

# Use of Mobile Phones in ICU - Why Not Ban?

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## Abstract

Due to the rapid growth of mobile telecommunications it is predicted that by 2005 there will be 1.6 billion mobile phone users worldwide. The usage of cellphones in Intensive Care Units carries with it a high incidence of interference with a number of medical devices like implantable defibrillators, cardioverters, pacemakers, monitors and other important devices like ventilators. It is in this context that this article will throw a light on complications of cellphones use in the Intensive Care Units and various strategies that can be taken to restrict their use in the Intensive Care Units. ©

## INTRODUCTION

With the opening of the telecommunication sector, mobile telecommunications has developed more rapidly than the expensive fixed line system. According to a recent study the number of mobile phone subscribers in India is in the range of 1.7 crores. Mobile phones have become a professional necessity as far as a physician is concerned as he can be in touch with the patients and be informed about the critical state of his patients in his hospital. When Rudy Krolopp designed the first mobile phone twenty years back, he was not aware that mobile phones could interfere with the functioning of the medical equipment. This article will deal with the effect of mobile phones on medical equipment and the hazards of its use in the Intensive Care Units.

### What is a mobile phone?

Mobile phones are low power radio devices that transmit and receive microwave radiation at frequencies of about 900 Megahertz (MHz) and 1800 MHz.<sup>1,2</sup> In many ways, cellular phone use is like a contemporary generational experiment. The radiation emitted by a cellphone is not x-ray radiation, but microwave radiation, and some scientists are concerned that this type of radiation may be heating and damaging brain cells due to the close proximity of the phone to the brain.

Mobile phones that are electromagnetically incompatible with various medical equipments are the ones which may lead to interference in the function of these equipments. The radiations emitted by the mobile phones can cause nearby electrical equipment to become a radio receiver and the mobile can then interfere with the functioning of the equipment.<sup>3</sup> As seen routinely that whenever our mobile rings near our

computer or our television it temporarily interferes with the monitor. The power output from a mobile phone and the frequency on which it operates determines how it affects electrical equipment. Different types of phones carry different levels of risk. The analogue radios used by the emergency services are a greater risk than security radios used by other hospital workers, which are in turn more risky than the mobile phones used by the general public.

## EFFECTS ON VARIOUS INSTRUMENTS

**Pacemakers and defibrillators** - Digital mobile phones (900 MHz, 8 Hz modulation) in close proximity to implanted pacemakers may cause intermittent pacemaker dysfunction leading to inappropriate ventricular tracking or pacemaker inhibition<sup>4,5</sup> (working at 125 ms time intervals; 8 Hz). However, no permanent pacemaker dysfunction or changes in the programmed parameters have to be expected once the phones are removed. High power output of the mobile phone, maximal sensitivity of the pace maker and unipolar lead configuration increase the susceptibility to electromagnetic interference, thereby facilitating pacemaker dysfunction.

Fetter *et al*<sup>6</sup>, have studied the interaction with implantable cardioverter - defibrillators - ICD and concluded that typical mobile phone 900 and 836 MHz digital mobile phones (NADC/TDMA-50) with 0.6 W power do not appear to interfere with the in vivo operation of specific ICD system. Damage or reprogramming to any of the tested ICDs during the use of the cellular telephone would seem to be highly unlikely. Nevertheless, provision of transvenous bipolar lead system could provide an additional measure of resistance to sensing interference energy fields. In contrast, there is potential for temporary suspension of ventricular tachycardia and fibrillation detection from the static magnetic field generated by the speaker in the cellular telephone earpiece only if the telephone is placed directly on top of and the distance is below 0.5 cm from the ICD - primarily those implanted in a

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subcutaneous pocket.

It would be prudent to provide an extra safety margin when pacemaker patients or patients implanted with ICD use mobile phones: minimal 15 cm distance (0.6 W) or 30 cm (above 3 W) between the antenna and the implanted device, holding the telephone to the ear opposite the side of the implanted device,<sup>7,8</sup> not holding the phone near their chest or carrying it in the breast pocket or on a belt and finally storing the phone in a location opposite the side of the implanted device in general.

**Ventilators** - It is undisputed that cellular phones can adversely interfere with aircraft equipment, heart and lung machines and other hospital equipment. It has been reported that a mechanical ventilator shut down and restarted when a cellphone was held just within two inches of the ventilator.<sup>9</sup> Dialysis machines at zero metre readings were distorted by phones.

**Anaesthetic Machines** - It was found in the study by the Medical Devices Agency in UK that these machines displayed incorrect oxygen values when mobile phones were used at a distance of less than 1 metre.<sup>9</sup> Infusion pumps were prone to alarms and there was even a reversal in pump direction when phones were used at a distance of less than 1 metre.

**Medical Monitors** - Mobile phone interference caused baseline noise in electrocardiogram tracings.<sup>10</sup> It was found that 61% of the monitors had changes to readings, severe judder, buzzing, and system crash when phones were at a distance of less than 2 metres. The maximum distance at which any phone caused interference was 2 metres and phones closer than 78 centimetres caused the most severe interference.<sup>10</sup> The risk due to the interference from mobile phones is low at a distance of more than 2 metres, but closer than this the danger is high.

## HOW TO PREVENT THIS?

On the face of some of these trends, the first signs of impending problems are emerging. A close review of all available information on this subject reveals that although no official guidelines have been issued, certain preventive measures can be adopted to minimize health risks. Of course, the best preventive measure is to eliminate cellphone use whenever possible. If this is not possible, the second best preventive measure is to refrain from using the cellphone in the Intensive Care Units. If cellphones are absolutely necessary in the course of employment, the employers can adopt a variety of preventive and precautionary strategies. The employers would do well to discourage frequent usage whenever possible; provide usage guidelines to employees who are required to use cellphones in the course of their work; raise awareness about potential health risks associated with cellphone use.

No interactions were found between phones that operate in the 1800 and 1900MHz bands.<sup>11,12</sup> Only one unnamed company's ICDs were affected, and these effects were only caused by TDMA-11 Hz which is only used in specialised operations, and even then no permanent ICD reprogramming

occurred. Still, doctors say that additional research is necessary, and researchers say that ICD patients should follow the same guidelines as pacemaker wearers.

Potential effects may be due to either the radiofrequency signal or the magnet within the phone and could include inhibition or asynchronous pacing when the phone is in close proximity (within 15 cm or 6 inches) to the pulse generator.<sup>13</sup> It is important to note that any effect resulting from an interaction between cellular phones and implanted pacemakers is temporary.<sup>14</sup> Simply moving the phone away from the implanted device will return the device to its previous state of operation. Because of the great variety of cellular phones and the wide variance in patient physiology, an absolute recommendation to cover all patients cannot be made.

Already in our system, the Intensive Care Units may face a variety of problems like erratic electric supply, breakdowns, lack of back up generator, voltage fluctuation and add to this the problem of interference in the instrument functioning due to mobile phones. This will only complicate the critical care management set up. In recent times the primitive system of call books has been replaced by pagers, telephones and till recently by mobile phones as seen in our institute. The situation elsewhere may not be very different.

With the increased interest in wireless personal telecommunications and concern about the safety of this newer technology, it can be expected that there will be many studies in the future. Thus even a small impact on health could have a major public health consequence.

It will thus be realized that in the modern world, though appliances can facilitate communications and make domestic and professional life easy and rather comfortable, the ill effects of such devices cannot be ignored. The do's and don'ts mentioned above need to be seriously considered in the Intensive Care set up, in particular. It does demand a lot of self discipline on the part of professionals working in such a set up and more appropriate measures however appears to be a ban on the usage of cell phones in Intensive Care set up, a step already taken in other countries like United States, United Kingdom<sup>15,16</sup> and therefore perhaps due in our context too.

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### *Announcement*

#### **Training in Diabetes Foot Care**

**Project supported by the World Diabetes Foundation (WDF)**

**Project Committee : Sharad Pendsey, India; Karel Bakker, The Netherlands; Ali Foster, UK;  
Zulfiqarali Gulam-Abbas, Tanzania, Vijay Vishwanathan, India**

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Selected participants will be provided with excellent educational material along with diagnostic/therapeutic instrument kits.

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Preference to young (<40 years), coming from non-metros, private/public/corporate/govt. medical institutions

Selection committee's decision will be binding in all applicants.

The last date of receipt of application is 30th June 2004.

Write for application form to : **Dr. Sharad Pendsey**, Project Incharge, Diabetes Clinic and Research Center, "Shreeniwas", Opp. Dhantoli Park, Nagpur 440 012 (India)

### *Announcement*

**Cardiology, Diabetology and Electrocardiology Summit – 2004. Bhopal (MP), 4<sup>th</sup> - 5<sup>th</sup> September, 2004**

For any information please contact : **Dr. PC Manoria**, Organizing Chairman, C.D.E. Summit – 2004. E-5/103 Area Colony, Bhopal.

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