

Preface

Electromagnetic interference (EMI) is the disruption of operation of an electronic device when it is in the vicinity of an electromagnetic field that is caused by another electronic device.

The section "Electromagnetic Interference with Medical Devices" of this issue of the Annali dell'Istituto Superiore di Sanità features original investigations and reviews of the proper functioning of medical devices in the presence of external sources of electromagnetic fields.

Research groups, manufacturers, and governmentall non-governmental agencies have reported EMI-related incidents with medical devices. Some of them had life-threatening consequences, others could have had, others can be considered just a nuisance. Over the past 15 years, the US Food and Drug Administration has had more than 500 incident reports suspected to be attributable to EMI affecting medical device in hospitals. These reports prompted the need for an increased attention to medical device electromagnetic compatibility by users, manufactures, and standard organizations.

The large number of different medical devices, the peculiarity of some of them (e.g., implantable vs non-implantable or diagnostic vs therapeutic), and the gravity of the potential consequences of EMI render it difficult to treat this matter with a unique approach. The wide number of potential sources of interference and related mechanisms (e.g., conducted vs radiated) make the problem even more complex. The fast-changing area of telecommunications and the increasingly complex technology of medical devices call for the continuous updating of the knowledge on EMI with medical devices.

The safety aspects regarding the functioning and use of medical devices are extremely interesting for the Istituto Superiore di Sanità. The Institute is, indeed, committed to focusing on individual health, but at the same time it considers the collective dimension of

public health. Electromagnetic compatibility of, and electromagnetic interference with, medical devices are part of the general problem of medical device safety.

This special section is devoted to reviews and innovative works in the following areas: electromagnetic interference with non-implantable medical devices; electromagnetic interference with active implantable devices; technical standards and regulations.

Given the dimension and the complexity of the EMI problem, this special section deals with topics which are expected to emerge in the near future: new experimental data and methodological approaches to address the impact of innovative services – e.g., TETRA mobile phones (to be adopted in many European countries by police, firemen and ambulance staff) and WiFi networks (installed in many hospitals worldwide) – as well as a global approach to the EMI environment management of an entire hospital; the state of the art of knowledge on low- and high-frequency EMI (power lines, magnetic resonance scanners and mobile phones) with the most widespread implantable devices (pacemakers and cochlear implants); a comprehensive review of the technical standards and norms concerning both medical devices and human exposure, including those guidelines which will constitute the basis for risk assessment in hospitals.

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**Pietro Bartolini, Giovanni Calcagnini
and Federica Censi**

*Dipartimento di Tecnologie e Salute,
Istituto Superiore di Sanità, Rome, Italy*