TITLE: Incubators and Infant Warmers: Safety

DATE: 26 February 2015

RESEARCH QUESTION

What is the safety associated with incubators and infant warmers in neonates or infants requiring their use in the hospital setting?

KEY FINDINGS

Two systematic reviews, two randomized controlled trials, and four non-randomized studies were identified regarding the safety of incubators and infant warmers.

METHODS

A limited literature search was conducted on key resources including PubMed, The Cochrane Library (2015, Issue 2), University of York Centre for Reviews and Dissemination (CRD) databases, ECRI (Health Devices Gold; HTAIS), Canadian and major international health technology agencies, as well as a focused Internet search. No filters were applied to limit the retrieval by study type. Where possible, retrieval was limited to the human population. The search was also limited to English language documents published between January 1, 2005 and February 11, 2015. 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.

SELECTION CRITERIA

One reviewer screened citations and selected studies based on the inclusion criteria presented in Table 1.
**Table 1: Selection Criteria**

<table>
<thead>
<tr>
<th>Population</th>
<th>Neonates or infants requiring the use of incubators or warmers in the NICU, Labour and Delivery Department, or the nursery</th>
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| Intervention | Incubators  
            Infant warmers                                                                                          |
| Comparator | No comparator  
            Other incubators                                                                                       |
| Outcomes | Safety (e.g., patient harms, adverse events associated with device use, iatrogenic events, any error that could put the patient at harm, usability errors, interface difficulties, etc.) |
| Study Designs | Health technology assessments, systematic reviews, meta-analyses, randomized controlled trials, non-randomized studies |

NICU = neonatal intensive care unit.

**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 and non-randomized studies.

Two systematic reviews, two randomized controlled trials, and four non-randomized studies were identified regarding the safety of incubators and infant warmers. No relevant health technology assessments were identified.

Additional references of potential interest are provided in the appendix.

**OVERALL SUMMARY OF FINDINGS**

Two systematic reviews\(^1,2\) were identified regarding the safety of incubators and infant warmers. One systematic review\(^1\) compared cot-nursing versus incubator care, and while there were fewer infant deaths in the cot-nursing group, the difference was not statistically significant. Another systematic review\(^2\) that examined external heat sources for very low birth weight infants reported that trans-warmer mattresses reduced the incidence of hypothermia upon admission to the neonatal intensive care unit (NICU) in this patient population.

Two randomized controlled trials\(^3,4\) examined the use of exothermic mattresses in infant care. One randomized controlled trial\(^3\) reported that the use of exothermic mattresses, used in addition with polyethylene bags, resulted in more infants with hyperthermia and temperatures outside of the normal range upon NICU admission. Another randomized controlled trial\(^4\) did not report any adverse effects with the use of trans-warmer mattresses for reducing hypothermia in preterm infants.

Four non-randomized studies\(^5-8\) were identified regarding the safety of incubators and infant warmers. One study\(^5\) reported that changes in radiant warmer output caused fluctuations in rectal and skin temperature for infants in intensive care; however, the long term effects of this were unknown. One study\(^5\) compared humidified hybrid incubators with nonhumidified conventional incubators and reported no difference in necrotizing enterocolitis, intraventricular hemorrhage, sepsis, or bronchopulmonary dysplasia between the two groups. They did, however, report a decrease in severe bronchopulmonary dysplasia and a decrease in the duration of assisted ventilation in the humidified incubator group. The 2010 study by Singh et al\(^7\) reported that infants wrapped in polythene bags and placed on exothermic mattresses were
significantly more hyperthermic than infants in bags only or wrapped in a towel. Another study\textsuperscript{8} reported that the electromagnetic fields of incubator motors influenced newborn heart rate variability and that basal heart rate variability was restored when incubator motors were turned on.
REFERENCES SUMMARIZED

Health Technology Assessments
No literature identified.

Systematic Reviews and Meta-analyses


Randomized Controlled Trials


Non-Randomized Studies


APPENDIX – FURTHER INFORMATION:

Non-Randomized Studies

Case Reports


Review Articles


Additional References

