



The National Intensive Care Skill Matching Study



... and the
Department of Clinical Nursing

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Acknowledgments

- Prof Alison Tierney
- Prof Helen McCutcheon
- The 46 Level 3 ICUs & 317 Shift Leader Nurses that participated

Research background

What is known:

- Skill mix and nurse numbers impact on outcome
- Inappropriate *matching* may lead to poor outcomes
- ↑ use of ICU agency nurses; skills may be unclear
- Global ICU nurse shortage
- Voluminous staffing literature but focus on predominant utilisation models



Inherent limitations of staffing models

Many models labour utilisation (nursing hours) based

Hurst 2003

Example: 2 models:

- **A) ACCCN:** 1:1 Standard Nurse/Patient Ratio = 26 hours

- Clinical Coordinator 1 = 1.3 hours

- Resource Nurse = 60% qual 1:6 = 4.3 hours

Total 31.6 Hours

- **B) WA:** NHpPD

Total 31.6 Hours

Brearley 2005

***Same utilisation in hours but unknown
skill 'mix' or 'match' !***

Many staffing method systems

- Nurse-to-patient ratios
- Hours per patient day (HPPD) *
- Nurses per occupied bed (NPOB) method
- The acuity-quality method
- Regression analysis method
- Full-time equivalent employment (FTE)
- Work utilisation ratio
- Patient dependency / Excelcare / Trendcare
- Dependency-activity method
- Dependency-activity-quality method
- Home-grown systems / hybrids

Flaws in nursing workload measurement

- Emphasis placed on what nurses do, rather than what they might achieve and prevent
- Measure patients' need for technology rather than their need for a nurse
- Fail to address need for supervision, training, support, layout
- Often lack definition in what is actually being measured

The most influential studies

Aiken, Clarke, et al. JAMA 2002

- ◆ Poor nurse staffing associated with higher:
 - 30-day mortality
 - Failure to rescue

Aiken, Clarke, et al JAMA 2003

- ◆ Hospitals with more baccalaureate-educated RNs had lower:
 - 30-day mortality
 - Failure to rescue

Outcome risks associated with having less nurses with less skill?

- Increase in catheter related infections (Robert et al 2000, Fridkin et al 1996)
- ↑ risk of mortality (Tarnow-Mordi 2000)
- ↑ risk of pulmonary and infectious complications:
 - ◆ Abdominal Aortic Aneurysm (Provonost et al, 2001)
 - ◆ Hepatectomy (Dimick et al, 2001)
 - ◆ Oesophagectomy (Amaravadi, et al 2000)

Research limitations

- Data on **hospitals** do not recognize different staffing on different units
- Studies at the **nursing unit level** involve primary data collection and are costly
- **Single-year studies** provide limited proof of causal relationships
- **No study identifies the “ideal” staffing ratio**

SO WHY IS SKILL-MATCHING SO IMPORTANT?

- Decisions about the size and mix of nursing teams are critical for health service providers
- Overstaffed, undermanned and imbalanced nursing teams have implications for quality, safety & cost of patient care
- Nurses' job satisfaction and effectiveness of student education may also be jeopardised by poorly configured nursing teams

What is not known..

- a. Who and What informs & dictates ICU staffing decisions in Australian ICUs?*
- b. What are the staffing problems faced by nurses who make staffing decisions?*
- c. What are some solutions?*

National Intensive Care Skill Matching Study (ICSMS): Research Aims

1. To describe both '*nurse skill assessment and allocation to patient acuity*' systems in Australian ICUs.
2. To develop a web-enabled platform (e approach) to facilitate multi-centre data collection.
3. To develop a staffing decision-support model

Data Collected in ICSMS

- ICU, NUM & SLN demographic/profile data
 - ICU staffing decision processes/systems/tools
 - Staffing related problems and solutions
[as identified by coal face decision-makers]
- = Map of national staffing practices in Level 3 ICUs**

Considerations for an e (electronic) approach for data collection & management?

PROS

- Direct data entry into interface, eliminates need for secondary data entry & potential transcription error
- Resource efficient – time, labour (single researcher!)
- Bias reduction as data entry blinded
- Ease of point of use (if facilitated at site)
- Real time entry allows checking progress anytime
- Secure / restricted access potential
- Cost effective
- Track data entry possible
- ┌ Interface with statistical package
- ┌ Easy reports, queries
- ┌ Minimum training
- ┌ Adequate server space (capacity)

Considerations for an e approach Web-enabled platform

CONS:

- Usually expensive
- Technology reliant; risk of fault/breakdown/data loss
- Limitations in IT knowledge of researcher requires collaboration/trust in others
- Limitations of end-users (respondents): access, capability, compliance
- ┌ IT privacy / spam restrictions
- ┌ Potential high aggravation factor if poorly designed

Building the web-enabled platform

- Using a SQL server, an ODBC database with Microsoft Access front end created to collect & store data
- Web based and subsequent follow-up mail-back options to allow flexibility in response
- Quantitative & qualitative data collected in 2 (NUM & SLN) survey instruments
- Statistical analyses performed using SAS V9.1 (SAS Institute Inc., Cary, NC, USA) in both the pilot and the primary study



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Login Page

Web Front page

Username:	<input type="text"/>
Password:	<input type="password"/>
<input type="button" value="Login"/> <input type="button" value="Reset"/>	

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It is recommended to use the latest version of either [Internet Explorer](#), [Mozilla Firefox](#) or [Netscape](#).

Welcome & Instructions



Welcome **Mandy RISCHBIETH**

Thankyou for your time in completing the surveys. You will be provided with a de-identified analysis of all responses. Please note, data is collected by an independent data management service and as such is unidentifiable to the researcher.

If you have any problems or queries, please contact Amanda Rischbieth at any time by [email](#) or on 0417 200 883.

Please note: As a security measure, ICSMS will automatically log you out after 30 minutes of inactivity. Any attempted activity after a 30 minute gap will take you back to the login screen. Also, **please use the logout link in the bottom right (:::logout::)** when you are finished with ICSMS. If you close the browser without logging out, due to the above security measures you will not be able to log in again for 30 minutes.

Older browsers may not display this website correctly, so it is recommended to use the latest version of either [Internet Explorer](#), [Mozilla Firefox](#) or [Netscape](#).

Filling out the Form(s): Required fields are signified by a red asterisk (*) and must all be completed for the questionnaire to be accepted. Upon submitting the form, you will see either a red cross, or a green tick near the top of the page, indicating whether you have answered all necessary fields. You then have the option to either return and edit your responses, or confirm your supplied answers and submit your questionnaire to the database. Please ensure all answers are correct as you may only submit the

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As a **Nurse Unit Manager** you have access to the following Data Collection Sheet(s):

2 Instruments

- ▶ [Data collection sheet for ICU Nurse Manager \(NUM\)](#)
- ▶ [Data collection sheet for ICU Shift Leader Nurses*](#)

* A Shift Leader Nurse is defined as one who makes decisions regarding required nurse numbers and/or nurse to patient allocation decisions

User Details		Hospital Details	
Login:	mrisch01	Hospital:	Department of Clinical Nursing
User Type:	Nurse Unit Manager	Type:	Not Required
Title:	Not Required	Address:	University of Adelaide, ADELAIDE SA 5000
Email:	amanda.rischbieth@adelaide.edu.au		

If any of the above details are incorrect, please notify the [administrator](#) with your updated details.

[::logout::](#)

27:42
Refresh Timer

Timer

Comment...

7. * What was your **total number of nursing hours** worked by AGENCY nurses over the 2003/2004 financial year?

29000

Comment...

8. * What percentage of the total ICU nurse staffing budget was spent on AGENCY nurses over the 2003/2004 financial year?

10-14%

9. * What is the *current* percentage of nurses with an ICU qualification (e.g. Crit Care Cert., Grad Diploma, Masters, Doctorate) in the ICU?

50-75%

10. * How many nurses **on your current roster** perform a Team Leader/Shift Leader role (i.e. decide staffing for upcoming shift)?

28

Submit Reset Clear Answers

Clear instructions

[Return to main page](#)

logout



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Data collection sheet for ICU Nurse Unit Manager (NUM)

- Confirmation Page -



All required answers have been answered.
Please review your answers and when you are happy, click **Confirm** at the bottom of this page.

1.	* How many ICU ventilator beds do you currently have open ?	7
2.	* How many open non-ICU (ie. HDU, CCU, CSurg) beds (within your ICU) are also staffed by ICU nurses?	6
3.	* What was your average ICU only bed occupancy (%) over the past 6 months?	50-74%
4.	* How many Full Time Equivalent Registered Nurses (FTE RNs) are currently employed in the ICU?	29

Data management strategies

- All respondents given **personal access codes**
- Mix of Open, Closed & Combination questions
- **Coding records** created
- **Database log** to record modifications
- **Data cleaning** - range and consistency checks done
- ┌ **Query resolution**
- ┌ **Back up** database
- ┌ **Data locked** for final analysis

Other data instrument design features

- **Unique identifier** - study number on every page
- **Identical question format** in e and hard copy
- **Simple language**
- **Objective measurements** wherever possible
- **Likert Scales** where appropriate
- **Categories/ranges** (unless continuous variable required) e.g. 10-20%
- **Standard definitions** used
- **Coded** wherever possible
- **Data duplication avoided** (e.g. age as well as DOB)

Additional points for hard copy instrument design

- **Type size** - 8 -12 point
- **Type face** - Arial, Times Roman, Helvetica
- **Case** - Mixed
- **Line length** - 40 -70 characters
- **Spacing** - less space shows related items etc
- **Section headings** – topics divided
- **Pagination** - easily visible
- **Identifiers** - consistent, easily visible position
- **Instructions** – clear, specific (i.e. '*tick only one*')

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SUMMARY OF PROGRESS

- All 58 Level 3 Australian Adult ICUs (per APD) invited
- Study data collected 2 + 2 weeks March/April 2005
- Response rate: 82.6%
[46 ICUs and NUMs; 317 SLNs]
- Final data
 - via Web: 51%
 - via Hard copy: 49%
- ┌ Analysis completed July 2006
- ┌ Articles IN PRESS
- ┌ Thesis passed Dec 2006

Proportion of nurses with a formal ICU qualification employed in each public and private hospital ICU

