How Many Cs in NICU?

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in fulfilment of requirements for the degree of
Doctor of Philosophy

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Certificate of Original Authorship

I certify that the work in this thesis has not previously been submitted for a degree nor has it been submitted as part of requirements for a degree except as fully acknowledged within the text.

I also certify that the thesis has been written by me. Any help that I have received in my research work and the preparation of the thesis itself has been acknowledged. In addition, I certify that all information sources and literature used are indicated in the thesis.

Lynn Sinclair
10 September 2013
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Peer-Reviewed Publications and Conference Presentations

Peer-Reviewed Publications


Conference Presentations


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## List of Abbreviations

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<th>Abbreviation</th>
<th>Full Form</th>
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<tbody>
<tr>
<td>ACT</td>
<td>Australian Capital Territory</td>
</tr>
<tr>
<td>AIHW</td>
<td>Australian Institute of Health and Welfare</td>
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<tr>
<td>ANZNN</td>
<td>Australia and New Zealand Neonatal Network</td>
</tr>
<tr>
<td>AQP</td>
<td>Aquaporin</td>
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<tr>
<td>CLD</td>
<td>Chronic lung disease</td>
</tr>
<tr>
<td>CNC</td>
<td>Clinical nurse consultant</td>
</tr>
<tr>
<td>CNRG</td>
<td>Cochrane Neonatal Review Group</td>
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<tr>
<td>CONSORT</td>
<td>Consolidated Standards of Reporting Trials</td>
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<tr>
<td>CP</td>
<td>Cerebral palsy</td>
</tr>
<tr>
<td>CPG</td>
<td>Clinical practice guidelines</td>
</tr>
<tr>
<td>CRCT</td>
<td>Cluster randomised controlled trial</td>
</tr>
<tr>
<td>CRIB</td>
<td>Clinical Risk Index for Babies</td>
</tr>
<tr>
<td>CTC</td>
<td>Clinical Trials Centre</td>
</tr>
<tr>
<td>DOI</td>
<td>Diffusion of Innovations</td>
</tr>
<tr>
<td>DSMC</td>
<td>Data and Safety Monitoring Committee</td>
</tr>
<tr>
<td>EBM</td>
<td>Evidence-based medicine</td>
</tr>
<tr>
<td>EBP</td>
<td>Evidence-based practice</td>
</tr>
<tr>
<td>ECW</td>
<td>Extracellular water</td>
</tr>
<tr>
<td>EoC</td>
<td>Essentials of Care</td>
</tr>
<tr>
<td>fMRI</td>
<td>functional magnetic resonance imaging</td>
</tr>
<tr>
<td>HIPI</td>
<td>Humidity in Incubators for Preterm Infants</td>
</tr>
<tr>
<td>HREC</td>
<td>Human research ethics committee</td>
</tr>
<tr>
<td>ICC</td>
<td>Intracluster correlation coefficients</td>
</tr>
<tr>
<td>ID</td>
<td>Identification</td>
</tr>
<tr>
<td>IVH</td>
<td>Intraventricular haemorrhage</td>
</tr>
<tr>
<td>MRN</td>
<td>Medical record numbers</td>
</tr>
<tr>
<td>NEC</td>
<td>Necrotising enterocolitis</td>
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<tr>
<td>NHMRC</td>
<td>National Health and Medical Research Council</td>
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<tr>
<td>NICU</td>
<td>Neonatal intensive care unit</td>
</tr>
<tr>
<td>NICUS</td>
<td>Neonatal Intensive Care Units</td>
</tr>
<tr>
<td>NSW</td>
<td>New South Wales</td>
</tr>
<tr>
<td>Abbreviation</td>
<td>Definition</td>
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<tr>
<td>PARiHS</td>
<td>Promoting Action on Research Implementation in Health Services</td>
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<tr>
<td>PDA</td>
<td>Patent ductus arteriosus</td>
</tr>
<tr>
<td>PET</td>
<td>Positron emission tomography</td>
</tr>
<tr>
<td>PICO</td>
<td>Patients, intervention, comparator and outcomes</td>
</tr>
<tr>
<td>PSANZ</td>
<td>Perinatal Society of Australia and New Zealand</td>
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<tr>
<td>PSN</td>
<td>Pregnancy and Newborn Services Network</td>
</tr>
<tr>
<td>PVL</td>
<td>Periventricular leukomalacia</td>
</tr>
<tr>
<td>qEEG</td>
<td>quantitative electroencephalography</td>
</tr>
<tr>
<td>QUOROM</td>
<td>Quality of Reporting of Meta-Analyses</td>
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<tr>
<td>RCT</td>
<td>Randomised controlled trial</td>
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<tr>
<td>SAE</td>
<td>Serious adverse event</td>
</tr>
<tr>
<td>SCAN</td>
<td>Social cognitive affective neuroscience</td>
</tr>
<tr>
<td>SCARF</td>
<td>Status, certainty, autonomy, relatedness, fairness</td>
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<tr>
<td>SCARF-SA</td>
<td>SCARF-Self-Assessment</td>
</tr>
<tr>
<td>SNAPPE-II</td>
<td>Score for Neonatal Acute Physiology—Perinatal Extension</td>
</tr>
<tr>
<td>SPIRIT</td>
<td>Standard Protocol Items: Recommendations for Interventional Trials</td>
</tr>
<tr>
<td>TEWL</td>
<td>Transepidermal water loss</td>
</tr>
<tr>
<td>TGA</td>
<td>Therapeutic Goods and Administration</td>
</tr>
<tr>
<td>TMC</td>
<td>Trial management committee</td>
</tr>
<tr>
<td>TMS</td>
<td>Transcranial magnetic stimulation</td>
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Abstract

Neonatal clinicians are challenged to ensure practice is evidence based and health outcomes are positive, which necessitates ongoing innovation and change. In the neonatal intensive care unit (NICU), assessment of the effectiveness of both new and existing interventions is required to reduce the burden of illness for extremely preterm infants and their families. The initial focus of the doctoral work outlined within this thesis was the investigation of the use of incubator humidity in the care of premature infants. My original doctoral plan was to undertake a randomised controlled trial in order to produce robust evidence to guide clinicians in humidity use and reduce the existing variability in practice. The doctoral work evolved to include a review of the broad literature that examines the physiological and historical context of humidification practices; a systematic review of randomised controlled trials that identifies a lack of research evidence to direct practice; a survey of humidification practices in NICUs across Australia and New Zealand that highlights the extent of the diversity in day-to-day practices; a single centre audit that was unable to detect any patterns between incubator humidity and neonatal health outcomes, but did reveal diversity in practice; and, the development of a protocol for the randomised controlled trial required to test the effect of different levels and duration of humidity and its effect on clinically important outcomes. The final chapters build on these findings and explore the kind of workplace cultures that are required to maximise the generation of meaningful evidence and the likelihood that clinicians would use this evidence to inform practice. The final chapter also explores the potential of contemporary social, cognitive, affective neuroscience for providing causal explanations for interventions such as transformational practice development (tPD) as well as providing pointers to additional strategies for creating more positive workplaces for clinicians and families.