TITLE: Cellular Telephone Interference in Hospitals: Safety and Guidelines

DATE: 24 November 2010

RESEARCH QUESTIONS

1. What is the evidence that cellular telephones interfere with patient monitoring equipment in hospitals?

2. What is the evidence for the safe use of cellular telephones in hospitals?

3. What are the guidelines for the safe use of cellular telephones in hospitals?

KEY MESSAGE

Evidence suggests that most cellular telephones do not cause clinically relevant interference with medical devices; however, there is some agreement that a one meter distance be maintained between cellular phones and medical equipment.

METHODS

A limited literature search was conducted on key health technology assessment resources, including PubMed, the Cochrane Library (Issue 11, 2010), University of York Centre for Reviews and Dissemination (CRD) databases, ECRI (Health Devices Gold), EuroScan, international health technology agencies, and a focused Internet search. The search was limited to English language articles published between January 1, 2005 and November 16, 2010. No filters were applied to limit the retrieval by study type. Internet links were provided, where available.

The summary of findings was prepared from the abstracts of the relevant information. Please note that data contained in abstracts may not always be an accurate reflection of the data contained within the full article.
RESULTS

Rapid response reports are organized so that the higher quality evidence is presented first. Therefore, health technology assessment reports, systematic reviews, and meta-analyses are presented first. These are followed by randomized controlled trials, non-randomized studies, and evidence-based guidelines.

One systematic review and six non-randomized studies were identified pertaining to the potential interference between cellular telephones and patient monitoring equipment, and the safe use of cellular telephones in hospitals. No relevant health technology assessment reports, randomized controlled trials, or evidence-based guidelines were identified. Additional information that may be of interest is included in the appendix.

OVERALL SUMMARY OF FINDINGS

Overall, evidence from the included systematic review and non-randomized studies suggests that while cellular telephones may interfere with the display7 or alarms5 of monitoring equipment, clinically relevant outcomes are unlikely.1,3,6,7 Authors of three of the included studies suggested that one meter was a safe distance between cellular telephone use and medical devices.1,4,7 None of the studies resulted in the conclusion that cellular telephones in hospitals should be disallowed.1-7 Additional details, such as the types of telephones more likely to cause interference, are included in Table 1. No evidence-based guidelines or recommendations were identified.

Table 1: Details of the Included Studies

<table>
<thead>
<tr>
<th>Author, Year, Study type</th>
<th>Study objectives, devices studied</th>
<th>Results</th>
<th>Conclusions</th>
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<tbody>
<tr>
<td>Calgagnini, 2007, SR1</td>
<td>To study the likelihood of electromagnetic interference (EMI) of cell phones on infusion pumps. Setting not reported</td>
<td>Risk of EMI depended on several factors: phone-emitted power, distance, carrier frequency, phone model, antenna type. No permanent damage to infusion pumps reported EMI resulting in clinically relevant outcomes found to be rare</td>
<td>Authors concluded that there is a “non-negligible” risk of EMI between cellular phones and infusion pumps at distances less than 1 meter but that there was no consensus as to a safe distance.</td>
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<td>Hietanen, 2007, NRS2</td>
<td>To test the effect of mobile communications devices on medical life-support devices* Global system for mobile communications (GSM) 1800, 900 type cellular phones</td>
<td>GSM1800 phones resulted in no interference at a distance of ≥5 cm. GSM900 phones resulted in no interferences at a distance of ≥70 cm.</td>
<td>Authors concluded that GSM1800 cellular phones are safe for use near life-support devices but that GSM900 phones may result in clinically relevant interference.</td>
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<td>Tri, 2007, NRS³</td>
<td>To determine if standard use of cellular telephones interfered with medical devices in patient care areas.</td>
<td>300 tests involving 192 medical devices in 75 patient care rooms. Interference occurred in 0 of 75 rooms and there were no instances of clinically important interference.</td>
<td>Authors concluded that &quot;normal&quot; use of cellular telephones did not result in interference with medical devices.</td>
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<td>van Lieshout, 2007, NRS¹</td>
<td>To classify incidents of EMI in second and third generation cellular telephones on medical equipment.</td>
<td>61 devices in 17 categories tested; 48 incidents in 26 devices (43%) occurred. 16 (33%) incidents were considered hazardous, 20 (42%) significant, and 12 (25%) light. One hazardous incident occurred at a distance beyond 100 cm (GPRS phone).</td>
<td>Authors concluded that critical care equipment was affected by EMI at distances of approximately 3 cm and that 1 meter policies were warranted.</td>
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<td>Jones, 2005, NRS³</td>
<td>To test possible interference between mobile communications devices and ventilators.</td>
<td>Display errors were seen with the telephones but ventilator performance was not affected. The Bluetooth device had no effect on display errors or on ventilator performance.</td>
<td>Authors concluded that medium powered devices such as cellular phones resulted in ventilator alarms but did not result in problems with ventilator performance.</td>
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<tr>
<td>Tri, 2005, NRS⁵</td>
<td>To test the interference between cellular telephones and medical devices.</td>
<td>Incidence of clinically important interference: 1.2% EMI was induced in 108 of 510 (21.2%) tests and in 7 of 16 (44%) devices.</td>
<td>Authors concluded that compared to previous tests of interference between cellular telephones and medical devices, current telephones must be closer to the devices in order to see EMI and advised periodic testing.</td>
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<td>Multiple Access (TDMA), analog</td>
<td>Medical devices were attached to simulators.</td>
<td>10 cases of display interference were reported</td>
<td>Authors concluded that GPRS cellular phones could be used safely within 1 meter of life supporting equipment and that cell phone use in public areas of hospitals should be allowed due to minimal risk of interference.</td>
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<td>Wallin, 2005, NRS</td>
<td>To test possible interference between wireless communication devices and life-supporting equipment in intensive care units and the operating room.</td>
<td>1 case of infusion pump malfunction (in an “older infusion pump”) at a distance of 50 cm</td>
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<td>GPRS cellular telephones</td>
<td>Laboratory and clinical tests</td>
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CDMA = code division multiple access; cm = centimeter; EMI = electromagnetic interference; GPRS = general packet radio signals; GSM = global system for mobile communications; IDEN = integrated digital enhanced network; NRS = non-randomized study; SR = systematic review; TDMA = time division multiple access UMTS = universal mobile telecommunications system  
*This study also examined TETRA telephones which operate on a two-way radio system and are not relevant to this report.*
REFERENCES SUMMARIZED

Health technology assessments
No literature identified.

Systematic reviews and meta-analyses

Randomized controlled trials
No literature identified.

Non-randomized studies


Guidelines and recommendations
No literature identified.

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APPENDIX – FURTHER INFORMATION:

Practice Guidelines and Recommendations


Case studies


Review articles


Additional references


