

**Analysing the role of the PICU nurse to guide education of new graduate nurses**

**Author**

Long, Debbie A, Young, Jeanine, Rickard, Claire M, Mitchell, Marion L

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**Abstract:** Background. One strategy to address the current nursing shortage in specialty areas has been to introduce graduate nurse programs. However introducing novice nurses to specialty areas raises concerns around education and competency which, in turn, highlights the need to identify and prioritise the elements of competent PICU nursing care considered essential to safe practice.

**Objectives.** To determine the key knowledge, skills and attributes of competent level paediatric intensive care (PICU) nurses.

**Methods.** A practice analysis survey of 15 nurse educators was conducted in all eight Australian and New Zealand PICUs during 2008. Three areas of practice essential to PICU nursing competence were explored: patients most commonly cared for; frequency and criticality of activities performed; and level of independence against critical care nursing competency standards. Data were analysed using descriptive statistics.

**Results.** Cardiac and respiratory problems accounted for over 50% of patients cared for by competent level nurses. Cardiac and respiratory activities were therefore also ranked as the most important activities. Respondents identified that competency domains of teamwork and professional practice are performed with minimal supervision, whereas clinical problem solving requires supervision and assistance.

**Conclusions.** PICU nurses are performing activities and caring for a breadth of complex patients within a year of entering the workforce. Using a practice analysis to define actual practice and expectations can assist in the identification and prioritisation of content for graduate and other educational programs.

## **Introduction**

As surgery, diagnostics, pharmacology and technology have advanced, children now survive extremely complex illnesses and surgical procedures, in part due to the diligent care of paediatric critical care nurses (Epstein and Brill, 2005). These specialty nurses need to possess an unusually broad set of knowledge and skills. With the better management of critically ill children, the need for a large pool of skilled practitioners rises accordingly but the available pool is actually shrinking, with the deficit reaching crisis proportions in some settings (Friedman, Cooper et al., 2011). To remedy this shortage, graduate nurses, that is, those newly registered with a Bachelor of Nursing degree (representing the largest pool of available nurses in the job market), are now being employed directly into specialty areas, including the PICU (Cavanaugh and Huse, 2004; Nolan and Murphy, 2006; Proulx and Bourcier, 2008; Duvall, 2009; Morris, Pfeifer et al., 2009; Square, 2010; Friedman, Cooper et al., 2011). Subsequently, most nurses no longer enter specialty areas as advanced beginners, but as novices who need to acquire both basic and advanced skills relatively quickly.

## **Background**

Graduate nurse programs assist with the transition into the workforce and typically offer a period of workplace training and support lasting for weeks to months. Nurses often gain exposure to a variety of clinical settings and cases, while consolidating theoretical learning and critical clinical skills and judgement. Like other specialty areas, new graduate programs in critical care demand a significant investment of time, money and human resources, therefore careful consideration of the curriculum content is required. Many specialised programs have been described in the literature outlining the use of preceptors (Williams, Sims et al., 2002; Cavanaugh and Huse, 2004; Messmer, Jones et al., 2004; Chestnutt and Everhart, 2007), web-based curriculum (Peterson and Van Buren, 2006; Thomason, 2006; Morris, Pfeifer et al., 2007; Kaddoura, 2010; Square, 2010; Friedman, Cooper et al., 2011), and simulation (Morris, Pfeifer et al., 2007; Stefanski and Rossler, 2009; Friedman, Cooper et al., 2011) to name a few. Others describe frameworks based on and emphasising critical thinking (Messmer, Jones et al., 2004; Herdrich and Lindsay, 2006; Kaddoura, 2010; Square, 2010) or skill acquisition (Wynd, 2002; Hall and Marshall, 2006; Herdrich and Lindsay, 2006; Chestnutt and Everhart, 2007; Altimier, 2009; Duvall, 2009). Whilst these frameworks and processes may all be important elements of a successful graduate program, there is little discussion surrounding how to determine what content is included, particularly with this new

set of graduate nurses; inexperienced to nursing in addition to being new to paediatrics and intensive care specialities. It is assumed that often decisions about program content may be reached by subjective means, such as consensus or higher authorities. Given that education and its subsequent assessment must be dynamic to reflect current expectations and roles (Schroeder, 1997), PICU graduate nurse programs need to evolve to incorporate new knowledge (expanding needs of the critically ill child) and paradigm shifts (new workforce of graduate nurses). As such, it seems important to employ objective techniques for the identification and prioritisation of graduate program content.

It is the development and integration of both technical and cognitive skills into the nurse's practice that defines transition from novice to competent practitioner (Benner, 1984). Exploring the work/practice undertaken by competent level PICU nurses, including technical and cognitive skills, may provide a useful insight into the essential components and expectations of knowledge and skills required for safe, competent practice. An objective process for content derivation traditionally used by large corporations for licensure examinations (e.g. NCLEX) involves the belief that information about patterns of practice is necessary in the understanding and evaluation of professional competence. This process would allow an understanding of the types of problems that nurses are called upon to solve, and the many contexts in which these problems occur, and subsequently graduate program content could therefore be developed based on information that is job specific and essential to safe, competent practice (Kane, 1997).

One way to elucidate the complexity of nursing specialties and to examine patterns of practice is to conduct a practice analysis (Kane, 1997; American Educational Research Association, American Psychological Association et al., 1999; Wang, Schnipke et al., 2005; Downing and Haladyna, 2006). Several professional organisations have performed practice analyses (or a variation of this) specific to their clinical areas by establishing independent corporations or councils and/or using testing and research consultants (Chase, 1988; Ropka, Norback et al., 1992; Zaglaniczny, 1993; Pellino, Willens et al., 2002; Fabrey and Walla, 2004; McShane and Fagerlund, 2004; Muenzen, Greenberg et al., 2004; Becker, Kaplow et al., 2006; Ortelli, 2006; Ramirez, Tart et al., 2006; Strasser, Maher et al., 2006; Baghi, Panniers et al., 2007). Information that is generated from a practice analysis serves as the basis to: define the realm of clinical practice; develop standards of care; guide curricula for

nursing education at all levels; establish research priorities; and develop blueprints for certification examinations (Raymond, 2001; Downing and Yudkowsky, 2009).

Practice analyses typically consist of two or more scales intended to obtain the information needed to determine test content, educational standards or other credentialing requirements. Some scales are intended primarily for rating tasks, activities, and practice responsibilities. Other scales are designed for judging the knowledge, skills and abilities (KSAs) required for practice. The purpose of the practice analysis will strongly influence the choice of rating scale (task- or person-orientated) and its descriptors, together with the source of information for the analysis. Preferred respondents for ratings of task frequency or difficulty are typically practitioners, while subject matter experts (SMEs) are the preferred respondents for task criticality and/or overall importance (Kane, 1997; Raymond, 2002; Raymond, 2005). Several comprehensive publications detail the practice analysis process, including choice of rating scale and methods for combining scales, and are a useful resource for survey development and analysis (Raymond, 1996; Kane, 1997; Raymond, 2001; Raymond, 2002; Raymond, 2005).

Given the objective exploration of practice and KSAs provided by practice analyses, this novel method may be useful for the determination of content in graduate nurse programs, where the aim is to develop safe and competent practice.

## **The Study**

### **Aim**

The aim of this study was to undertake a practice analysis of competent level PICU nursing practice in Australia and New Zealand, and specifically address the following questions:

- What are the most frequently cared for patient conditions?
- What are the most frequently performed nursing activities?
- What is the criticality of nursing activities performed?
- Under what level of supervision do nurses practise?

### **Design**

This study used a cross-sectional survey design in which nurse educators from Australian and New Zealand PICUs completed a practice analysis on one occasion.

## **Participants**

All nurses employed in education positions in the eight PICUs in Australia and New Zealand (n=18) were invited to participate in the study. It is recommended that practice analysis surveys should be completed by individuals who are qualified to provide the type of information being sought, and includes practitioners, educators, managers, and recognised subject matter experts (SMEs) (Raymond, 2002). Raymond (2002) suggests that an expert panel of educators are the best primary source of criticality and mastery ratings in speciality clinical settings. Small sample sizes are justified for professions that employ fewer people or for practice analyses conducted by small regions as it increases the applicability to specific practice settings (Raymond and Neustel, 2006). Australia and New Zealand with eight PICUs constitute a small region in comparison to other world regions that might have in excess of 50 PICUs (for example, USA).

## **Data Collection**

An email survey was distributed using the internet to a purposive sample of nurse educators from eight PICUs in Australia and New Zealand.

## **Instrument**

To ensure key aspects of the complex nature of competent level PICU nursing were explored, a practice analysis survey was created in three sections: Section One - Patient care problems, Section Two - Nursing activities, and Section Three – Nursing competencies.

*Section One: Patient care problems.* To help identify key knowledge and skill areas of PICU work, patient care problems were described using the Australian and New Zealand Paediatric Intensive Care Registry (ANZPICR) diagnostic codes (Norton and Slater, 2004) which are utilised by each of the eight dedicated PICUs in Australia and New Zealand. The ANZPICR codes list patient care problems in two distinct lists, organised by systems and post procedure diagnosis. The systems list contains seven categories with a total of 201 diagnoses: cardiovascular (n=43), respiratory (n=39), trauma (n=18), neurological (n=26), renal (n=6), gastrointestinal (n=26), and miscellaneous (n=43). Using a top-down approach participants were asked to rate the approximate percentage of patients in their PICU who could be grouped into the seven systems categories (with responses totalling 100%). In addition,

participants were asked to rank the top *three* patient problems most frequently cared for in their workplace (using the systems lists) by competent level PICU nurses.

*Section Two: Nursing activities.* A list of interventions, tests, procedures, medications and monitoring devices used by PICU nurses was developed from a review of literature and PICU nursing textbooks and refined by a small group of local SMEs (different to study sample). The final listing was comprised of 51 specialised interventions, tests, procedures, medications, and monitoring devices. Participants were asked how frequently competent level PICU nurses performed each activity, using an absolute six-point Likert scale (0 = never performed, .02 = about once per year, .25 = about once per month, 1 = about once per week, 5 = about once per day, 10 = several times per day). Absolute scales were used over relative scales, as responses actually approximate a ratio scale corresponding to the number of times per week an activity is performed (Raymond and Neustel, 2006). As such, if a task was never performed, it was assigned a value of zero, while a task performed daily is given a value of five on a time-per-week scale. Similarly, a task performed weekly would be given a value of one. Whilst it may be considered that the times-per-week scale is rather coarse; it is preferable to the distortion introduced by using a simple ordinal relative scale that runs from zero to six, or a similar range of values, where each interval is considered to have the same value (Raymond and Neustel, 2006). Participants were also asked to rate the criticality of performing the specified PICU nursing activity by considering if the task was performed incorrectly (or not at all), what would be the risk of an adverse consequence such as patient injury or litigation. Participants ranked criticality using a four-point Likert scale (0 = no risk of adverse consequences, 1 = slight risk, 2 = moderate risk, 3 = very high risk of adverse consequences).

*Section Three: Nursing Competencies.* The nursing competencies and standards required to perform activities safely and effectively in the PICU were described by the Australian College of Critical Care Nurses (ACCCN) and are entitled *Competency Standards for Specialist Critical Care Nurses* (2002). ACCCN outlines six domains of practice: enabling, clinical problem solving, professional practice, reflective practice, teamwork and leadership. Each domain is comprised of between two and seven competency standards describing the higher level performance of a proficient or expert nurse. Standards are further described by 58 elements. Nurse educators were asked to rate the level of independence or mastery of each element that they considered realistically achievable for a nurse following one year of

employment in their PICU. Level of independence was assessed using a five-point Likert scale (1 = dependent, 2 = marginal, 3 = assisted, 4 = supervised, 5 = independent).

### **Ethical Considerations**

Permission to conduct this research was obtained from the Human Research Ethics Committee at the Queensland University of Technology and each of the eight participating hospitals. Seven hospitals provided a waiver for the need to provide written consent, where completion and return of the practice analysis survey implied consent. One hospital required written consent.

### **Data analysis**

Descriptive statistics were used to explore each of the patient condition, nursing activity frequency and criticality, and level of independence survey sections. In addition, to establish the overall importance of PICU activities a statistical weighting analysis was undertaken. Weightings for PICU nursing tasks were determined by a multiplicative model using activity frequency and criticality to create a single index of task importance (Kane, Kingsbury et al., 1989; Raymond and Neustel, 2006). The overall importance for each item was then calculated by using the following formula: Mean frequency rating of performing the activity ( $F_i$ )  $\times$  3[Mean criticality rating of the activity<sup>a</sup>] ( $C_i^a$ ), where  $a$  equals a transformation to equalise variance in the two scales ( $\sqrt{[\text{var}(\ln F_i)/\text{var}(\ln C_i)]}$ ) (Kane, Kingsbury et al., 1989; Raymond and Neustel, 2006). This equation has been used extensively to determine the importance and subsequent inclusion of content for high-stakes examinations (Downing and Haladyna, 2006). Consideration was also given to the contribution of both frequency and criticality to overall importance. Given the purpose of this study was to assess the critical knowledge and skills necessary for safe and effective practice, it was desirable to identify nursing activities that would pose a serious threat to patients if they were omitted or done improperly. Some researchers would argue that this implies criticality be given greater emphasis than frequency (Kane, Kingsbury et al., 1989; Raymond and Neustel, 2006). In this study, local SMEs judged criticality to be three times more important than frequency. Indexes rating importance were then converted into a weight that corresponded to the proportion of test items allocated to each task. Given the weights were intended to be directly proportional to the importance index, the weight for any individual task was obtained by dividing its importance index by the sum of importance indexes over all tasks ( $W_i = I_i / \sum I$ ) (Kane, Kingsbury et al., 1989; Raymond and Neustel, 2006).



## **Results**

### **Participant characteristics**

Fifteen nurses in PICU education positions completed the practice analysis survey (response rate 83%), representing nurse educators from every PICU in Australia and New Zealand. A majority of the respondents were females with an average of approximately 18 years as a licensed registered nurse. Approximately half (53.3%) of the respondents were employed in a Nurse Education role and worked more than 0.5 full time equivalent. Respondents indicated an average of approximately three years in their current PICU education position with an average of approximately five years of total nursing education experience. A majority of respondents held tertiary equivalent qualifications, 80% of these specifically in paediatric intensive care. Approximately half of the respondents held additional qualifications, with most of these in education and/or training.

### **Patient Care Problems**

More than 50% of PICU nursing care was reported to be dedicated to cardiac and respiratory conditions (see Figure 1). The most frequently cared for conditions identified within each system are outlined in Table 1, with bronchiolitis, pneumonia, head trauma and seizures amongst the most commonly cared for patient conditions.

### **Frequency and Criticality of Activities**

The mean frequency ratings ranged from .01 to 10, with all frequency ratings listed in Table 2. Monitoring and maintaining equipment for assessment and diagnosis were ranked as the most frequently performed activities. Monitoring and maintaining cardiac devices were ranked as the least frequently performed activities.

The mean criticality ratings ranged from 1 to 3, with all criticality ratings listed in Table 2. Activities associated with cardiac and respiratory support were rated as the most critical. Activities associated with monitoring, chemotherapy and non-invasive ventilation were rated as the least critical.

After raising criticality to the power of 14.01, giving criticality three times the emphasis of frequency and to equalise for variance, overall importance of each nursing activity was calculated. The nursing activities with the highest overall importance were associated with

respiratory and cardiac support, namely mechanical ventilation, inotropes, airway management, pacemakers and invasive haemodynamic monitoring. The nursing activities with the lowest overall importance were: interpret 12-lead ECG; monitor and maintain train of four neurostimulation to measure the degree of neuromuscular blockade; monitor and maintain patient under phototherapy; perform 12-lead ECG; obtain and assess invasive cardiac output/index determination; administer immunoglobulin therapy; monitor and maintain automatic implantable cardioverter defibrillators; monitor and maintain patient on heliox; administer surfactant replacement therapy; and Monitor and maintain a patient receiving chemotherapy. Each of these activities represented an importance weighting of zero indicating that these activities are not important to new graduate nursing practice. Importance weightings are tabulated in Table 2.

### **Nursing Competencies**

Mean independence ratings for overall Competency Standard domains ranged from 2.83 to 3.95. Respondents identified that the domains of Teamwork (mean 3.95) and Professional Practice (mean 3.65) should be performed with minimal supervision in a competent level PICU nurse, whereas the domain of Clinical Problem Solving (mean 3.35) required further supervision and assistance. Reflective Practice (mean 2.83) and Leadership (mean 3.25) required the most support.

Listed in Table 3 are the mean independence ratings for each ACCCN Competency Standard element. The independence ratings ranged from 1.80 to 4.67. Participants ranked that 26% of elements should be performed at the supervised level or higher (mean  $\geq 4$ ). Notably, participants ranked that PICU nurses should be maintaining collaborative and constructive relationships with colleagues (mean 4.67), recognising and respecting multidisciplinary roles (mean 4.60) and accepting responsibility for actions (mean 4.60) independently once they reach competent level of practice.

## **Discussion**

### **Patient Care Problems**

Results from this study indicate that PICU nurses practising at Benner's (1984) competent level in Australia and New Zealand provide care to a diverse range of critically ill children and utilise a broad set of knowledge and skills. Knowledge and skill domains of competent

level PICU nursing practice in the Australian and New Zealand context were ascertained by a practice analysis survey of patient care problems and frequency and criticality of nursing activities. In this study using 15 PICU Nurse Educators as subject matter experts, cardiac and respiratory conditions represented greater than 50% of the patients cared for by PICU nurses. This is not surprising given that critical illness can often be defined by cardiac and respiratory failure, leading to the need for PICU admission.

Two previous studies have examined PICU nursing roles and activities using a practice analysis, however both were conducted to inform a credentialing test blueprint. In 2001, the American Association of Critical Care Nursing (Certification Corporation)(AACN-CC) contracted the Professional Examination Service to undertake a practice analysis of critical care nursing practice, where it was estimated that 50 PICU nurses informed the development of the Pediatric CCRN Certification Examination (Muenzen, Greenberg et al., 2004), a credential granted to validate expert knowledge in critical care and promote continuing excellence. It is difficult to ascertain the true allocation of patient care problems within the AACN-CC report as it includes all aspects of critical care nursing practice (adult, paediatric, neonatal, and progressive care). The paediatric examination blueprint (outlined within the report) however, revealed that 19% of cardiovascular and 22% of respiratory patient care problems make up the 150 item Pediatric CCRN Certification Examination (Muenzen, Greenberg et al., 2004). The most recent Pediatric CCRN test plan (informed from the 2008 practice analysis) (American Association of Critical-Care Nurses Certification Corporation, 2011) shows a reduction in time spent in cardiovascular (14%) and respiratory (18%) areas. Given the high-stakes nature of these examinations (i.e. applicants receive either a pass or fail result), there are elevated levels of security around practice analysis data and subsequently minimal information is published in the public domain. Demographic information of the participating PICU nurses is unavailable, in addition to the specific patient conditions and nursing activities, making direct comparison difficult. What is known is that the practice analyses performed for the AACN-CC is to inform the development and content validation of a credentialing exam, which infers a higher level of practice than that of the competent nurse (i.e. proficient and expert nurse).

Although the time dedicated to respiratory patients was higher (over 30%) in this study, the AACN Pediatric Test Plan still reflects that almost all respondents also devote the most time to patients with problems related to cardiovascular and respiratory systems. One explanation

for their lower percentage in the respiratory category may be related to the use of Respiratory Therapists and Technicians in the USA, a role which has not developed in Australian and New Zealand PICUs. Whilst it is possible that this variation is due to examining practices across different levels of nursing experience (expert as opposed to competent), it also raises the issue of variations in practice in general. Variations in nursing practice between countries have been highlighted, particularly between Australia and the United States of America (Boyle, Kenney et al., 1995; Schaller and James, 2005; Long, Young et al., 2012). Some variations may be related to patient demographics, educational attainment, or resource availability. For example, the Pediatric CCRN test blueprint covers sickle cell disease, a condition which is seen in less than 1% of patients within Australian and New Zealand PICUs (ANZPICR 2011, pers. comm., 23 July). The issue that these differences raise is the inability to use a previously developed curriculum unless the practice in your area is very similar. AACN offer a well-developed web-based critical care curriculum called the Essentials of Critical Care Orientation (ECCO) (including a paediatric version), which has been used by areas outside of the USA (American Association of Critical-Care Nurses, 2010). However, caution needs to be used when determining whether curriculum matches practice. Furthermore, others report that they are not able to purchase programs such as ECCO as their budget does not cater for the AU\$6,000 site license (Duvall, 2009).

### **Nursing activities**

Most surprising in this study was the illumination of skills that were previously performed solely by more experienced nurses. These skills include ECMO, high frequency ventilation, nitric oxide therapy and renal replacement therapies. Whilst these skills are performed infrequently and therefore rank low on the importance index, some institutions have competent level nurses performing these activities on a monthly basis indicating that the parameters for what we consider to be competent level practice are changing. Increased patient complexity and new technologies have influenced the shape of our current workforce and their educational preparation. What has not changed is the criticality to which we rate the therapies provided, with most activities ranked as having moderate to very high risk of adverse consequences if not performed correctly. This affirms the high-stakes nature of PICU nursing practice and highlights how advanced skills, in addition to basic skills, need to be acquired and consolidated by graduate nurses within a relatively short period of time.

As rated by this sample of PICU nurse educators, mechanical ventilation is the most important aspect of competent level PICU nursing knowledge and skills. Inotropic support, airway support and arterial blood pressure line management were also ranked in the group of highly important activities and interventions in the PICU. The number and breadth of patient care problems and activities ranked as important to competent level nursing practice embodies the heterogeneous nature of paediatric critical care. This heterogeneity makes it almost impossible to cover every aspect of PICU nursing practice in a graduate program, unless the program is particularly lengthy. What this practice analysis does represent however, is an objective snapshot of knowledge and skills considered critical to competent level PICU nursing practice at a time when the profession is needing to evaluate the education and training of its workforce.

### **Level of independence**

One quarter of the ACCCN Competency Standards for Specialist Critical Care Nurses (Australian College of Critical Care Nurses, 2002) are expected to be performed at the supervised or higher level, indicating that reasonable levels of independence are required in PICU graduate nurse practice within one year of entering the workforce. The majority of competency standards are expected to be performed or undertaken at the assisted level, suggesting that facilitating and mentoring may be required beyond the graduate program period. What is required, regardless of the expectations surrounding competency standards, is a strong support system that all nurses can access at any time during their career development. Ultimately, any education aims to develop safe practitioners, who know their scope of practice and are appropriately allocated to patients who match their current skill and knowledge levels.

Given that graduate nurses enter the specialty areas as novices, some would argue that basic nursing competency standards are more appropriate for guiding practice. Although the ACCCN competency standards provide guidance for specialist or expert practice, these competency standards are grounded in the national RN competency standards (Australian College of Critical Care Nurses, 2002). Despite the lack of competency standards for critical care nursing practice at the competent level, the ACCCN standards do provide a framework for evaluating expectations against expert nursing practice. It is obvious that practice has changed significantly over the last few decades, and the ACCCN competency standards have not been reviewed since 2002. The organisation identifies this as problematic and a review is

currently underway. It could be that the competencies no longer accurately reflect practice, or alternately it may be that core competencies and values for critical care practice, and indeed general nursing practice, do not change significantly. This said, it is highly plausible that given the changes in our nursing workforce, the expectations of practice against these standards and values may have shifted.

### **Study limitations**

This practice analysis is not intended to be generalised to PICU nursing practice in other countries, yet it provides an novel method for future international studies to generate comparative data. Whilst the results in this study are not proposed as a comprehensive definition of PICU nursing competence, it does provide information about those aspects considered critical to the concept of competence, which are knowledge and skill. Kane (1992) affirms this notion by explaining that mastery of knowledge and skills does not guarantee successful performance in practice, but major gaps in mastery would presumably be a serious limitation in the practice of the profession. Given the absence of any description of the knowledge and skills required for competent level practice in this population, both the product and the process of undertaking a practice analysis have therefore represented a unique and critical advancement in PICU nursing education and assessment in Australia and New Zealand.

Although the content domain for the test was assessed through a representative sample of PICU Nurse Educators, there is an assumption that the role of the nurse educator had a firm grounding in the educational principles and activities of competent level PICU nurses. These PICU Nurse Educators did represent however, each of the eight tertiary level PICUs in Australia and New Zealand. The practice analysis could have been complemented by direct observation of competent level PICU nurses, but this was beyond the scope of the study and could be explored in future work. Determination of expertise would prove difficult however, as years of experience does not necessarily imply competence.

### **Conclusion**

This study demonstrated that a practice analysis of competent level PICU nursing can objectively identify core knowledge and skills areas required. This provides vital information to inform graduate program content for novice nurses. Educating graduate nurses in specialty

areas is a significant investment, therefore accurate identification and prioritisation of content for inclusion in such programs can reduce time and costs involved. When developing any program, curriculum must reflect the current workforce requirements and the work performed.

To the researchers' knowledge, there is no published independent analysis of PICU nursing practice, other than for credentialing purposes by large-scale organisations. Conducting an empirical practice analysis was objective and provided grounds for generalisability of the results across Australia and New Zealand. The practice analysis provided a rigorous process and an accurate description of current PICU nursing practice in Australia and New Zealand upon which to base orientation program development. This process was complemented with systematic procedures for collecting and combining ratings.

The objective nature of the practice analysis could provide useful information for not only graduate orientation programs, but for curriculum development within post-graduate offerings on a larger scale. In this instance, higher levels of expertise could be explored. Whilst this study examined types of patient conditions and standards relating to practice specifically in Australia and New Zealand, other areas of practice could be explored. Practice analysis data can further inform the development of assessment tools to evaluate performance of individuals and groups and identify strengths and areas requiring development.

It is the profession's responsibility to provide appropriate education, training, and evaluation for all levels of nursing practice. Just as healthcare should be viewed as an asset not a liability (Kearney, 2011), so should education and training of today's largest available nursing workforce – the graduate nurse. Sound, long term investments in graduate nurses, through workplace nurturing, education and support, can only provide returns and benefits that we as a profession and society will ultimately reap.

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Figure 1.

Percent of time competent level nurses care for patients in ANZPICR diagnostic categories.

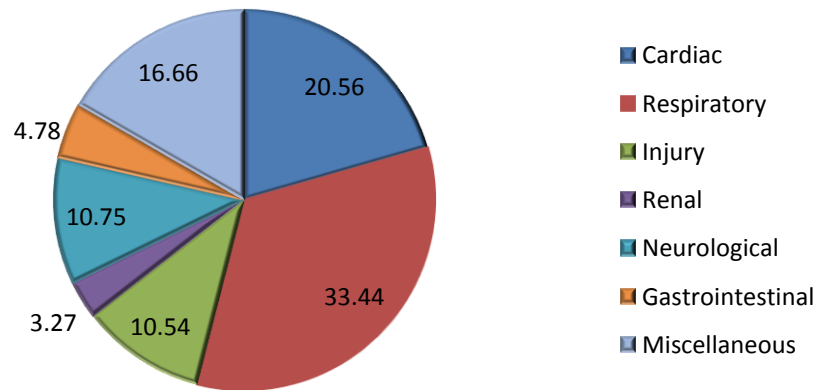


Table 1.

Most commonly cared for patient conditions identified by PICU nurse educators

<b>Patient Care Problems organised by Body Systems</b>	<b>n</b>	<b>%</b>
<i>Cardiac</i>		
Transposition of the Greater Arteries	5	33
Ventricular Septal Defect	7	47
Cardiac Failure	5	33
Supraventricular Tachycardia	5	33
Atrial Septal Defect	3	20
Cardiomyopathy	3	20
Coarction	3	20
Hypertension – Pulmonary	4	27
AVSD	2	13
Hypoplastic Left Heart Syndrome	2	13
RV Outflow Obstruction	1	7
Single Ventricle	1	7
Vascular Thrombosis	1	7
Aortic Stenosis	1	7
Tetralogy of Fallot	1	7
<i>Respiratory</i>		
Asthma	8	53
Bronchiolitis	12	80
Pneumonia	10	67
Respiratory Failure	8	53
Obstructive Sleep Apnoea	2	13
Chronic Lung Disease (including BPD)	2	13
Aspiration	1	7
ARDS	2	13
<i>Injury</i>		
Burns	5	33
Immersion	7	47
Ingestion	8	53
Trauma – Head	14	93
Trauma – Abdomen	4	27
Trauma – Skeletal	3	20
Trauma – Chest	2	13
Drug Toxicity - Iatrogenic	1	7
Trauma – Facial	1	7
<i>Renal</i>		
Haemolytic Uraemic Syndrome	10	67
Acute Renal Failure	14	93
Chronic Renal Failure	11	73
Previous Renal Transplant	5	33
Nephritic &/or Nephrotic Syndrome	4	27
Urinary Tract Infection	1	7
<i>Neurological</i>		
Meningitis	7	47
Seizures	14	93
Intracranial Hypertension (Raised ICP)	5	33
Brain Tumour	5	33
Encephalopathy – Acute	4	27
CSF Shunt Malfunction or Infection	3	20
Intracranial Haemorrhage – Spontaneous	3	20
Brain AV Malformation	1	7
Brain Death	1	7
Encephalitis	1	7
Myopathy	1	7
<i>Gastrointestinal</i>		

Gastroenteritis	8	53
Bowel Obstruction	3	20
Gastroschisis or Exomphalos	4	27
Bowel perforation	4	27
Necrotising Enterocolitis	4	27
Pyloric Stenosis	3	20
Gastrointestinal Haemorrhage	3	20
Intussusception	2	13
Liver Failure – Acute	2	13
Oesophageal Atresia	2	13
Pancreatitis	2	13
Peritonitis	2	13
Previous Liver Transplant	2	13
Liver Failure – Chronic	1	7
Neonatal Jaundice	1	7
Varices – Oesophageal or Gastric	1	7
<i>Miscellaneous</i>		
Diabetic Ketoacidosis	7	47
Respiratory Arrest	6	40
Shock – Septic	7	47
Sepsis	5	33
ICU Procedure (eg. CVL Insertion)	3	20
Acute Life Threatening Event (Near Miss SIDS)	2	13
Scoliosis	2	13
Cardiac Arrest	2	13
Leukaemia or Lymphoma	2	13
Home Ventilation Patient	1	7
ICU Diagnostic Monitoring – Elective	1	7
Prematurity	1	7
Shock – Cardiogenic	1	7
Craniosynostosis	1	7
Diabetes Mellitis without Ketoacidosis	1	7
Shock – Hypovolaemic	3	20

Table 2.

Frequency, Criticality and Importance ratings for nursing activities as identified by PICU nurse educators

Nursing Activity	Frequency		Criticality		Importance Index
	Mean	SD	Mean	SD	
Monitor and maintain continuous ECG	10	0.00	2.2	0.94	1
Perform 12-lead ECG	1.15	1.61	1.13	0.83	0
Interpret 12-lead ECG	0.50	1.29	1.00	0.82	0
Monitor and maintain non invasive haemodynamic and respiratory monitoring	9.07	2.58	2.13	0.99	1
Perform head to toe physical assessment	8.67	0.01	2.20	0.94	1
Monitor and maintain external pacemakers	0.30	0.39	2.92	0.28	2
Monitor and maintain temporary pacemakers	1.64	3.42	2.92	0.28	10
Monitor and maintain programmable pacemakers	0.17	0.35	3.00	0.00	1
Monitor and maintain internal pacemakers	0.04	0.09	2.20	1.30	0
Monitor and maintain automatic implantable cardioverter defibrillators (AICD)	0.01	0.01	3.00	0.00	0
Administer phosphodiesterase inhibitors (eg. Amioderone, milrinone)	1.49	2.65	2.73	0.46	4
Monitor and maintain patient on cardiac assist devices (eg IABP, RVAD, BVAD, LVAD)	0.02	0.06	3.00	0.00	0
Perform cardiopulmonary resuscitation	0.22	0.24	2.87	0.35	1
Maintain and monitor invasive arterial blood pressure line	7.87	3.78	2.60	0.74	9
Interpret arterial blood gas analysis	8.67	2.29	2.07	0.88	0
Maintain and monitor central venous pressure line	7.87	3.78	1.73	0.70	0
Maintain and monitor pulmonary artery pressure line	1.30	2.72	2.55	0.82	1
Obtain and assess invasive cardiac output/index determination	0.07	0.11	1.57	0.98	0
Maintain and monitor RA pressure line	1.30	2.72	2.45	0.69	1
Maintain and monitor LA pressure line	0.75	1.27	2.73	0.47	2
Monitor and maintain umbilical arterial and venous pressure monitoring	0.14	0.12	2.62	0.65	0
Monitor and maintain CO2 devices	6.17	4.07	1.40	0.83	0
Monitor and maintain a patient on nasal/ facial CPAP/BIPAP	1.82	2.76	1.80	0.68	0
Monitor and maintain a patient on conventional mechanical ventilation	8.13	3.38	2.80	0.41	27
Monitor and maintain a patient on heliox	0.02	0.06	1.83	0.75	0
Monitor and maintain a patient on nonconventional mechanical ventilation (eg. HFOV)	0.30	0.30	2.85	0.38	1
Administer surfactant replacement therapy	0.01	0.01	2.00	0.63	0
Monitor and maintain train of four (peripheral nerve stimulator)	0.11	0.26	1.14	0.90	0
Monitor and maintain a patient on Nitric Oxide	0.56	1.25	2.60	0.74	1
Monitor and maintain a patient on ECMO	0.02	0.06	3.00	0.00	0
Airway management (new trache, ETT)	4.85	4.22	2.73	0.46	11
Assist with intubation of patient	1.28	1.55	2.40	0.74	1
Perform tracheostomy care	2.97	3.98	1.93	0.70	0
Perform or assist with retaping of endotracheal tube	3.77	3.72	2.53	0.64	3
Monitor and maintain chest tubes	3.77	3.72	1.93	0.80	0
Perform endotracheal suctioning	9.33	1.76	2.20	0.77	1
Perform or assist with exchange transfusions	0.01	0.01	2.33	0.82	0
Monitor and maintain patient under phototherapy	0.08	0.11	1.36	0.67	0
Monitor and maintain patient having plasmapheresis	0.09	0.11	2.43	0.85	0
Monitor and maintain patient with ICP monitoring devices insitu	0.52	0.41	2.60	0.51	1

Monitor and maintain a patient undergoing ultrafiltration	0.17	0.26	2.82	0.40	1
Monitor and maintain a patient receiving renal replacement therapies (CVHD, CVVHD)	0.30	0.30	2.79	0.43	1
Monitor and maintain a patient receiving peritoneal dialysis	0.31	0.37	1.86	0.53	0
Administer immunoglobulin therapy	0.07	0.10	1.67	0.49	0
Administer neuromuscular blocking agents	3.45	3.80	2.07	0.70	0
Monitor and maintain a patient receiving neuromuscular blocking agents	3.45	3.80	2.13	0.52	0
Administer intravenous analgesia and sedation	8.57	3.05	1.86	0.77	0
Monitor and maintain a patient receiving analgesia and sedation	8.67	2.96	1.80	0.68	0
Monitor and maintain a patient receiving inotropic support	5.42	4.56	2.80	0.41	18
Monitor and maintain a patient receiving chemotherapy	0.18	0.26	1.71	0.61	0
Monitor and maintain the weaning of a patient from ventilation	4.60	3.40	1.80	0.68	0

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Table 3.

Level of independence of ACCCN Competency Standards by competent level nurses as identified by PICU nurse educators.

<b>ACCCN Competency Standards for Specialist Critical Care Nurses</b>		
<b>Critical Care Elements</b>	<b>Mean</b>	<b>SD</b>
<b>Enabling</b>		
Consistently and accurately identifies situation of risk to individual or groups, responds appropriately, achieving a safe outcome.	3.53	0.99
Demonstrates an awareness of and sensitivity towards the comfort needs of individuals and effectively meets these needs.	4.27	0.70
Establishes, maintains and terminates effective caring and therapeutic relationships with individuals and groups.	4.00	0.93
<b>Acts in a way which personalises or attempts to normalise the patient care environment.</b>	<b>4.33</b>	<b>0.90</b>
Appropriately involves the individual as an active participant in the process of care.	4.00	1.07
<b>Demonstrates respect for the values, customs and spiritual beliefs of individuals and appreciates the value of these in the healing process and incorporates into plan of care.</b>	<b>4.47</b>	<b>0.83</b>
Implements strategies to promote self esteem, including identifying and using appropriate support networks for individuals.	3.80	1.08
Identifies situations that may compromise the dignity and integrity of individuals and takes appropriate action to achieve safe and effective outcomes.	4.27	0.88
Consistently provides relevant, accurate and comprehensive information about health care to individuals that encourages and supports decision making in critical care.	3.33	0.62
<b>Communicates appropriately and effectively with individuals and other members of the critical care team.</b>	<b>4.40</b>	<b>0.63</b>
<b>Organises workload to ensure that planned nursing care for individuals is effected.</b>	4.27	0.59
<i>Delegates to other nurses activities commensurate with their abilities and scope of practice, to ensure a safe outcome.</i>	3.00	1.07
<i>Provides comprehensive supervision for aspects of care provided by other members of the health care team, to ensure safe outcomes.</i>	2.93	1.16
<i>Implements appropriate human resource strategies to accommodate the skills, abilities and limitations of members of the critical care team.</i>	2.27	1.03
Demonstrates effective and accurate knowledge in the safe use and application of technology.	3.53	0.52
Manages human and physical resources to optimise delivery of care.	3.20	0.77
Demonstrates a comprehensive knowledge of the effects and implications of evidenced based interventions and regimes.	3.13	0.74
Acts on assessment findings to appropriately initiate, manage and monitor therapeutic interventions and regimes.	3.40	1.06
<b>Clinical Problem Solving</b>		
Gathers, analyses and integrates data from a variety of sources and determines the significance of findings.	3.20	0.94
Initiates pre-emptive interventions in anticipation of potential patient complications.	3.20	0.86
Analyses alterations in physiological parameters and intervenes appropriately.	3.60	0.83
Effectively anticipates and manages emergency situations.	3.07	0.96
Formulates and implements a plan of care incorporating specialised knowledge, to achieve desired outcomes.	3.33	0.82
Assesses effective nursing management in achieving desired outcomes and reviews plan in accordance with evaluated data.	3.40	0.83
Effectively plans for continuity of care.	3.67	0.90
<b>Professional Practice</b>		
<i>Demonstrates an accurate and comprehensive knowledge of the legislation pertinent to critical care nursing practice.</i>	3.00	1.07
Promotes an accurate awareness of the legal implications of actions taken within the critical care team and fulfils the duty of care in the course of practice.	3.07	0.96
Recognises unsafe practice and responds by contributing to formation of policies and protocols ensuring safe outcomes in the area of practice.	3.20	1.15



Intervenes appropriately to ensure a safe outcome when policies or practices may impede or contravene the law.	3.20	1.15
<b>Demonstrates effective and appropriate methods of documenting information in a comprehensive, clear manner within a legal and ethical framework.</b>	<b>4.33</b>	<b>0.72</b>
Demonstrates a comprehensive and accurate knowledge of the rights and individuals in critical care settings.	3.60	0.83
Collaborates with appropriate members of the critical care team to ensure safe and effective outcomes and intervenes appropriately when policies or practices impinge on the rights of individuals.	3.53	1.06
<b>Accepts responsibility for own actions</b>	<b>4.60</b>	<b>0.74</b>
<b>Clarifies unclear instructions and questions interventions, to ensure safe outcomes.</b>	<b>4.40</b>	<b>0.63</b>
Consistently makes complex and informed independent decisions within level of competence and scope of practice.	3.60	0.51
<b>Consistently and comprehensively complies with the professions code of ethics and code of conduct.</b>	<b>4.53</b>	<b>0.64</b>
Demonstrates an accurate and comprehensive knowledge of contemporary ethical issues impinging on critical care nursing.	3.20	1.08
Contributes to contemporary ethics by participating in ethical discussions in multidisciplinary settings.	3.07	0.96
Accurately identifies instances of unprofessional conduct and responds appropriately.	3.80	1.01
<b>Reflective Practice</b>		
Assesses own abilities independently, comprehensively and accurately and practices within these limits and scope of practice.	4.00	1.00
Engages in activities to enhance own level of practice and quality of outcomes for patients.	3.93	0.96
Contributes to application of evidence based critical care nursing practice.	3.20	1.01
<i>Promotes research to improve critical care nursing practice.</i>	<i>2.67</i>	<i>1.23</i>
<i>Participates in collaborative research within the multidisciplinary team.</i>	<i>3.00</i>	<i>1.00</i>
Incorporates research evidence into critical care nursing practice.	3.00	1.00
<b>Teamwork</b>		
<b>Recognises and respects the roles of members of the critical care team in the delivery of health care.</b>	<b>4.60</b>	<b>0.74</b>
<b>Establishes and maintains collaborative and constructive relationships with colleagues in the critical care team.</b>	<b>4.67</b>	<b>0.62</b>
Actively participates in patient care conferences within the critical care team.	3.87	0.74
Collaborates with other members of the health care team in decision making.	4.07	0.70
<i>Initiates strategies to support colleagues and facilitates resolution of situations that may threaten the dignity and integrity of colleagues and team members.</i>	<i>2.53</i>	<i>1.13</i>
<b>Leadership</b>		
Uses a professional approach to the assessment of self and others.	4.07	1.10
Identifies deviations from appropriate standards of care and interventions using effective communication strategies to ensure optimal patient outcomes.	3.60	1.12
Demonstrates a commitment to continuing education and ongoing professional development of self and others.	3.87	1.13
<i>Facilitates the identification and assists in meeting the learning needs of peers, students and other critical care health professionals.</i>	<i>2.87</i>	<i>0.92</i>
<i>Actively participates in critical care professional organisations.</i>	<i>2.87</i>	<i>1.30</i>
Mentors and precepts students and less experienced staff.	3.13	0.92
Acts as a positive role model for peers and other members of the critical care team.	3.80	0.77
<i>Acts as a consultant outside critical care.</i>	<i>1.80</i>	<i>0.77</i>

Bold text identifies elements with higher independence. Italicised text indicates element with lower independence.