considered a strategic management approach to improving the health outcomes of health organizations, updating, and increasing the roles of both health professionals and patients in terms of controlling and critically evaluating the process of care and making suggestions for improvement (OHL principle 1).

The next step should overcome resistance to change and to rethink the practice of Italian radiology departments. These department should be more open and resilient in adapting to the needs of both patients/caregivers and colleagues, with input from all stakeholders in the decision-making process. In this way, the reform of Italian radiology departments will satisfy the requirements of both the 2013/59/EURATOM Directive and the population (OHL principle 4), becoming a virtuous example of a Health Literate Health Department [61]. Radiology departments should be an example for colleagues in other departments. The increasingly widespread application of the OHL attributes in health organizations should be an internal mechanism of change and evolution, able to positively reform the entire Italian national healthcare system.

The auspicated impact of the OHL principles' introduction in radiology departments will bring to increase the advantages for patients and caregiver in relation with the positive outcome given as in the cardiac rehabilitation (feasible organizational quality improvement interventions that responded to local HL needs, enhancement of social support and individualized care, organizational impact promoting co-design process, motivation and ownership among service's users, staff, and leaders), maternal and child departments (teaching activity) or primary care settings (participative development and evaluation process of a HL self-assessment tool with general practitioners and community care organizations) in which these have already been adopted with knowledge of the facts. In these fields of actions, the additional and significant variables were especially the will and the mandate by the top management as decision-maker to implementation HLHO thought these actions for the achievement of fixed purposes, or rather to more navigable patient-centred health services.

CONCLUSIONS

Since the issuance of the 2013/59/EURATOM Directive, European studies focused on the technological equipment and professional competences required to contain exposure to ionizing radiations. These studies influenced the procurement of new technologies and the review of procedures adopted. However, the improvement of radiation protection knowledge among patients, caregivers, and health professionals, through the enhancement of the informative and educational competence of radiology staff, remains a critical issue. Although their training needs are clear, no solutions have yet been proposed to address this.

Today, there is no longer any time to postpone. Improving the OHL in Italian radiology departments could provide an opportunity to expedite this process. The requirements mandated by the 2013/59/EURATOM Directive and the attributes that a health service or organization should possess to increase its level of OHL are the same. Health policymakers and top management of healthcare organizations should promote this experimentation in radiology as a pilot study for cross-sectional collaboration with the entire healthcare sector. This experience could validate the positive results already obtained in some other medical specialties. If the expected benefits are confirmed, improving OHL should be adopted as a systematic approach to reposition the patient at the centre of the Italian healthcare system. This is likewise the primary objective of Mission 6 – Health of the National Plan of Recovery and Resilience drawn up by the Italian government to address the severe economic crisis resulting from the COVID-19 pandemic.

Conflict of interest statement

Nothing to declare.

Received on 4 May 2023.
Accepted on 24 April 2024.

REFERENCES

1. Fitousi N. Patient dose monitoring systems: a new way of managing patient dose and quality in the radiology department. Physica Medica. 2017;44;212-21. doi: 10.1016/j.ejmp.2017.06.013
2. Komperød M, Friberg EG, Rudjord AL. Radiation doses to the Norwegian population. Summary of radiation doses from planned exposure and the environment. Østerås: Norwegian Radiation Protection Authority; 2015. (StrålevernRapport 2015/13).
3. Loose R, Wucherer M, Walz M, Adamus R. The new radiation protection framework since 2019. Implementation in Germany and comparison of some aspects in seven European countries. Rofo. 2020;192(11):1036-45. doi: 10.1055/a-1137-0096
4. Chateil J, Cavanagh P, Ashford N, et al. Referral guidelines for medical imaging: availability and use in the European Union. European Commission, Directorate-General for Energy; 2014.
5. Jaschke W, Clark J, Hierath M, et al. European study on clinical diagnostic reference levels for X-ray medical imaging: EUCLID, European Commission, Directorate-General for Energy; 2021.
6. Kenny E, Byrne B, Lewis M, King DM. Perception of medical radiation risk in Ireland: Results of a public survey. Physica Medica. 2019;68;96-103. doi: 10.1016/j.ejmp.2019.10.033
7. Sweetman SJ, Bernard J. Patient knowledge and perception of radiation risk in diagnostic imaging: A cross-sectional study. J Patient Exp. 2020;7(1):110-5. doi: 10.1177/2374373518825118

8. Della Monaca S, Dini V, Grande S, Palma A, Tkaczyk AH, Koch R, Murakas R, Perko T, Duranova T, Salomaa S, Roivainen P. Assessing radiation risk perception by means of a European stakeholder survey. J Radiol Prot. 2021;41(4):1145. doi: 10.1088/1361-6498/abf75a
9. European Society of Radiology. Summary of the European Directive 2013/59/EURATOM: essentials for health professionals in radiology. Insights into imaging. 2015;6;411-7. doi: 10.1007/s13244-015-0410-4
10. Daley F, Bister D, Markless S, Set P. Professionalism and non-technical skills in radiology in the UK: a review of the national curriculum. BMC Res Notes. 2018;5;11(1):96. doi: 10.1186/s13104-018-3200-5
11. Hawkins CM, Bowen MA, Gilliland CA, Walls DG, Duszak R Jr. The impact of nonphysician providers on diagnostic and interventional radiology practices: operational and educational implications. J Am Coll Radiol. 2015;12(9):898-904. doi: 10.1016/j.jacr.2015.03.034
12. Bonaccorsi G, Romiti A, Ierardi F, Innocenti M, Del Riccio M, Frandi S, Lorini C. Health-literate healthcare organizations and quality of care in hospitals: a cross-sectional study conducted in Tuscany. IJERPH. 2020;17(7):2508. doi: 10.3390/ijerph17072508
13. Sørensen K, Van den Broucke S, Fullam J, et al. Health literacy and public health: A systematic review and integration of definitions and models. BMC Public Health. 2021;12;80. doi: 10.1186/1471-2458-12-80
14. Batterham RW, Hawkins M, Collins PA, Buchbinder R, Osborne RH. Health literacy: Applying current concepts to improve health services and reduce health inequalities. Public Health. 2016;132:3-12. doi: 10.1016/j.puhe.2016.01.001
15. Nielsen-Bohlman L, Panzer AM, Kindig DA. Health literacy: a prescription to end confusion. 2004. Washington: National Academies Press; 2004.
16. Rudd RE, Renzulli D, Pereira A, Daltory L. Literacy demands in health care settings: The patient perspective. In: Schwartzberg JG, Van Geest JB, Wang CC (Eds). Understanding health literacy: implications for medicine and public health. Chicago: AMA Press; 2005.
17. Brach C, Keller D, Hernandez LM, Baur C, Parker R, Dreyer B, Schyve P, Lemerise AJ, Schillinger D. Ten attributes of health literate health care organizations. Washington: Institute of Medicine of the National Academies; 2012.
18. Zanobini P, Lorini C, Baldasseroni A, Dellisanti C, Bonaccorsi G. A scoping review on how to make hospitals health literate healthcare organizations. IJERPH. 2020;17:1036. doi: 10.3390/ijerph17031036
19. Brach C. The journey to become a health literate organization: a snapshot of health system improvement. Stud Health Technol Inform. 2017;240:203-37.
20. Yin RK. Case study research. London: Sage Pubblications; 2003.
21. Eisenhardt KM. Building theories from case study research. AMR. 1989;14(4):532-50. doi: 10.5465/amr.1989.4308385
22. Miles MB, Huberman AM. Qualitative data analysis: An expanded sourcebook. London: Sage pubblications; 1994.
23. Bastiani L, Paolicchi F, Faggioni L, Martinelli M, Gerasia R, Martini C, Cornacchione P, Ceccarelli M, Chiappino D, Della Latta D, Negri J, Pertoldi D, Negro D, Nuzzi G, Rizzo V, Tamburrino P, Pozzessere C, Aringhieri G, Caramella D. Patient perceptions and knowledge of ionizing radiation from medical imaging. JAMA Netw Open. 2021;4(10):e2128561. doi: 10.1001/jamanetworkopen.2021.28561
24. Ria F, et al. Awareness of medical radiation exposure among patients: a patient survey as a first step for effective communication of ionizing radiation risks. Physica Medica. 2017;43:57-62. doi: 10.1016/j.ejmp.2017.10.014
25. Ria F, D'Ercole L, Origgi D, Paruccini N, Pierotti L, Rampado O, Torresin A. Statement of the Italian Association of Medical Physics (AIFM) task group on radiation dose monitoring systems. Insights Imaging. 2022;13(1):23. doi: 10.1186/s13244-022-01155-1
26. European Society of Radiology. Summary of the European Directive 2013/59/EURATOM: essentials for health professionals in radiology. Insights Imaging. 2015;6:411-7. doi: 10.1007/s13244-015-0410-4
27. Stewart C, Smith-Bindman R. It is time to inform patients of medical imaging risks. JAMA Netw Open. 2021;1;4(10):e2129681. doi: 10.1001/jamanetworkopen.2021.29681
28. Tomà P, Bartoloni A, Salerno S, Granata C, Cannatà V, Magistrelli A, Arthurs OJ. Protecting sensitive patient groups from imaging using ionizing radiation: effects during pregnancy, in fetal life and childhood. Radiol Med. 2019;124(8):736-44. doi: 10.1007/s11547-019-01034-8
29. Oikarinen HT, Perttu AM, Mahajan HM, Ukkola LH, Tervonen OA, Jussila AI, Henner AO. Parents' received and expected information about their child's radiation exposure during radiographic examinations. Pediatr Radiol. 2019;49(2):155-61. doi: 10.1007/s00247-018-4300-z
30. Salerno S, Nardi C, Tudisca C, Matranga D, Vernuccio F, Di Piazza A, Selvi V, Colagrande S. Complete written/oral information about dose exposure in CT: is it really useful to guarantee the patients' awareness about radiation risks? Radiol Med. 2018;123(10):788-98. doi: 10.1007/s11547-018-0909-0
31. Salvatori M, Rizzo A, Rovera G, et al. Radiation dose in nuclear medicine: the hybrid imaging. Radiol med. 2019;124:768-76. doi: 10.1007/s11547-019-00989-y
32. Giordano L, Stefanini V, Senore C, Frigerio A, Castagno R, Marra V, Dalmasso M, del Turco MR, Paci E, Segnan N. The impact of different communication and organizational strategies on mammography screening uptake in women aged 40-45 years. Eur J Public Health. 2012;22(3):413-8. doi:10.1093/eurpub/ckr090
33. Rundo L, Ledda RE, di Noia C, Sala E, Mauri G, Milanese G, Sverzellati N, Apolone G, Gilardi MC, Messa MC, Castiglioni I, Pastorino U. A low-dose CT-based radiomic model to improve characterization and screening recall intervals of indeterminate prevalent pulmonary nodules. Diagnostics (Basel). 2021;3;11(9):1610. doi: 10.3390/diagnostics11091610
34. European Commission. European guidelines on diagnostic reference levels for paediatric imaging. Radiation Protection 185. 2018. Available from: http://www.eurosafeimaging.org/wp/wp-content/uploads/2018/09/rp_185.pdf.
35. Siciliano R. Radiological examinations in paediatric age. Ann Ig. 2017;29(2):134-40. doi: 10.7416/ai.2017.2140
36. Granata C, Sorantin E, Seuri R, et al. European Society of Paediatric Radiology Computed Tomography and Dose Task Force: European guidelines on diagnostic reference levels for paediatric imaging. Pediatr Radiol. 2019;49:702-5. doi: 10.1007/s00247-019-04346-z
37. Granata C, Origgi D, Palorini F, Matranga D, Salerno S. Radiation dose from multidetector CT studies in children: results from the first Italian nationwide survey. Pediat Radiol. 2015;45(5):695-705. doi: 10.1007/s00247-014-3201-z
38. Salerno S, Marchese P, Magistrelli A, Tomà P, Matranga D, Midiri M, Corsello G. Radiation risks knowledge in resident and fellow in paediatrics: a questionnaire survey.

Ital J Pediatr. 2015;41(1):1-7. doi: 10.1186/s13052-015-0130-x
39. Portelli JL, McNulty JP, Bezzina P, Rainford L. Benefit-risk communication in paediatric imaging: What do referring physicians, radiographers and radiologists think, say and do? Radiography (Lond). 2018;24(1):33-40. doi: 10.1016/j.radi.2017.08.009
40. Gebhard RD, Goske MJ, Salisbury SR, Leopard AC, Hater DM. Improving health literacy: use of an informational brochure improves parents' understanding of their child's fluoroscopic examination. AJR. 2015;204(1):W95-W10.3. doi: 10.2214/AJR.14.12573
41. Bulas D, Goske M, Applegate K, Wood B. Image gently: improving health literacy for parents about CT scans for children. Pediat Radiol. 2009;39(2):112-6. doi: 10.1007/s00247-008-1101-9
42. World Health Organization. Communicating radiation risks in paediatric imaging: information to support health care discussions about benefit and risk. WHO; 2022. Available from: https://apps.who.int/iris/handle/10665/205033ng/en/.
43. Sørensen K, Van den Broucke S, Fullam J, et al. Health literacy and public health: A systematic review and integration of definitions and models. BMC Public Health. 2012;12:80. doi: 10.1186/1471-2458-12-80
44. Goguen J. Health literacy and patient preparation in radiology. J Med Imaging Radiat Sci. 2016;47(3):283-6. doi: 10.1016/j.jmir.2016.06.002
45. Salerno S, Laghi A, Cantone MC, Sartori P, Pinto A, Frija G. Overdiagnosis and over imaging: an ethical issue for radiological protection. Radiol Med. 2019;124(8):714-20. doi: 10.1007/s11547-019-01029-5
46. Goldberg-Stein S, Chernyak V. Adding value in radiology reporting. J Am Coll Radiol. 2019;16(9 Pt B):1292-8. doi: 10.1016/j.jacr.2019.05.042
47. Picano E. Informed consent and communication of risk from radiological and nuclear medicine examinations: how to escape from a communication inferno. BMJ. 2004;329(7470):849-51. doi: 10.1136/bmj.329.7470.849
48. Torresin A, Evans S, Lizio D, Pierotti L, Stasi M, Salerno S. Practical recommendations for the application of DE 59/2013. Radiol Med. 2019;124(8):721-7. doi: 10.1007/s11547-019-01031-x
49. Cornacchia S, Errico R, Balzano RF, Fusco V, Maldera A, Pierpaoli E, Ferrari C, Rubini G, Guglielmi G. Medical radiological procedures: which information would be chosen for the report? Radiol Med. 2019;124(8):783-93. doi: 10.21037/qims-19-1035
50. Housten AJ, Hoover DS, Britton M, Bevers TB, Street RL, McNeill LH, Strong LL, Hersch J, McCaffery K, Volk RJ. Perceptions of conflicting breast cancer screening recommendations among racially/ethnically diverse women: a multimethod study. J Gen Intern Med. 2022;37(5):1145-54. doi: 10.1007/s11606-021-07336-w
51. Han PK, Lary C, Black A, Gutheil C, Mandeville H, Yahwak J, Fukunaga M. Effects of personalized risk information on patients referred for lung cancer screening with low-dose CT. Med Decis Making. 2019;39(8);950-61. doi: 10.1177/0272989X19875966
52. Lowes S, Bydder M, Sinnatamby R. A national survey exploring UK trainees' perceptions, core training experience, and decisions to pursue advanced training in breast radiology. Clin Radiol. 2017;72(11):991.e1-991.e13. doi: 10.1016/j.crad.2017.06.013
53. Santner T, Santner W, Gutzeit A. Effect of image quality and motivation of radiographer teams in mammography after dedicated training and the use of an evaluation tool like PGMI. Radiography (Lond). 2021;27(4):1124-9. doi: 10.1016/j.radi.2021.05.006
54. Oudkerk M, Devaraj A, Vliegenthart R, Henzler T, Prosch H, Heussel CP, Bastarrika G, Sverzellati N, Mascalchi M, Delorme S, Baldwin DR, Callister ME, Becker N, Heuvelmans MA, Rzyman W, Infante MV, Pastorino U, Pedersen JH, Paci E, Duffy SW, de Koning H, Field JK. European position statement on lung cancer screening. Lancet Oncol. 2017;18(12):e754-e766. doi: 10.1016/S1470-2045(17)30861-6
55. Aaby A, Simonsen CB, Ryom K, Maindal HT. Improving organizational health literacy responsiveness in cardiac rehabilitation using a co-design methodology: results from the heart skills study. IJERPH. 2020;17(3);1015. doi: 10.3390/ijerph17031015
56. Vamos CA, Thompson EL, Griner SB, Liggett LG, Daley EM. Applying organizational health literacy to maternal and child health. Matern Child Health J. 2019;23(5);597-602. doi: 10.1007/s10995-018-2687-7
57. De Gani SM, Nowak-Flück D, Nicca D, Vogt D. Self-assessment tool to promote organizational health literacy in primary care settings in Switzerland. IJERPH. 2020;17(24);9497. doi: 10.3390/ijerph17249497
58. Società Italiana di Radiologia Medica e Interventistica. Documento intersocietario. Raccomandazioni intersocietarie per la comunicazione della classe di dose (D.Lgs. 101 – art.1 61, c. 5-6). 2020. Available from: https://sirm.org/2020/12/30/raccomandazione-intersocietarie-comunicazione-classe-di-dose/.
59. Miele V, Granata C, Salerno S, Bonasera L, Magistrelli A, Cavedon C, Stasi M, Origgi D, Isoardi P, Sottocornola C, Polito C (Eds). Documento intersocietario SIRM-AIFM. Il manuale di qualità ai sensi del D.Lgs.101/2020 art. 164 e allegato XXVIII. Società Italiana di Radiologia Medica e Interventistica; 2020. Available from: https://sirm.org/2022/03/18/documento-intersocietario-sirm-aifm-manuale-di-qualita/.
60. Sentell T, Foss-Durant A, Patil U, Taira D, Paasche-Orlow MK, Trinacty CM. Organizational Health Literacy: Opportunities for Patient-Centered Care in the Wake of COVID-19. Qual Manag Health Care. 2021;30(1):49-60. doi: 10.1097/QMH.0000000000000279
61. Vagal A, Wahab SA, Butcher B, Zettel N, Kemper E, Vogel C, Mahoney M. Human-Centered Design Thinking in Radiology. J Am Coll Radiol. 2020;17(5):662-7. doi: 10.1016/j.jacr.2019.11.019

Ann Ist Super Sanità 2024 | Vol. 60, No. 2: 154-165
DOI: 10.4415/ANN_24_02_10

ViolHelp: results of a pilot study to identify potential warning signs and risk factors for self- and hetero-directed violence in the calls received by the Helplines of the Italian National Institute of Health

Rosilde Di Pirchio[1*], Silvia Ghirini[1*], Marta De Santis[2], Antonella Sanseverino[2], Claudia Mortali[1], Monica Vichi[3], Eloise Longo[4], Massimiliano Orri[5], Alberto Forte[6], Antonella Faieta[7] and Luisa Mastrobattista[1]

[1]*Centro Nazionale Dipendenze e Doping, Istituto Superiore di Sanità, Rome, Italy*
[2]*Centro Nazionale Malattie Rare, Istituto Superiore di Sanità, Rome, Italy*
[3]*Servizio Tecnico Scientifico di Statistica, Istituto Superiore di Sanità, Rome, Italy*
[4]*Dipartimento di Neuroscienze, Istituto Superiore di Sanità, Rome, Italy*
[5]*McGill Group for Suicide Studies, Douglas Mental Health University Institute, Department of Psychiatry, McGill University, Montreal, Quebec, Canada*
[6]*Service Universitaire de Psychiatrie de l'Enfant et de l'Adolescent (SUPEA), Lausanne, Switzerland*
[7]*Associazione Nazionale Volontarie Telefono Rosa, Rome, Italy*
**These Authors contributed equally*

Abstract

Background. Self- and hetero-directed violence (SHDV) is a serious public health problem and a complex phenomenon, influenced by individual and environmental factors. SHDV may occur particularly in moments of personal, economic and/or social crisis. During the COVID-19 pandemic, the ISS-Helplines operators have perceived an increase in psychological distress and self-isolation among callers. The ViolHelp project aimed at identifying potential warning signs and risk factors of SHDV emerging in the activity of the ISS-Helplines (Istituto Superiore di Sanità, ISS, Italian National Institute of Health).

Materials and methods. A dashboard collecting warning signs and risk factors of SHDV was developed to be used during the ISS-Helplines activity.

Results. In one year of data collection, 135 calls were compiled. In 106 calls, callers referred experienced violence: 72 self-directed violence (SDV), 20 hetero-directed violence (HDV), 14 both. The most frequent warning signs and risk factors for SDV were desire to die (68.6%), previous suicide attempts (31.4%) and threat of self-harm (25.6%); for HDV were depressed mood (32.4%), diagnosis of pathology and/or psychiatric disorders, desire to die, use of psychotropic drugs, and alcohol abuse (29.4%).

Conclusions. The results of this pilot project show the importance of being able to read the warning signs and to create a network that can improve information, prevention and support activities for people at risk of violence and their families.

Key words
- violence
- suicide
- prevention
- risk factors
- helpline

INTRODUCTION

The World Health Organization (WHO) defines violence as the intentional use of physical force or power, threatened or actual, against oneself, against another person or against a group or community, which either results in or has a high likelihood of resulting in injury, death, psychological harm, mal-development or deprivation [1, 2]. In 1996, the forty-ninth World Health As-

Address for correspondence: Marta De Santis, Centro Nazionale Malattie Rare, Istituto Superiore di Sanità, Viale Regina Elena 299, 00161 Rome, Italy. E-mail: marta.desantis@iss.it.

sembly adopted resolution WHA49.25, declaring violence a major and growing public health problem across the world. In this resolution, the Assembly drew attention to the serious consequences of violence – both in the short-term and in the long-term – for individuals, families, communities and countries, and stressed the damaging effects of violence on health care services [1, 2]. To address the problem WHO produced the "World report on violence and health" (WRVH 2002), the first comprehensive review of the problem of violence on a global scale, which provides a useful framework to examining and understanding the causes and consequences of violence and for preventing violence from occurring through primary prevention programs, policy interventions and advocacy [1, 2]. The WRVH 2002 suggests also four modes in which violence may be inflicted: physical, sexual and psychological attack, and deprivation. There also are three sub-types according to the victim-perpetrator relationship: self-directed violence, which refers to violence in which the perpetrator and the victim are the same individual and is subdivided into self-abuse and suicide; interpersonal violence which refers to violence between individuals (subdivided into family and intimate partner violence and community violence); collective violence which refers to violence committed by larger groups of individuals and can be subdivided into social, political and economic violence [1, 2].

In 2019, the WHO estimates that approximately 475,000 people worldwide are victims of homicide every year (global rate of 6.2 per 100,000) and deaths by suicide turn out to be more than 700,000; moreover, for each suicide, there are more than 20 suicide attempts (https://apps.who.int/violence-info/homicide/) [3]. New provisional estimates published by the US Centers for Disease Control and Prevention in 2022 show a 4 percent increase in the national suicide rate, rising from 13.5 deaths per 100,000 population in 2020 to 14.0 deaths per 100,000 population in 2021 (https://www.cdc.gov/media/releases/2023/s0810-US-Suicide-Deaths-2022.html) [4]. On the contrary, over the past decade homicide rate in worldwide has remained relatively stable, fluctuating from 400,000 to 450,000 victims annually; in Western Europe homicide rate has fluctuated around a relatively stable longer-term trend of 1 per 100,000 population. Victims of hetero-direct violence, homicide in particularly, are more frequently man (https://apps.who.int/violence-info/homicide/) [5]. In Italy, the homicide rate has declined steadily in recent decades; however, the reduction has been more pronounced among men, who were starting from much higher levels; as a result, the gender ratio among victims has decreased. Thus, although homicides have decreased among both sexes, the percentage of women in the total number of victims has increased (https://apps.who.int/violence-info/homicide/) [6, 7].

However, homicide is just the tip of the iceberg of violence, hundreds of millions more men, women, and children suffer non-fatal forms of interpersonal violence [2]. There are many forms of violence, one is domestic violence, or intimate partner violence, violence between intimate partners, and in particular, violence acted by the man on the woman. Such violence falls within the framework of violence against women, or gender-based violence, since as the Istanbul Convention (2011) points out, gender inequality is a cause and consequence of violence against women [8].

Self- and hetero-directed violence (SHDV) is a serious public health problem and a complex phenomenon, influenced by a range of individual (genetic and psychological) and environmental (cultural, environmental, socio-demographic and economic) factors, some of them are shared between self-directed violence (SDV) and hetero-directed violence (HDV): alcohol and drug abuse, depression and exposure to a violent environment [5, 9]. Both types of violence can be read as indicators of a loss of cohesion and social malaise, and may occur particularly in moments of crisis, with a breakdown in the ability to cope with life's stresses, such as financial problems, relationship breakdowns, or chronic pain and illness [6]. Suicide and homicide thus share a common source. In Freud's psychoanalytic perspective, for example, suicide can be defined as the suicidal person's tendency to transfer hostility, usually directed at an external object, to himself through an introjection of the external object, while homicide is, conversely, the turning of aggression outwards towards another [10].

Thus, the external environment, social structure, family, personality, culture, could determine whether aggression would be directed against oneself or others [7, 11].

For many years, therefore, WHO has been supporting to strengthen prevention strategies in each Country through a multisectoral public health approach that addresses potential risk factors at the level of the social, economic and relational context of the individual [5, 12]. Indeed, the progress made in suicide prevention at European and global level shows a reduction in the global suicide rate which nevertheless remains among the top three most frequent causes of death among people aged 15 to 29 globally and in Italy [13].

Suicide prevention is among the priority goals both at the European and global level. In 2021 WHO releases "LIVE LIFE" that is WHO's approach to suicide prevention [12, 14-21]. It details the practical aspects of implementing evidence-based interventions for preventing suicide at national level [22].

On the other hand, also interpersonal violence is a pervasive public health, human rights, and development challenge [23]. Its effects reverberate through families, communities, and nations and across generations. Homicide is simply the tip of the iceberg of much more widespread interpersonal violence. It includes different types of violence like child maltreatment, youth violence, intimate partner and sexual violence, and elder abuse. In fact, the violent act constitutes a risk factor for the mental health of the family and social network of both the victim and the perpetrator of violence, with destabilizing effects on the whole community. Attention to interpersonal violence as a global issue has expanded dramatically since the World Health Assembly identified violence as a public health priority in 1996. Reports by the United Nations (UN) have contributed greatly to increased awareness [2, 24]. These and other efforts

culminated in specific targets for eliminating interpersonal violence in the UN's post-2015 Action Agenda for Sustainable Development [24]. Worldwide, the global homicide mortality rate has slowly decreased since 2000 (https://apps.who.int/violence-info/homicide/); in Italy the decrease was more consistent than in other countries and above all for men [6, 7].

Violence prevention refers to the reduction in the frequency of new cases of violent victimization or perpetration through direct efforts to remove or reduce the underlying causes and risk factors, and by harnessing the indirect effects of other policies and programmes that may contribute to reducing exposure to underlying causes and risks [25, 26]. A prevention policy implies the existence of a harmonized articulation of measures to reduce the underlying factors of violence and crime. An important and widespread component of SHDV (including suicide) prevention strategies across different health systems are crisis helplines, which provide timely and anonymous advice to callers at current risk of violence, provide support for victims and are effective in deterring active suicidal ideations [27, 28]. Indeed, many studies confirm that crisis lines are the first point of contact with mental health services for many people [29], making them a particularly important community and public health service. These services are easily accessible, usually free of charge and anonymous. The confidential, non-directive and non-judgmental environment makes it possible to help anyone experiencing emotional difficulties or distress, or in acute crisis, and to signpost them to further support and resources if needed. Crisis hotlines are often operated by staff (often volunteers) who receive training in active listening skills, crisis intervention skills, call management, suicide and risk assessment and management, referral and follow-up. In addition, some crisis lines train staff also in specific mental health issues (e.g., substance use, mood disorders) and populations (e.g., deaf or hard of hearing, HH) [29].

Some crisis lines are focused on suicide and acceptance of callers' need to explore suicidal feelings and intentions. In these emergency situations where there are safety concerns, confidentiality is no longer maintained. In fact, they usually work closely with emergency services such as police, ambulance and hospitals [30]. The confidential services offered by crisis lines may help overcome the barrier of stigma surrounding suicide and mental health problems that could prevent a person from seeking help in other ways. Consequently, crisis lines often engage with persons who are not otherwise receiving help for their suicidal thoughts [31].

A similar situation is experienced by victims of every kind of interpersonal violence who could feel stigmatized as well and are reluctant to ask for help and this experience of isolation could exacerbate their condition and can lead to self-destructive thoughts and gestures also in this population. Therefore, helplines, being anonymous, are essential in overcoming these barriers, hooking people in distress and secondly facilitating access to specific pathways and services for self and hetero-directed violence. For these reasons, and because of an increase in the female homicide percentage [32], in 2022 the European Commission established a harmonized European helpline number for victims of violence against women and domestic violence; this number is widely advertised as a public number, free of charge and available round-the-clock. The support provided includes crisis counselling and referring to face-to-face services, such as shelters, counselling centres or the police [33].

With technological advances giving rise to modes of communication beyond phone calls, several text- and video-based crisis lines have emerged. These services may be particularly advantageous for certain groups, such as youth or deaf and HH populations. Text-based crisis lines have been rated by adolescents as convenient, acceptable, and confidential, and are associated with increased help-seeking [34]. Youths prefer to seek information and help through more modern methods and describe the web as the primary source of health information [35]. Text lines have also advantaged for staff (e.g., being able to serve multiple people at once) [30].

Compared to telephone calls, chat, and text messages, contacts tend, on average, to concern serious crises such as eating disorders, self-mutilation and sexual aggression. Contacts by Internet chat and text messages tend more frequently to concern suicide and, overall, people who make this kind of contact are at higher suicide risk than those who make contact by telephone [32].

The service delivery model of the crisis lines, in most cases, considers each call as a single session with no fixed time limit; in some cases, includes a follow-up call to check on safety and well-being; provides routine safety checks and identification of suicidal ideation and the level of suicide risk routinely on all calls, with crisis intervention techniques applied as appropriate; sometimes, offers a translation service and access for persons with hearing difficulties or other disabilities.

Reports from crisis lines indicate that the overall underlying motive to contact the service appears to be the need to connect safely with another person for help and support in a crisis or to meet a general emotional need. The wide range of issues reported by callers are: family and relationships problems, relationship breakdown, health and disability, self-harm, burdens associated with raising children, caring for others (such as elderly parents), work loss, other work-related issues, or a financial crisis. Mental health issues are experienced by many of those who call crisis lines [32, 36]. Some callers are or feel socially isolated.

The Istituto Superiore di Sanità, ISS (Italian National Institute of Health) is the main centre for research, control and technical-scientific advice on public health in Italy, and alongside the Ministry of Health, the Regions and the entire National Health Service, guides health policies based on scientific evidence from prevention and health promotion. The ISS offers consultancy services to citizens through the activity of national, anonymous, toll-free helplines. During the COVID-19 pandemic, which affected every country in the world and had a significant negative impact on health, economic and social aspects [26, 37-43], the ISS-Helplines dedicated to rare diseases, the fight against drugs, gambling,

tobacco and nicotine, alcohol, doping, noticed a change in the number, length and quality of calls and sometimes in the subject matter of the requests received, which made it necessary to adapt their services to deal with the emotional distress that was present in most of the calls. More than ever before, staff had to deal with psychological distress, negative emotional states, fear and anxiety expressed by callers. In this background, the project of the ISS called ViolHelp, aimed at identifying potential warning signs and risk factors of SHDV emerging in the activity of the helplines operating at the ISS itself. The project aimed to verify the need for developing a new tool to identify the state of the discomfort of the caller during ISS-Helplines calls for early detection of SHDV signs helpful to refer these callers to specific healthcare settings while respecting the specific mission of each ISS-Helpline.

MATERIALS AND METHODS

The helplines participating in the study are national, anonymous and toll-free, and don't specifically deal with violence. They provide consultancy for citizens on addiction and doping (Antismoking Helpline, Alcohol Helpline, Drug Addiction Helpline, Gambling Helpline, Anti-Doping Helpline at National Addiction and Doping Center) and rare diseases (Helpline for Rare Diseases at the National Center for Rare Diseases). These helplines can also be reached by e-mail and have a mailbox dedicated to the deaf. They are run by a staff of psychologists and experts, trained on telephone counselling methodology and public health policies, that provide caller-centered interventions to listen empathetically and without judgment to callers and facilitate them in the adoption of health choices through the activation of their own and family resources and those available in their territory.

In the first phase of the project (months 1-5), the researchers, drawing on the different expertise of the project group (psychologists, statistician, medical doctors, experts in rare diseases, experts in addictions and doping and experts in the field of SHDV), carried out a bibliographic review of the signs of SHDV identified in the scientific literature, with a particular focus on helplines dedicated to violence. The pool of ISS experts assessed the recurring signs and contextualised them in relation to the different issues dealt with by the helplines. This assessment made it possible to prepare a selection of warning signs and risk factors, which were anonymously submitted to the helpline's operators, who, based on their specific experience, focused on the warning signs that they happened to pick up during the calls to better specify them in relation to ISS-Helplines issues. This activity allowed to identify a selection of topics for the development of a dashboard to be used during calls to the ISS-Helplines in the months 7-18 of the project. Before data collection, each operator underwent a standard training programme.

The dashboard ViolHelp collected socio-demographic data, risk factors, and warning signs related to SHDV subdivided as following: birth pathway (pregnancy, abortion, adoption), psycho-behavioural risk factors (including the desire to die, self-harm thoughts, suicidal plans, depressed mood, absence of hope for future, despair, social support) substance-related disorders and addiction disorders, reported signs of self-directed violence (including previous suicide attempts, self-harm acts, access to the emergency room), signs of reported HDV (including physical, sexual, psychological, economic), social aspects and sentinel events (including bereavement, job loss, separation-divorce).

For the present analysis, two different types of outcome variables were assessed: SDV and HDV. The SDV was detected during the call by the operators through the identification of at least one of the following events or suicidal and self-harm ideas reported by the callers: previous suicide attempts, acts of self-harm, desire to die, thoughts of self-harm, suicidal plans and threats of self-harm. The HDV was detected during the call by the operators through the identification of at least one of the following types of violence: physical violence, sexual violence, psychological violence, threats, stalking, non-consensual pornography, economic violence, and bullying. All other factors were considered "non characterizing" for violence and considered as risk factors for analysis only if they were present in conjunction with one of the factors characterizing the two groups (SDV and HDV).

Descriptive analysis of socio-demographic variables and violence risk factors by SDV and HDV was performed using the commercial statistical program IBM-SPSS 27 (IBM-SPSS Corp., Armonk, NY). We used Fisher's exact test to examine the association between two dummy variables while for categorical variables we used the chi-square and Yates' corrected chi-square test. To evaluate the association between two dummy variables we use the Phi Coefficient, and we also calculate the odds ratio (OR) as a measure of association. A p-value was less than 0.05 was considered statistically significant. A p-value was less than 0.05 was considered statistically significant.

RESULTS

Data was collected between May 2022 and May 2023. In total, the data analysis refers to 135 calls received by the ISS-Helplines in which, the operators have detected indicators of /or hetero-directed reported violence and/or violence risk factors and for which the ViolHelp dashboard was opened.

During the period under consideration, more than three out of four of the 135 calls (74.5%) referred to the operators to have experienced self-and/or hetero directed violence. For only 29 callers (21.5%) the operators of the ISS-Helplines identified risk factors for violence that were not those that characterized the two categories (SDV or HDV); for these callers, the ISS-Helplines operators opened the dashboard and nevertheless collected risk factors for SHDV. The following analysis refers to the 106 subjects who referred to the operators to have experienced violence.

The number of calls involved in the study differed by each helpline during this period. Considering the number of calls for which the ViolHelp dashboard has been filled out compared to the number of calls received by each service, the Alcohol Helpline and the Drug Addic-

tion Helpline were found the services with the highest percentage of ViolHelp dashboards of calls respectively received by these two helplines (respectively 4.8% and 4.3%) followed by the Gambling Helpline (0.7%), the Helpline for Rare Diseases (0.3%) and the Antismoking Helpline (0.2%) (*Figure 1*).

The services that received the most calls (35) considered by the operators to be at risk for SHDV were the Gambling Helpline and the Alcohol Helpline followed by the Antismoking Helpline (17); 12 calls were received by the Drug Addiction Helpline and 7 by the Helpline for Rare Diseases. No ViolHelp dashboards was opened for the Anti-Doping Helpline.

Of the 106 calls analysed, 53.3% of callers were male, 44.8% female, and 2 people indicated another gender; in 1 caller, data was missing (*Table 1*).

Analysis by gender and age group showed that among men the highest percentage of calls (58.2%) came from people under 44 years old followed by age group 45-64 years old (29.1%) and lastly by people 65 years and older (12.7%). Among females the most prevalent age group was 45-64 years old (50.0%); the percentage of callers in the youngest age group (<44 years) dropped to 27.3% and the percentage of women aged 65 years and older was 22.7% (*Table 1*).

One out of two men are engaged and 22.9% are looking for a job; the percentage among women are lower because only 30.0% are engaged and 10.0% are waiting for a job. The percentage of retired is higher among women than men (*Table 1*).

Considering the educational level of callers, more than half of the callers indicated a secondary school degree followed by those who had a middle school diploma (30.3%); 7.6% had an elementary school qualification or no education all and only 3.0% had at least a bachelor's degree (*Table 1*).

Although the percentage of callers living alone was similar among males (30.8%) and females (31.0%) (p=0.580), there was a gender difference related to the cohabitation status: the percentage of men living with other person different by relatives was 34.6% while the percentage among women was 14.3%, (p=0.021), finally there were not callers among men that live alone with sons while the percentage among women was 19.1% (*Table 1*).

The operators of the ISS-Helplines have collected information considering whether the callers had called for him/herself or other persons like parents, sons, other relatives, or friends. We observed a significant gender difference among subjects who have called the ISS-Helplines for themselves (31.1%): males were almost twice as females (*Table 1*).

The operators of the ISS-Helplines have collected information considering if the information on violence was referred to the callers themselves or other persons like parents, sons, other relatives, or friends. Almost one out of two of the callers reported information on violence referred to themselves without gender difference (p=0.567) (*Table 1*).

Regarding violence experienced and the highlighted violence risk factors, in 85.8% of the cases, the information was related to the same person for whom the helplines had been contacted. When subjects called the helplines for their spouse or partner (9.4%) in 40.0% of cases, the information on violence was referred to themselves and not to the person they had called for. For those who called for themselves (31.1%), in all the cases they reported information of violence referred to themselves (data not showed).

Looking in detail at the 106 subjects that contacted the ISS-Helplines, overall, 82.1% of them had called the specific Helplines for gambling, alcohol, and

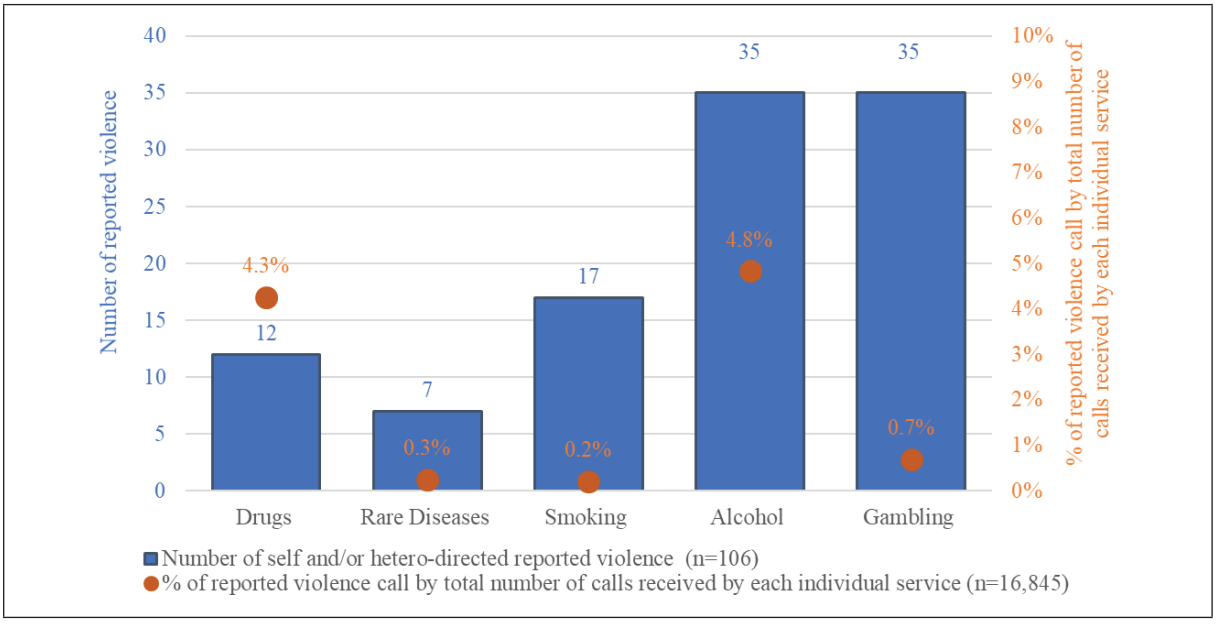


Figure 1
Number of calls by each ISS-Helpline and percentage of reported violence calls by total number of calls received by each service. ISS: Istituto Superiore di Sanità, Rome, Italy.

Table 1
Socio-demographic characteristics of subjects who have called the ISS-Helplines

		Men		Women		Total*	
		n	%	n	%	n	%
Gender		56	53.3	47	44.8	105	-
Helpline services	Antismoking	10	17.9	7	14.9	17	16.0
	Alcohol	15	26.8	19	40.4	35	33.0
	Drug	8	14.3	3	6.4	12	11.3
	Gambling	21	37.5	14	29.8	35	33.0
	Rare diseases	2	3.6	4	8.5	7	6.6
Total		56	100.0	47	100.0	106	100.0
Age groups**	≤44 years	32	58.2	12	27.3	46	45.1
	45-64 years	16	29.1	22	50.0	39	38.2
	65+ years	7	12.7	10	22.7	17	16.7
Total		55	100.0	44	100.0	102	100.0
Labour status**	Employed	23	47.9	9	30.0	32	40.0
	Searching for employment	11	22.9	3	10.0	15	18.8
	Retired	5	10.4	5	16.7	11	13.8
	Other condition	9	18.8	13	43.3	22	27.5
Total		48	100.0	30	100.0	80	100.0
School qualification	Primary education/no education	2	5.1	2	8.0	5	7.6
	Diploma of lower/upper secondary education/technical specialisation	12	30.8	7	28.0	20	30.3
		24	61.5	15	60.0	39	59.1
	University education	1	2.6	1	4.0	2	3.0
Total		39	100.0	25	100.0	66	100.0
Cohabitation status**	Living alone	16	30.8	13	31.0	29	30.2
	Living with partner without sons	5	9.6	6	14.3	11	11.5
	Living with partner with son	13	25.0	9	21.4	22	22.9
	Living alone with sons	0	0.0	8	19.1	8	8.3
	Living with others	18	34.6	6	14.3	26	27.1
Total		52	100.0	42	100.0	96	100.0
Do you call for:	Me myself**	23	41.1	10	21.3	33	31.1
	Parents	3	5.4	8	17.0	11	10.4
	Partners	3	5.4	6	12.8	10	9.4
	Brother/sister	7	12.5	9	19.2	16	15.1
	Sons	10	17.9	7	14.9	17	16.0
	Other relatives	6	10.7	6	12.8	13	12.3
	A friend	4	7.1	1	2.1	6	5.7
Total		56	100.0	47	100.0	106	100.0
The collected information refers to:	Me myself**	24	42.9	20	42.6	44	41.5
	Parents	3	5.4	10	21.3	13	12.3
	Partners	3	5.4	0	0.0	4	3.8
	Brothers and sisters	7	12.5	8	17.0	15	14.2
	Sons	9	16.1	2	4.3	11	10.4
	Other relatives	6	10.7	6	12.8	13	12.3
	A friend	4	7.1	1	2.1	6	5.7
Total		56	100.0	47	100.0	106	100.0

*Data on "other gender" was included; **there's a difference by gender ($p<0.05$); ISS: Istituto Superiore di Sanità, Rome, Italy.

tobacco and nicotine issues. Over half of the people who called the Antismoking Helpline were calling for themselves and the information about violence was referred to themselves; in 41.2% of cases, however, they were calling for other people (relatives and friends) and the information about violence concerned the person they had called for. In the case of the Gambling Helpline, 45.7% of the callers contacted the service for other persons, and the information about violence was referred to them; 37.1% of subjects have called for themselves and reported information on violence about themselves. In the Alcohol Helpline, in two out of three cases, subjects called for other people and the violence was not referred to the callers, in comparison the percentage of those who called for themselves and gave information on violence related to themselves fell to 14.3% (*Figure 2*).

In 106 calls callers referred to the ISS-Helplines operators to have experienced violence. Among those, 72 callers referred to experiencing SDV, 20 referred to having experienced HDV, and 14 referred to having experienced both.

Among the 86 callers from subjects who experienced SDV, 73 callers referred to experiencing only SDV, and 14 referred to having experienced both SDV and HDV.

The most frequent types of SDV highlighted by the ISS-Helplines operators were the desire to die for more than two thirds, followed by previous suicide attempts for almost one third, the threat of self-harm (25.6%), suicidal plans (18.6%), self-harm thoughts (15.1%) and self-harm acts (8.1%) (*Figure 1S available online as Supplementary Material*).

The most frequent risk factors identified by the ISS-Helplines operators were for half of the call depressed mood and for more than one third alcohol abuse, pharmacological therapy, absence of hope for the future, use of psychotropic drugs, and having received a diagnosis of pathology and/or psychiatric disorders. More than one out of five callers also reported tobacco and/or nicotine dependence, lack of social support, having had access to the PS, and gambling habits.

The ISS-Helplines answered 34 calls from people who reported having experienced HDV, 20 callers referred to experiencing only HDV, and 14 referred to having experienced both SDV and HDV. The most frequent types of HDV highlighted by the ISS-Helplines operators were physical violence for more than two thirds, threats for almost half and psychological violence for more than one third; only 4 callers referred economic violence, and bullying while sexual violence, stalking and non-consensual pornography were reported only by one subject (*Figure 1S available online as Supplementary Material*).

The most frequent risk factors for HDV identified by the ISS-Helplines operators were depressed mood for almost a third, followed by having received a diagnosis of pathology and/or psychiatric disorders, desire to die, use of psychotropic drugs, and alcohol abuse (29.4%). More than one out of four have tobacco and/or nicotine dependence while 23.5% of callers reported access to emergency room and lack of social support. The absence of hope for the future, pharmacological therapy, and financial difficulties were also reported by 20.6% of subjects (*Table 2*).

The analysis of the two different typologies of violence showed that depressed mood was the prevalent risk factor for both. Looking at the first ten risk factors highlighted by ISS-Helplines operators, nine out of ten are highlighted in the case of both HDV and SDV, even in a different order (*Table 2*).

The risk factors related to addictions have been highlighted by the operators of the ISS-Helplines (in four out of five cases specific for addictions) both in the case of HDV and in the case of SDV even if with a different priority; for gaming the percentage is higher among subjects who reported SDV than in subjects who reported HDV (SDV 27.9% *vs* HDV 5.9% p=0.026) (*Table 2*).

DISCUSSION

The aim of the project was to assess the need to create a useful tool for non-violence-specific ISS-Helplines operators to intercept and redirect people with signs of SDV and HDV to specific resources and healthcare settings. The ISS-Helplines operators conducted every call

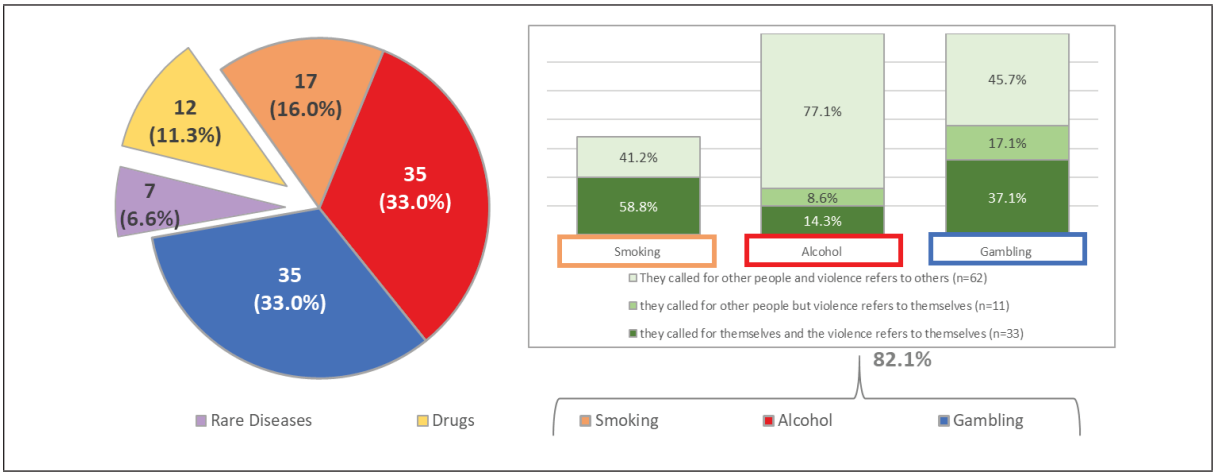


Figure 2
Distribution (%) of calls by ISS-Helplines. ISS: Istituto Superiore di Sanità, Rome, Italy.

Table 2
Self- and hetero-directed violence by risk factors

	SDV (n=86)		HDV (n=34)		Fisher's exact test	Phi test	Odd ratio (SDV/HDV)
Violence risk factors	**n**	**%**	**n**	**%**	**p**	**value**	**value**
Previous suicide attempts	-	-	4	11.8	-	-	-
Family suicide (o suicide attempts)	6	7.0	3	8.8	0.712	-0.032	0.775
Friend suicide (o suicide attempts)	3	3.5	1	2.9	1.000	0.014	1.193
Diagnosis of pathology and/or psychiatric disorders	29	33.7	10	29.4	0.829	0.041	1.221
Family diagnosis of pathology and/or psychiatric disorders	7	8.1	5	14.7	0.317	-0.099	0.514
Physical illness	17	19.8	4	11.8	0.425	0.095	1.848
Family physical illness	7	8.1	1	2.9	0.438	0.094	2.924
Self-harm acts	-	-	4	11.8	-	-	-
Hospitalization risk factors	**n**	**%**	**n**	**%**	**p**	**value**	**value**
Emergency room access	25	29.1	8	23.5	0.652	0.056	1.332
Hospital access	22	25.6	5	14.7	0.233	0.117	1.994
Mandatory medical treatment	10	11.6	5	14.7	0.760	-0.042	0.763
HDV risk factors	**n**	**%**	**n**	**%**	**p**		**value**
Physical violence	12	14.0	-	-	-	-	-
Sexual violence	1	1.2	-	-	-	-	-
Psychological violence	3	3.5	-	-	-	-	-
Threats	5	5.8	-	-	-	-	-
Stalking	1	1.2	-	-	-	-	-
Non-consensual pornography	1	1.2	-	-	-	-	-
Economic violence	1	1.2	-	-	-	-	-
Bullying	3	3.5	-	-	-	-	-
Psycho-behavioral risk factors	**n**	**%**	**n**	**%**	**p**		**value**
Desire to die	-	-	10	29.4	-	-	-
Self-harm thoughts	-	-	4	11.8	-	-	-
Suicidal plans	-	-	2	5.9	-	-	-
Threat of self-harm	-	-	5	14.7	-	-	-
Guilt	12	14.0	0	0.0	0.019	0.210*	-
Impulsiveness	7	8.1	2	5.9	1.000	0.039	1.418
Hostile and/or aggressive personality	14	16.3	4	11.8	0.777	0.057	1.458
Anxiety	10	11.6	4	11.8	1.000	-0.002	0.987
Depressed mood	43	50.0	11	32.4	0.104	0.160	2.091
Fear	1	1.2	2	5.9	0.193	-1.360	0.188
Mutism-long silence	4	4.7	2	5.9	1.000	-0.025	0.780
Easy crying	11	12.8	3	8.8	0.755	0.056	1.516
Agitation	9	10.5	5	14.7	0.536	-0.060	0.678
Low self-esteem	8	9.3	2	5.9	0.723	0.056	1.641
Confusional state	8	9.3	2	5.9	0.723	0.056	1.641
Reported sudden mood changes/fluctuating mood	9	10.5	3	8.8	1.000	0.025	1.208
Reported insomnia and sleep disorders	14	16.3	3	8.8	0.390	0.096	2.009
Reported desire not to leave the house	8	9.3	0	0.0	0.103	0.168	-
Reported having no contacts	2	2.3	1	2.9	1.000	-0.018	0.786
Dispaire	20	23.3	3	8.8	0.078	0.165	3.131
Absence of hope for the future	30	34.9	7	20.6	0.187	0.139	2.066

Continues

Table 2
Continued

Addictions risk factors	**n**	**%**	**n**	**%**	**p**		**value**
Use of psychiatric drugs	29	33.7	10	29.4	0.829	0.041	1.221
Food disorders	5	5.8	1	2.9	0.674	0.059	2.037
Alcohol use	34	39.5	10	29.4	0.401	0.095	1.569
Cannabis	8	9.3	3	8.8	1.000	0.007	1.060
Opiates	4	4.7	0	0.0	0.576	0.117	-
Amphetamine	6	7.0	0	0.0	0.182	0.144	-
Gamble	24	27.9	2	5.9	0.007	0.241*	6.194**
Tobacco and nicotine	28	32.6	9	26.5	0.662	0.059	1.341
Social and economic aspects	**n**	**%**	**n**	**%**	**p**		**value**
Lack of social support	27	31.4	8	23.5	0.505	0.078	1.487
Psychotherapeutic pathways	16	18.6	5	14.7	0.791	0.046	1.326
Pharmacological therapy	33	38.4	7	20.6	0.085	0.170	2.402
Sentinel events	**n**	**%**	**n**	**%**	**p**		**value**
Deaths in the family or loved ones	16	18.6	5	14.7	0.791	0.046	1.326
Loss of job	13	15.1	5	14.7	1.000	0.005	1.033
Separation, divorce	9	10.5	2	5.9	0.726	0.072	1.870
Problem with the law	3	3.5	2	5.9	0.621	-0.054	0.578
Financial problems	21	24.4	7	20.6	0.812	0.041	1.246
School problem	2	2.3	2	5.9	0.318	-0.089	0.381
Conflicts with spouse/partner	9	10.5	4	11.8	1.000	-0.019	0.877
Family conflicts	14	16.3	6	17.7	1.000	-0.017	0.907

*p<0.05; **95% CI (confidence interval) do not include 1; SDV: self-directed violence; HDV: hetero-directed violence.

following the standardised methodological model, provided for telephone counselling interventions, regarding the particular topic dealt with each ISS-Helplines and detected risk factors and warning signs of violence that spontaneously emerged during the call. In order to avoid the induction of thoughts of SDV and/or HDV, the operator was not allowed to further investigate and ask personal questions concerning the topics of interest of the project.

To facilitate this process, a dashboard was created and tested to standardise the collection of risk factors and warning signs associated with violence that could have emerged during the phone calls.

The activity, which was carried out for 12 months, intercepted 106 callers, who were affected by violence, demonstrating how this type of service can contribute to prevent and intercept this phenomenon, as well as to create and strengthen cooperation networks in the field of violence.

The experimental nature of the pilot study precludes comparisons with other studies as, to our knowledge, the literature only includes studies of helplines specific for violence. However, the results of the project show how the issue of violence can be subtly present, latent even in health promotion and disease prevention services that do not directly address it, especially when dealing with risk factors for violence, such as addiction. A tool tailored to and embedded in the specific issues of the telephone services in which it is applied, accompanied by adequate training in its use and in the phenomenon of violence, can help to identify risk factors for violence. Such a tool can firstly raise awareness of the issue of violence and secondly enable a broader and less sectorial approach to health and mental health, while simultaneously facilitating targeted referrals to local services.

In our experience, the services that received the highest number of calls (35) considered to be at risk for SHDV, were the Gambling Helpline and the Alcohol Helpline. Almost half of the callers reported information on violence referring to themselves, with no gender difference. More than half of the callers reported information on violence referring to someone they care for, indicating how this large percentage of family members and friends can act as sentinels to the phenomenon of violence, often recognizing signs that they do not know how to interpret. In both cases, finding a welcoming, confidential, and competent listening space, in which the operator is capable of intercepting, warning signs of violence, can facilitate the willingness to seek help and, for relatives, help family members to make sense of signals they did not know how to interpret.

There were more calls regarding SDV compared to HDV: 72 for SDV, 20 for HDV, 14 for both. In line with what has been reported in the literature, our study confirms the commonality of several risk factors between SDV and HDV, although in a different rank order in each group. It is worth noticing that depressed mood is

the most important factor for both SDV and HDV. The Gambling Helpline was found to be more involved in self-directed violence.

The dashboard created for the Violhelp project was the starting point for this study and its experimentation highlighted both its potential and the critical issues to be worked on in order to refine the tool and the data collection methodology.

During the course of the project, some critical issues were encountered. In the data collection phase, for the ISS-Helplines operators, it proved complex to retrieve some of the information present in the dashboard, such as the time span of the detected events, also due to the project's request not to solicit the caller's report of violence. The analysis showed that some items entered in the dashboard were never detected by the operators during the calls. Furthermore, in 29 cases, the difficulty to associate some risk factors to the two types of violence became apparent, since the callers had not declared any of the risk factors characterising the two categories (SDV and HDV).

Strengths and limitations

The helplines involved in the study do not deal specifically with violence, and indeed the aim of the project was precisely to test whether the operators of these helplines, appropriately trained, could intercept situations of SHDV with the help of a specific tool. For this reason, the number of calls analysed in this study represents only a small percentage of the calls received by the helplines involved (from 0.2% to 4.8% of the total calls received by each helpline). This limitation also proved to be the strength of testing a tool for use by non-violence helpline operators.

The anonymity of the helpline is a second limitation, but also a strength. While anonymity guarantees confidentiality, freedom of expression and a non-judgmental relationship of trust, it also allows only minimal information to be recorded about each contact (duration, sex of the caller, sometimes age, etc.), and there is no way of verifying the personal details that may have been revealed during the call or no way of creating an accurate profile of the caller. Then, the study findings are based on users' self-reported information, attitudes and behaviours. All data are anonymous, self-reported and limited to the single point in time of the call.

The smallness of the sample did not make possible to explore the association between risk factors and sociodemographic characteristics of the 106 persons affected by SDV and/or HDV, as well as to have an in-depth, gender-specific analysis.

Both in HDV and SDV, the risk factors related to addictions (alcohol, gambling, tobacco and nicotine, and drugs) have been frequently highlighted by the operators of the ISS-Helplines. This can be also attributable to the typology of the ISS-Helplines involved in the project that, in four out of five cases referred to addictions. The last limitation in this pilot study is the use of the telephone helpline, which is often not used by young people and children who prefer short written communication to verbal communication, being more comfortable with SMS, chat or emails [44-48].

CONCLUSIONS

Although there are many definitions of violence, it should be noted that it is a cross-cutting phenomenon, for this reason it is very important that public health practitioners understand the broad scope of violence and are able to identify modes for successful intervention to prevent violence and its health and social impacts.

The health emergency, caused by the COVID-19 pandemic, which resulted in social containment and distancing measures, have had repercussions on SHDV. In the face of a general contraction of support services, the effort and commitment of helplines has been considerable. The scientific literature points to the strengthening and networking of health services as the most effective tools to counter the phenomenon of violence through the development of protocols and skills of service workers and the creation of networks for recognition of violence events. The role of the health care system is central in estimating the size of the phenomenon, its causes and consequences on health status; recognizing violence and providing appropriate interventions at all levels; and developing and evaluating violence prevention programs. Among health care services, helplines represent an important point for intercepting violence. This pilot study has shown that helplines are an important first point of contact in the prevention and care of people with health problems, psychosocial concerns and those at risk of SHDV. Helplines can provide confidential information and emotional support and intervene with people in crisis, even if they are not specialised in a specific area. The trained ISS-Helplines operators involved in the study have detected the discomfort and fragility of a small part of the population with a suspicion of violence also thanks to the active and attentive listening features of the telephone counselling methodology.

The results of this pilot project show how important is to know how to read the signs of SHDV and the need to have a network capable of improving information, prevention and support activities for people at risk of violence and their families.

In the future, the possibility of extending the helplines services to other communication tools like SMS, chat or emails, preferred by young people could be explored. Text-based counselling also helps to rebalance the power between the child/young adult and the counsellor and gives the user more control over their self-presentation.

It is therefore useful that the ViolHelp experience can be replicated and implemented by other helplines, with whom the ISS-Helplines can share experience, training and tools (e.g., an expanded and improved dashboard).

Authors' contributions

RD, SG, MD, AS, CM, MV, EL and LM conceptualized the study, SG and MV analysed the data and RD, SG, MD, AS and LM wrote the first draft of the manuscript. AS, CM, MV and EL provided important contributions for the interpretation of findings. MO, AFo and AFa carefully revised the final draft of the manuscript. All Authors have read and approved the last version of the manuscript.

Acknowledgments

A special thanks to the Project Working Group (operators at the ISS-Helplines): Graziella Lanzillotta, Piergiorgio Massaccesi, Guido Mortali of National Centre on Addictions and Doping and Rosa Immacolata Romeo of National Centre for Rare Diseases for their participation in the construction of the dashboard and data collection as part of the counseling activity at the ISS-Helplines.

Funding

This study received financial support from Bando ricerca indipendente ISS 2020-2022, Italian National Institute of Health for the project Identification of potential warning Signs of self- and hetero-directed violence within the calls to Istituto Superiore di Sanità (ISS)-Helplines (ViolHelp). A study on the need for the development of a new tool for early detection of self- and hetero-directed violence in the ISS-Helplines activity. Project code: ISS20-3277f97304f0.

Conflict of interest statement

The Authors declare no conflict of interest.

Received on 5 February 2024.
Accepted on 24 April 2024.

REFERENCES

1. World Health Organization. Forty-ninth World Health Assembly. WHA49.25. Prevention of violence: A public health priority. Geneva: WHO, 1996. Available from: https://apps.who.int/iris/bitstream/handle/10665/178941/WHA49_1996-REC-1_eng.pdf.
2. Krug EG, Mercy JA, Dahlberg LL, Zwi AB. The world report on violence and health. Lancet. 2002;360(9339):1083-8. doi: 10.1016/S0140-6736(02)11133-0
3. World Health Organization. Suicide Worldwide in 2019: Global health estimates. Geneva: WHO; 2021. Available from: https://iris.who.int/bitstream/handle/10665/341728/9789240026643-eng.pdf?sequence=1.
4. Curtin SC, Garnett MF, Ahmad FB. Provisional numbers and rates of suicide by month and demographic characteristics: United States, 2021. CDC; 2022. (NVDD vital statistics rapid release; report 24). doi: https://dx.doi.org/10.15620/cdc:120830.
5. United Nation Office on Drug and Crime (UNODC). Global study on homicide, 4th edition. New York, NY: UNODC; 2023. Available from: https://www.unodc.org/documents/data-and-analysis/gsh/2023/Global_study_on_homicide_2023_web.pdf.
6. Vichi M, Ghirini S, Roma P, Mandarelli G, Pompili M, Ferracuti S. Trends and patterns in homicides in Italy: A 34-year descriptive study. Forensic Sci Int. 2020;307:110141. doi: 10.1016/j.forsciint.2020.110141
7. Vichi M, Ghirini S, Pompili M, Erbuto D, Siliquini R. Suicidi. In: Osservatorio Nazionale sulla Salute nelle Regioni Italiane. Rapporto Osservasalute 2021: Stato di salute e qualità dell'assistenza nelle regioni italiane. Milano: Prex Spa; 2022.
8. Italia. Legge 27 giugno 2013, n. 77 Ratifica ed esecuzione della Convenzione del Consiglio d'Europa sulla prevenzione e la lotta contro la violenza nei confronti delle donne e la violenza domestica, fatta a Istanbul l'11 maggio 2011. (13G00122) (GU Serie Generale n.152 del 01-07-2013). Available from: https://www.gazzettaufficiale.it/eli/id/2013/07/01/13G00122/sg.
9. Pompili M, Vichi M, Innamorati M, Lester D, Yang B, De Leo D, Girardi P. Suicide in Italy during a time of economic recession: Some recent data related to age and gender based on a nationwide register study. Health Soc Care Community. 2014;22(4):361-7. doi: 10.1111/hsc.12086
10. Freud S. Lutto e melanconia. In: Freud S. Opere V. 8: Introduzione alla psicoanalisi e altri scritti (1915-1917). Torino: Boringhieri; 1976.
11. Stack S, Laubepin F, Vichi M, Minelli G, Lester D, Ferracuti S, Girardi P, Pompili M. Economic deprivation as a predictor of the direction of lethal violence: An analysis of Italian provinces. Arch Suicide Res. 2016;20(3):483-7. doi: 10.1080/13811118.2015.1103343
12. United Nations. Dept. for Policy Coordination and Sustainable Development. Prevention of suicide: Guidelines for the formulation and implementation of national strategies. New York: United Nations; 1996. Available from: https://digitallibrary.un.org/record/215713.
13. Forte A, Vichi M, Ghirini S, Orri M, Pompili M. Trends and ecological results in suicides among Italian youth aged 10-25 years: A nationwide register study. J Affect Disord. 2021;282:165-172. doi: 10.1016/j.jad.2020.12.142
14. European Commission. European pact for mental health and well-being. Available from: http://ec.europa.eu/health/ph_determinants/life_style/mental/docs/pact_en.pdf.
15. World Health Organization. Public health action for the prevention of suicide. A framework. Geneva: WHO; 2012. Available from: http://apps.who.int/iris/bitstream/10665/75166/1/97892415 03570_eng.pdf.
16. United Nations Economic and Social Council. Report of the Secretary-General. Special edition: Progress towards the sustainable development goals. Available from: https://undocs.org/E/2019/68.
17. World Health Organization. Mental health action plan 2013-2020. Geneva: WHO; 2013. Available from: https://www.who.int/publications/i/item/9789241506021.
18. World Health Organization. Preventing suicide: A global imperative. Geneva: WHO; 2014. Available from: https://iris.who.int/bitstream/handle/10665/131056/9789241564779_eng.pdf?sequence=1.
19. World Health Organization. Preventing suicide: A resource for media professionals. Geneva: WHO; 2023. Available from: https://iris.who.int/bitstream/handle/10665/372691/9789240076846-eng.pdf?sequence=1.
20. United Nations. The sustainable development goals report. New York, NY: United Nation; 2023. Available from: https://sdgs.un.org/sites/default/files/2023-07/The-Sustainable-Development-Goals-Report-2023_0.pdf.
21. World Health Organization. National suicide prevention strategies. Progress, examples and indicators. Geneva: WHO; 2018. Available from: https://apps.who.int/iris/rest/bitstreams/1174021/retrieve.
22. World Health Organization. LIVE LIFE: An implementation guide for suicide prevention in countries. Geneva: WHO; 2021. Available from: https://iris.who.int/bitstream/handle/10665/341726/9789240026629-eng.pdf?sequence=1.
23. United Nations, General Assembly. Secretary General's in-

depth study on all forms of violence against women. New York, NY: United Nations; 2006. Available from: https://www.un.org/womenwatch/daw/vaw/SGstudyvaw.htm.
24. United Nations. Transforming our world: The 2030 agenda for sustainable development. New York, NY: United Nations; 2015. Available from: https://sustainabledevelopment.un.org/content/documents/21252030%20Agenda%20for%20Sustainable%20Development%20web.pdf.
25. Institute for Security Studies Violence Prevention Forum. Policy brief. What is violence prevention? A new definition. Institute for Security Studies; 2022. Available from: https://www.violence-prevention.org/docrepo/What%20is%20violence%20prevention%20-%20A%20new%20definition_policy%20brief.pdf.
26. World Health Organization. Addressing violence against children, women and older people during the COVID-19 pandemic: Key actions. Geneva: WHO; 2020. Available from: https://iris.who.int/bitstream/handle/10665/332458/WHO-2019-nCoV-Violence_actions-2020.1-eng.pdf?sequence=1.
27. European Commission. Proposal for a directive of the European Parliament and of the Council on combating violence against women and domestic violence. Strasbourg: European Commission; 2022. Available from: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52022PC0105.
28. Predmore Z, Ramchand R, Ayer L, Kotzias V, Engel C, Ebener P, Kemp JE, Karras E, Haas GL. Expanding suicide crisis services to text and chat. Crisis. 2017;38(4):255-60. doi: 10.1027/0227-5910/a000460
29. Boness CL, Helle AC, Logan S. Crisis line services: A 12-month descriptive analysis of callers, call content, and referrals. Health Soc Care Community. 2021;29(3):738-45. doi: 10.1111/hsc.13325
30. Mishara BL, Weisstub DN. Resolving ethical dilemmas in suicide prevention: The case of telephone helpline rescue policies. Suicide Life Threat Behav. 2010;40(2):159-69. doi: https://doi.org/10.1521/suli.2010.40.2.159
31. World Health Organization. Preventing suicide: A resource for establishing a crisis line. Geneva: WHO; 2018. Available from: https://iris.who.int/bitstream/handle/10665/311295/WHO-MSD-MER-18.4-eng.pdf?ua=1.
32. Vichi M, Ghirini S, Roma P, Mandarelli G, Pompili M, Ferracuti S. Trends and patterns in homicides in Italy: A 34-year descriptive study. Forensic Sci Int. 2020;307:110141. doi: 10.1016/j.forsciint.2020.110141
33. European Commission. A proposal for a directive of the European Parliament and of the Council on combating violence against women and domestic violence (COM(2022)0105 – C90058/2022 – 2022/0066(COD). Available from: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52022PC0105.
34. Gray NJ, Klein JD, Noyce PR, Sesselberg TS, Cantrill JA. Health information-seeking behaviour in adolescence: The place of the internet. Soc Sci Med. 2005;60(7):1467-78. doi: 10.1016/j.socscimed.2004.08.010
35. Dinger U, Jennissen S, Rek I. Attachment style of volunteer counselors in telephone emergency services predicts counseling process. Front Psychol. 2019;10:1936. doi: 10.3389/fpsyg.2019.01936
36. Luzi AM, Colucci A, Gallo P, De Mei B, Mastrobattista L, De Santis M, Pacifici R, Taruscio D, Gallo C. The communicative-relational operating model of the Italian National Institute of Health for an effective telephone intervention in public health, structured on basic counselling skills. Ann Ig. 2023;35(4):379-402. doi: 10.7416/ai.2023.2555
37. Apicella M, Serra G, Trasolini M, Andracchio E, Chieppa F, Averna R, Iannoni ME, Infranzi, A, Moro, M, Guidetti C, Maglio G, Raucci U, Reale A, Vicari S. Urgent psychiatric consultations for suicide attempt and suicidal ideation before and after the COVID-19 pandemic in an Italian pediatric emergency setting. Front Psychiatry. 2023;14. doi: https://doi.org/10.3389/fpsyt.2023.1135218
38. Yahya AS, Khawaja S, Chukwuma J. Association of COVID-19 with intimate partner violence. Prim Care Companion CNS Disord. 2020;22(3):20com02634. doi: 10.4088/PCC.20com02634
39. Mittal S, Singh T. Gender-based violence during COVID-19 pandemic: A mini-review. Front Glob Womens Health. 2020;1:4. doi: 10.3389/fgwh.2020.00004
40. Guessoum SB, Lachal J, Radjack R, Carretier E, Minassian S, Benoit L, Moro MR, Adolescent psychiatric disorders during the COVID-19 pandemic and lockdown. Psychiatry Res. 2020;291:113264. doi: 10.1016/j.psychres.2020.113264
41. Sher L. The impact of the COVID-19 pandemic on suicide rates. QJM. 2020;113(10):707-12. doi: 10.1093/qjmed/hcaa202
42. Italia. Ministero dell'Interno. Dipartimento della Pubblica Sicurezza. Servizio Analisi Criminale. Violenza di genere e omicidi volontari con vittime donne. Gennaio – Giugno 2020. Roma: Ministero dell'Interno; 2020. Available from: https://www.interno.gov.it/sites/default/files/2020-07/violenza_genere_omicidi_gennaio_giugno_17072020.pdf.
43. Gould MS, Greenberg T, Munfakh JLH, Kleinman M, Lubell K. Teenagers' attitudes about seeking help from telephone crisis services (hotlines). Suicide Life Threat Behav. 2006;36(6):601-13. doi: 10.1521/suli.2006.36.6.601
44. Lenhard A. Teens, smartphones & texting. Washington, DC: Pew Internet & American Life Project; 2012.
45. Schwab-Reese L, Kanuri N, Cash S. Child maltreatment disclosure to a text messaging–based crisis service: Content analysis. JMIR Mhealth Uhealth. 2019;7(3):e11306. doi: 10.2196/11306
46. Mathieu SL, Uddin R, Brady M, Batchelor S, Ross V, Spence SH, Watling D, Kõlves K. Systematic review: The state of research into youth helplines. J Am Acad Child Adolesc Psychiatry. 2021;60(10):1190-233. doi: 10.1016/j.jaac.2020.12.028
47. Bambling M, King R, Reid W, Wegner K. Online counselling: The experience of counsellors providing synchronous single-session counselling to young people. Counselling Psychother Res. 2008;8(2):110-16. doi: 10.1080/14733140802055011
48. Mallen, MJ, Vogel DL, Rochlen AB. The practical aspects of online counseling: Ethics, training, technology, and competency. Counseling Psychologist. 2005;33(6):776-818. doi: 10.1177/0011000005278625

Ann Ist Super Sanità 2024 | Vol. 60, No. 2: 166
DOI: 10.4415/ANN_24_02_11

Book Reviews, Notes and Comments

Edited by
Federica Napolitani Cheyne

SUL PUBBLICARE IN MEDICINA
Impact factor, open access, peer review, predatory journal e altre creature misteriose
Luca De Fiore
Roma: Il Pensiero Scientifico Editore; 2024
182 p
18,00 €
ISBN: 9788849007756

[On medical publishing. Impact factor, open access, peer review, predatory journal, and other mysterious creatures]

Nowadays, the STM (Science, Technology, Medicine) publishing market represents 5% of all the editorial market with 36,000 journals and 5 million articles published each year (2023 data). These numbers, among other factors, are the result of the famous "publish or perish" principle, that pushes researchers in the world to publish continuously in order to have a career, and the advent of internet which has made possible the digitalization of a big segment of the editorial process and, consequently, the publication of a vast number of articles. Not to mention the fact that these huge profits are mostly obtained thanks to the unpaid work of editors, peer reviewers and authors.

Although the numbers that characterize it are overwhelming, scientific publishing is going through a period of great precarity. In his book *Sul pubblicare in medicina. Impact factor, open access, peer review, predatory journal e altre creature misteriose*, Luca De Fiore (the CEO of Il Pensiero Scientifico Editore, a STM Publishing Company, with an experience of over 40 years in the field of publishing) starts with a reflection on a Richard Horton (Editor-in-Chief of *The Lancet*) phrase of the 2016 "the state of scientific publishing today has never been more precarious" to address very critically the current state of the art of STM publishing.

The book is introduced by a text written by Richard Smith (former Editor-in-Chief of *The BMJ*), giving interesting insights on the birth of the modern scientific publishing. After a first chapter devoted to illustrating the (huge!) numbers of the scientific publishing industry, the subsequent chapters analyze, in an fluent but detailed style, the peculiar critical issues of today's scientific publishing: from the lights and shadows of Open Access to the peer review's difficulty of acting as a quality filter, from predatory journals to paper mills, review mills and retractions, from the recent impact of the artificial intelligence to the integrity of the scientific communication, from bibliometric narcissism to the impossibility of citation indexes to define the real value of contents.

In the last chapter, titled "Rethinking the scientific information system", Luca De Fiore affirms that "the system should be rethought from its foundations" asking for a major cultural shift, internationally and at local level, with some helpful concrete suggestions for a real cultural change, or a "possible revolution", that could significantly improve the scientific communication system: publish less (but more in-depth) research, increase the transparency of research outputs, involve doctors and patients in research planning, publish original research on public platforms and transform journals into a space for discussion with perspectives and comments, and, last but not least, teach the principles of science ethics along with more conventional material at school.

The book is an easy, well documented, and informative read giving food for thought, and bibliographic references to delve deeper into the topic. A well thought out "Index of questions" adds further value.

The interesting topic and the clear and accessible style should make it of great interest to readers from the academic/research world and to citizens interested in this crucial theme.

Annarita Barbaro
Scientific Communication Unit
Istituto Superiore di Sanità, Rome, Italy
annarita.barbaro@iss.it

Ann Ist Super Sanità 2024 | Vol. 60, No. 2: 167-169
DOI: 10.4415/ANN_24_02_12

Publications from International Organizations on Public Health

Edited by
Annarita Barbaro

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS (FAO)

Angioni C, Haensel M, Wolf J. **Catalysing climate solutions. An introduction to FAO's work on climate change adaptation in agrifood systems**. Rome: Food and Agriculture Organization of the United Nations 2023; 85 p. ISBN 978-92-5-138462-6. Recognizing the important role adaptation to climate change plays for agrifood systems, the paper presents and reflects on FAO's repertoire of different adaptation actions and solutions. Complementing the conclusion of the Global Stocktake at COP28, it comprehensively summarizes FAO's efforts to boost progress in global adaptation actions. The paper emphasizes the importance of bringing agrifood systems into the global adaptation agenda and policy landscape, creates a cross-sectoral portfolio of FAO adaptation solutions covering multiple scales and approaches, and gives an insight into FAO's work with partners and Members and presents relevant networks and collaborations. Laying out FAO's guiding principles according to the FAO Strategy on Climate Change 2022–2031, it underscores FAO's efforts for transformative action in agrifood systems and demonstrates FAO's people-centred approach to climate change adaptation.

Prevention and control of microbiological hazards in fresh fruits and vegetables – Parts 1 & 2: General principles. Meeting report. Rome: Food and Agriculture Organization of the United Nations and World Health Organization 2023 (FAO Microbiological Risk Assessment Series, No. 42); 154 p. ISBN (FAO) 978-92-5-138340-7 ISBN (WHO) 978-92-4-008209-0 (print version) ISBN (WHO) 978-92-4-008208-3 (electronic version). In response to requests of the Codex Committee on Food Hygiene concerning microbiological hazards in fresh fruits and vegetables and to update and expand the information available in Microbiological hazards in fresh leafy vegetables and herbs (MRA14), which was published in 2008, FAO and WHO convened a series of expert meetings in 2021 to 2022. The purpose of the meetings was to collect, review and discuss relevant measures to control microbiological hazards from primary production to point of sale in fresh, ready-to-eat (RTE) and minimally processed fruits and vegetables, including leafy vegetables. The experts made an effort to update and include any recent trends in commodity and pathogen pairing or pathogen occurrence and presence with a focus on emerging and neglected pathogens. The primary production in open fields was investigated by considering the location, adjacent land use, topography, and climate; prior land use; water; wildlife, animal and human intrusion; soil amendments; and harvest and packing. The experts also worked on: primary production in protected facilities; minimal processing; transport, distribution, and point of sale; and also the gaps in mitigation and interventions measures. The advice herein is useful for both risk assessors and risk managers, at national and international levels and those in the food industry working to control the relevant hazards in the fresh fruits and vegetables. the development of improved mitigation and intervention measures.

INTERNATIONAL SCIENCE COUNCIL (ISC)

Preparing National Research Ecosystems for AI: strategies and progress in 2024. Paris: International Science Council 2024; 76 p. The aim of this paper is to increase the knowledge of current initiatives toward the integration of Artificial Intelligence (AI) in national research ecosystems, of what has been achieved so far, and the possible roadblocks. To these ends, this paper provides a literature study of over 300 publications on the integration of AI in national research ecosystems and twelve country case studies. In detail, this working paper seeks to gather the basic knowledge and information about the issues, and the current efforts to prepare science and research systems for AI, help countries as they develop roadmaps for the uptake of AI in their science systems; create regional and global networks of people involved in the reflections on adaptation and implementation of AI for science, and raise awareness and help shape a critical discussion among the scientific and policy communities of the critical issues that AI raises for the organization of science and research. By the end of 2024, a second, more comprehensive edition of this paper, incorporating additional case studies, and putting forward recommendations for more coordinated and collaborative science policies for AI will be released.

A framework for evaluating rapidly developing digital and related technologies: AI, Large Language Models and beyond. Paris: International Science Council 2023; 12 p. This discussion paper on evaluating rapidly developing digital and related technologies establish a process to produce and maintain an annotated framework/checklist of the risks, benefits, threats and opportunities associated with rapidly moving digital technologies, including – but not limited to

– AI. The purpose of this checklist would be to inform all stakeholders – including governments, trade negotiators, regulators, civil society and industry – of potential future scenarios, and would frame how they might consider the opportunities, benefits, risks and other issues.

UNITED NATIONS ENVIRONMENT PROGRAMME (UNEP)

Global Resources Outlook 2024: Bend the Trend – Pathways to a liveable planet as resource use spikes. Nairobi: United Nations Environment Programme 2024; 181 p. ISBN: 978-92-807-4128-5. The scientific community has never been more aligned or more resolute on the need for urgent global transformation towards the sustainable use of resources. This 2024 edition of the Global Resources Outlook sheds light on how resources are essential to the effective implementation of the Agenda 2030 and multilateral environmental agreements to tackle the triple planetary crisis. The report, built on more than 15 years of work by the International Resource Panel - including scientific assessments and inputs from countries, a vast network of stakeholders in the field and regional experts - brings together the best available data, modelling and assessments to analyse trends, impacts and distributional effects of resource use. The report shows how demand for resources is expected to continue increasing in the coming decades and outlines five critical actions at all levels of governance that are essential to enable transitions to resource-efficient and sustainable consumption and production.

Global Waste Management Outlook 2024: Beyond an age of waste – Turning rubbish into a resource. Nairobi: United Nations Environment Programme 2024; 116 p. ISBN: 978-92-807-4129-2. Jointly published with the International Solid Waste Association (ISWA), this report provides an updated assessment of global waste management and an analysis of data concerning municipal solid waste management worldwide. The analysis uses life cycle assessments to explore what the world could gain or lose through continuing business-as-usual, adopting halfway measures, or committing fully to zero waste and circular economy societies. The report also evaluates three potential scenarios of municipal waste generation and management, examining their impacts on society, the environment, and the global economy. Furthermore, it presents potential strategies for waste reduction and enhanced management, following the waste hierarchy, to treat all waste materials as valuable resources.

EUROPEAN FOOD SAFETY AUTHORITY (EFSA)

EFSA (European Food Safety Authority), Carrasco Cabrera L, Di Piazza G, Dujardin B, Marchese E, Medina Pastor P. **The 2022 European Union report on pesticide residues in food**. EFSA Journal 2024, 22(4): e8753. The 2022 EU report on pesticide residues in food provides an overview of the official control activities on pesticide residues carried out in the EU Member States, Iceland and Norway. The analysis of the results from all reporting countries is presented in a data visualisation format to provide stakeholders with a comprehensive, easily digestible analysis of the European situation related to the findings. The conclusions and recommendations derived from the results remain within this report, giving risk managers a tool for designing future monitoring programmes and taking appropriate decisions on which pesticides and food products should be targeted. The report also includes the outcome of the deterministic risk assessment, both acute and chronic to single substances and the consolidation of the methodology introduced last year on probabilistic exposure assessment to single substances, where probabilities of exceedance of the health-based guidance values (HBGV) of pesticides have been calculated in different subpopulation of European consumers for the 193 pesticides (corresponding to 199 active substances) listed in the EU MACP Regulation. The purpose of these calculations is to provide readers with a deeper insight into the risks of dietary exposure to pesticides and to evidence the differences between the two methodologies (i.e. deterministic and probabilistic).

EFSA and ECDC (European Food Safety Authority and European Centre for Disease Prevention and Control), Melidou A, Enkirch T, Willgert K, Adlhoch C, Alm E, Lamb F, Marangon S, Monne I, Stegeman JA, Delacourt R, Baldinelli F, Broglia A. **Drivers for a pandemic due to avian influenza and options for One Health mitigation measures**. EFSA Journal 2024, 22(4): e8735. This document considers the pandemic potential of currently circulating A(H5N1) viruses in the European Union and European Economic Area (EU/EEA) and at the global level. It is intended as a reference for public health authorities in animal and human sectors dealing with surveillance, preparedness and response to zoonotic influenza infections. This document focuses on potential events such as reassortment, mutation and adaptation of the Avian influenza viruses (AIV) to mammals including humans. The drivers contributing to viral evolution and adaptation of currently circulating A(H5N1) viruses to mammals including humans are described and discussed. This includes the implications of the co-circulation of human influenza viruses alongside the current AI A(H5N1) strains in mammals. This document also addresses which One Health mitigation measures could be implemented in animals and humans to reduce the risk to human health.

WORLD HEALTH ORGANIZATION (WHO)

Global report on neglected tropical diseases 2024. Geneva: World Health Organization 2024; 86 p. ISBN 978-92-4-009153-5 (electronic version) ISBN 978-92-4-009154-2 (print version). This document is

the second in a series of global reports describing progress towards the 2030 targets set in "Ending the neglect to attain the Sustainable Development Goals: a road map for neglected tropical diseases 2021–2030". It describes a wide range of activities, accomplishments and challenges across the portfolio of neglected tropical diseases (NTDs) and across all six WHO regions. The report presents epidemiological and programmatic data for 2022, which were gathered, compiled and analysed in 2023. In some cases, 2023 data are available and presented; in other cases, less recent information is included, when 2022 data are not available. In addition, it presents the main facts or events that occurred in 2023.

Global hepatitis report 2024: action for access in low- and middle-income countries. Geneva: World Health Organization 2024; 242 p. ISBN 978-92-4-009167-2 (electronic version) ISBN 978-92-4-009168-9 (print version). This is the first consolidated WHO report on viral hepatitis epidemiology, service coverage and product access, with improved data for action. Building on previous WHO reports published in 2016, 2018 and 2020, this report presents the latest estimates on the disease burden and the coverage of essential viral hepatitis services from 187 countries across the world – versus estimates from 130 countries in 2019 and 42 countries in 2018. The report also updates progress made since 2019 in improving access to health products for both hepatitis B and C in low- and middle-income countries, with information from 38 countries that together comprise nearly 80% of global viral hepatitis infections and deaths – versus information on health products for hepatitis C in 12 countries in the 2020 report. The report provides a regional perspective, analysing the barriers and opportunities for countries in each of the six WHO regions to expand access to health products for viral hepatitis. It presents actions for countries and stakeholders to accelerate the scaling up of effective viral hepatitis interventions within a public health approach, necessary to eliminate viral hepatitis by 2030.

Future surveillance for epidemic and pandemic diseases: a 2023 perspective. Geneva: World Health Organization 2024; 116 p ISBN 978-92-4-008095-9 (electronic version) ISBN 978-92-4-008096-6 (print version). Future surveillance for epidemic and pandemic diseases describes the global context and the result of horizon scanning of infectious diseases with pandemic and epidemic potential, including newly emerging and re-emerging zoonoses, with a focus on surveillance. It aims to describe the key considerations, opportunities and innovations that shape a vision of how surveillance will function in the future. This report reflects the input and advice of leading experts with different skills, worldviews and experiences who share a commitment to better prepare for future infectious hazards.

Instructions to Authors

Annali dell'Istituto Superiore di Sanità is a peer reviewed quarterly science journal which publishes research articles in biomedicine, translational research and in many other disciplines of the health sciences. The journal includes the following material: original articles, reviews, commentaries, editorials, brief and technical notes, book reviews. The publication of Monographic Sections on *Annali ISS* has been discontinued. In case you wish to present a limited number of coordinated contributions on specific themes concerning priorities in public health, please contact the Editorial office. If only regional or Italian data are presented in the manuscript, these should be compared with similar data available at European or international level. *Annali* follows the Recommendations for the Conduct, Reporting, Editing, and Publications of Scholarly Work in Medical Journals, issued by the International Committee of Medical Journal Editors (ICMJE) recently updated with a specific section II.A.4. on Artificial Intelligence (AI)–Assisted Technology. www.icmje.org.

MANUSCRIPT SUBMISSION

Manuscripts should be submitted online to https://annali.iss.it/.
The submission should include:
- cover letter where the authors declare that the manuscript has not been published or submitted for publication elsewhere;
- manuscript;
- tables and figures;
- author's contribution statement (individual contribution to the manuscript);
- conflict of interest statement (a conflict of interest exists when authors or their institutions have financial or personal relationship with other people or organizations that could inappropriately bias conduct and findings of the study);
- permission to reproduce figures, if appropriate.

Receipt of author's paper will be acknowledged by an e-mail containing an identification number which should be used in future correspondence.
If Artificial intelligence (AI)-assisted technologies were used in the production of the submitted work, both the cover letter and the submitted work clearly state this and provide detail on their use.

NOTE FOR ISS AUTHORS

Authors whose affiliation is Istituto Superiore di Sanità can submit their paper only after completing the usual ISS authorization procedure (Infoweb).

REVIEW PROCEDURE

Each paper submitted to *Annali* is subjected to the following procedures:
- it is reviewed by the Editor-in-Chief for general suitability;
- if it is judged suitable, qualified referees are selected and a peer review process takes place;
- based on the recommendations of the referees and replies of the authors, the Editor-in-Chief decides whether the article should be accepted, modified or rejected;
- once the paper has been accepted, authors will receive proofs from the editorial office, which should be corrected and returned (usually within three working days).

MANUSCRIPT PRESENTATION

Please ensure that your manuscript follows these guidelines.
Manuscripts should be written in good English, as concisely as possible to allow a clear understanding of the text. The title should be followed by the complete name of the authors, their affiliations – only one per author and in the original language – town and country. The name of the Working Group should appear at the end of the by-line; its composition should be reported before the References, names and affiliations of each member are required. The name and address, telephone and e-mail of the corresponding author should also be indicated. On the same page a running head of no more than 40 characters (including spaces) should be included.
Original articles should normally be organized into different sections (*i.e.*: Introduction, Materials and methods, Results, Discussion, Conclusions). In the Methods section a specific paragraph on the adopted statistical analysis should necessarily be included.
Each article should be accompanied by:
- an abstract of about 150 words; the abstract should be structured when required (such as in original articles);
- key words up to a maximum number of five (MeSH headings, whenever possible. Refer to: www.nlm.nih.gov/mesh/meshhome.html).

Tables and figures should be kept to a minimum and be presented only if necessary.
Authors should deal responsibly and effectively with security issues that might be raised by their papers (see: Statement on Scientific Publication and Security *Science* 2003;299:1149).
This journal has adopted the SAGER reporting Guidelines for Sex and Gender Equity in Research.
These guidelines apply to original research articles and review papers. Authors should use the terms sex and gender carefully in order to avoid confusing both terms. Where subjects can also be differentiated by gender (shaped by social and cultural circumstances), the research should be conducted similarly at this additional level of distinction. Where the subjects of research comprise organisms capable of differentiation by sex, the research should be designed and conducted in a way that can reveal sex-related differences in the results, even if these were not initially expected.
Please consult the guidelines (https://researchintegrityjournal.biomedcentral.com/articles/10.1186/s41073-016-0007-6).

Authors are also encouraged to use fair, accurate and respectful language, but preferences can change and vary across groups and individuals and can also evolve overtime. The following guidelines may help in use of a correct terminology in the area of HIV: https://www.cdc.gov/stophivtogether/library/stop-hiv-stigma/fact-sheets/cdc-lsht-stigma-factsheet-language-guide.pdf
https://www.hptn.org/resources/HIVLanguageGuide
https://unesdoc.unesco.org/ark:/48223/pf0000144725
The name of the bioresource (and identifier, if available) which provided samples/data useful for the conduct of the study should be reported in extense, either in the Material and methods section or in the Acknowledgements.

LENGTH OF THE TEXT

To provide a text that meets the requirements of our publication:
• the *letter* to the Editor should be about 450 words; it does not need an abstract. Please contact the editorial office in advance if you wish to submit a Letter;
• the *editorial* should be no longer than 1,000 words; editorials are submitted on invitation. Please contact the editorial office in advance if you wish to submit an editorial;
• the *commentary,* 2,000 words; the commentary is an opinion piece or reflection on recent papers previously published on *Annali ISS* or elsewhere; an abstract is required; please contact in advance the editorial office;
• the *brief note*, 3,000 words, including about 15 references, one table and one figure;
• the *article,* 6,000 words, including about 40 references, three tables and two figures;
• the *review* should be no longer than 10,000 words, including no more than 100 references up to a maximum of four tables and three figures.
• *Supplementary materials* should be no longer than two printed pages. If necessary, authors could invite readers to contact them.

FORMATTING GUIDELINES

Text

• Use Times New Roman font, 10 point, single spaced;
• do not use the automated features of your application (endnotes, headers, footers, especially for references);
• avoid using bold characters to emphasise words or sentences within the text;
• indicate clearly titles of chapters and subchapters avoiding numbering.

Tables and figures

They should be understandable also without reference to the text and should be numbered in Arabic numerals in a consecutive and independent way according to their citation within the paper.
Tables should be presented on a separate sheet and preceeded by a title. Each column within the table should have a heading. Abbreviations should be reported in full in the legend.
Figures should be loaded as separate files. The following file formats are acceptable: JPEG, TIFF or EPS. Vectorial images (graphs, flow charts, schemes, and other non bitmap material) should be in Excel, Adobe Illustrator, Microsoft Power Point so as to allow the editorial formatting of the material.
Figures are redrawn into the *Annali* style by our in-house illustrators.
Photographs must have a minimum resolution of 300 dpi.
Captions should be presented on a separate sheet and contain a sufficient explanation of their object. They should be concise but comprehensive.

REFERENCES

All references in the text must be numbered in square brackets, *i.e.* [1, 2, 3-6], and mentioned at the end of the article in the order in which they are quoted. They should conform to the "Recommendations for the Conduct, Reporting, Editing, and Publications of Scholarly Work in Medical Journals" (www.icmje.org), according to the following examples.
Titles of periodicals should be abbreviated in accordance with the Medline abbreviation of the US National Library of Medicine (www.nlm.nih.gov/bsd/aim.html).
Online journal articles can be cited using, in addition to the complete citation, the DOI number. Do not insert websites among the References but directly in the text in parentheses, where necessary.

Articles in journal

Bozzuto G, Ruggieri P, Molinari A. Molecular aspects of tumor cell migration and invasion. Ann Ist Super Sanità. 2010;46(1):66-80. doi: 10.4415/ANN_10_01_09

Books and chapters in a book

Godlee F, Jefferson T. Peer review in health sciences. London: BMJ Books; 1999.
Van Weely S, Leufkens HGM. Background paper: orphan diseases. In: Kaplan W, Laing R (Eds). Priority medicines for Europe and the world – a public health approach to innovation. Geneva: World Health Organization; 2004.

Proceedings

Fadda A, Giacomozzi C, Macellari V. Comparative measurements to validate a new telemetric pressure insoles system. In: 2. International Symposium on measurement, analysis and modelling of human functions. 1. Mediterranean Conference on measurement. Workshop on evaluation check of traceability. Proceedings. Genova: June 14-16, 2004. p. 425-7.

Technical reports

Della Seta M, Di Benedetto C, Leone L, Pizzarelli S, Siegmund U. ETHICSWEB technical guides. Manual for the creation of standards and guidelines for sharing information about knowledge organization systems on ethics and science. Roma: Istituto Superiore di Sanità; 2011. (Rapporti ISTISAN, 11/32).

Legislation

Italia. Decreto legislativo 29 ottobre, n. 419. Riordinamento del sistema degli enti pubblici nazionali, a norma degli articoli 11 e 14 della legge 15 marzo 1997, n. 59. Gazzetta Ufficiale – Serie Generale n. 268, 15 ottobre 1999.
US Social Security Administration. Evidentiary require-

ments for making findings about medical equivalence. Final rules. Fed Reg. 2006 Mar 1;71(40):10419-33.
The authors should check that each reference cited in the text appears in the reference list and viceversa. References should not include works submitted for publication but not yet accepted or unpublished results, etc. These can be mentioned in the text in parentheses.

CONVENTIONS

All Latin or foreign words should be in italics. The authors should use internationally accepted abbreviations. All abbreviations should be spelled out in full the first time they occur in the text, followed by the shortened term in parentheses; afterwards use the abbreviation only. Avoid abbreviations in the title of the manuscript.
For writing symbols, quantities and units of measurements refer to the International Systems of Units (SI) and the ISO standards.

LICENSES AND AGREEMENTS

Please, contact the Editorial Office for any other information. Annali Editorial Office - Scientific Communication Service
Istituto Superiore di Sanità
Viale Regina Elena, 299 00161 Rome, Italy
Tel.: +39 06 49902945 Fax: +39 06 49902253
E-mail: annali@iss.it
www.iss.it/annali - https://annali.iss.it/