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Pediatric Intensive Care Nursing

Newsletter of the International Pediatric Intensive Care Nursing Network

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International Editorial Advisory Board

We are pleased to introduce our new International Editorial Advisory Board. This establishes a formal ongoing collaboration among pediatric intensive care nurses from around the world.

This Board will collaborate on future issues in shaping the future structure and content of the Newsletter. Board members will also be writing reports on current activities in their regions - starting with Pang Nguk Lan's (from Singapore) submission for this issue.

We hope to recruit additional Board members in the near future from countries that are not yet represented. Our goal is to build a widely inclusive Board that can ensure the international depth of our Newsletter.

Franco Carnevale, Canada
Beverley Copnell, Australia
Dirk Danschutter, Belgium
Libbie Janeke, South Africa
Mario Labadet, Argentina
Jos Latour, Netherlands
Elaine McCall, New Zealand
Patricia Moloney-Harmon, United States
Pang Nguk Lan, Singapore
Karin Storm, Denmark
Colin Way, UK
Ilona Weidner, Germany

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International News

Medical Earthquake Relief Mission to Gujarat, India
Pang Nguk Lan RN, INCC, MSc
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KK Women's and Children's Hospital/Singapore

Armed with medical equipment and supplies, and a strong desire to do something for the disaster victims, a 13 member medical team from Singapore was dispatched to aid in medical earthquake relief work in Gujarat, India. The team was supported by the Humanitarian Relief Program of the Singapore International Foundation (SIF), a non-government, non-profit organization that seeks to actively engage Singaporeans in international voluntarism as one of its main goals. The Humanitarian Relief Program (HRP) supports Singapore professionals and civil groups who want to volunteer for humanitarian relief operations in countries affected by natural disasters.

Bhuj was at the epicentre of the earthquakes, this disaster killed more than 20,000 people and devastated the state of Gujarat on January 26, 2001. Our medical team, comprised of a pediatrician, an emergency medicine specialist, a primary health care doctor, 3 surgeons (orthopedic, general surgery), 5 registered nurses, 1 environmental officer and a team coordinator from SIF left for India via a commercial flight in the night of February 2, 2001. The team also brought along nearly 2 tons of medical equipment and supplies.

The original hospital in Bhuj was leveled by the quake and many of their medical personnel had died. The part of team that dealt with adults set up an outpatient center next to the temporary Bhuj Regional Hospital which was built with prefabricated material. Since our team members were from multidisciplinary specialties, we were able to provide treatment for the victims with various medical conditions ranging from fractures, open wounds, respiratory diseases, diarrhea, dehydration and infection. The 13-member team had been tending to a constant stream of quake victims ranging from children to old people.

Dr Varsha and myself, both with pediatric background, worked closely with Dr Shantu Patel, a local pediatrician in Bhuj whose home premises were converted into a makeshift hospital for children. As the buildings were badly damaged in the quake, we had to quickly set up a pediatric outpatient clinic, intensive care unit (ICU) and a ward for children, smack in the middle of Dr.Shantu's garden. We didn't expect ICU work but there we were, setting up a field neonatal ICU in a couple of hours with all that we could find. We had to go through the rubble to salvage furniture for makeshift trolleys, stands, shelves and tables. We were quite innovative and did the best we could with whatever we had at hand.

Providing medical relief in a disaster zone was a real eye opening experience for all of us. We were working with the limitations of a field hospital. There were no free flow of oxygen, proper warming devices, pumps nor monitors. We had to modify our treatment and care methods totally. Many children were treated and cared for based on clinical judgment alone as there were no facilities for investigations like x-ray and blood tests. However, with the limitation of the facilities, we were able to revive a baby who came to our clinic pulseless. Two premature neonates were brought to us by the Israeli's field hospital. One of the babies was delivered by emergency cesarean section after mother was rescued from the rubbles.

All of us had to work from morning to dusk while encountering extreme changes in temperature. It was very hot during the day and near freezing at night. Our team slept in open air, in sleeping bags or tents. We also learned quite quickly how to adapt to the situation such as looking after ourselves in a disaster zone, be alerted and on a look-out for there were many aftershocks. Even those nurses from our team who had no experience in looking after very sick neonates were just excellent when urgent help was needed.

On my personal reflection, I viewed this medical relief mission not just as providing aid but rather as an opportunity for me to learn, share and work with people from other countries. During the two weeks of stay, we were able to work closely with the Indian Medical

Association, local non-government organizations, civilians, a regional hospital, Israeli field hospital and the Red Cross. We definitely worked well as a big family. The work and living conditions were tough, but the warmth and friendliness of people did tide us over the stressful periods. At the end of the day, I think we achieved much more than what we expected.

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Innovations & Controversies

Changing syringes containing inotropic medications: A review of two methods

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Introduction

The problem of hypotension in critically ill children associated with routine syringe changes of inotropic medications prompted several PICU nurses to conduct a quality assurance project. This project examined different methods of delivery of inotropes when routinely changing syringes infused by syringe pumps (Alaris P-3000 model). Two methods of changing syringes were examined: i) single pump (SP) and ii) double pump (DP). A SP syringe change involved changing only the syringe. A DP syringe change involved using a second pump. For a short duration, this second pump simultaneously infuses the newly prepared inotrope with the pump containing the inotrope that is to be changed. The time interval for this overlapping of inotropes varies; evidence of hemodynamic stability is the criterion to discontinue the overlapping process.

The first set of experiments involved comparing SP and DP methods. For the SP method three syringes and pumps were prepared; each syringe contained normal saline (NS). Another syringe was prepared and set aside. This syringe was used to replace the syringe that was to be changed. Data collection included fluid measurement (volume) over time, in order to determine the actual flow rate. The three pumps were purged and then started (purging is a necessary step with this pump to ensure the immediate flow of fluid when the pump is initially started or restarted). Fifteen seconds after the pumps were started, one of the pumps was placed on hold and the original syringe was replaced with another. The pump was purged and restarted. The solutions flowed out through the end of the stopcock into individual medication cups; specimens were collected at different time intervals. Each specimen was manually measured. This experiment was repeated in an identical manner; these experiments were identified as SP1 and SP2.

For the DP method the same equipment and supplies used in the previous experiments were used again. A fourth pump and syringe were assembled. Three of the four pumps were purged and started. Fifteen seconds into the experiment the fourth pump was purged and started. After 90

seconds of simultaneous infusions, the pump containing the syringe that was to be changed was turned off. Data collection and analysis were the same as the previous experiments. This experiment was repeated in an identical manner; these experiments were identified as DP3 and DP4.

Findings

These data represent the volume of fluid delivered by the pump in time intervals of 15 seconds. The findings showed more inconsistencies from the SP method of syringe change than the data from the DP method. In SP1 the baseline volume before the syringe was changed was 0.29 ml (per 15-sec interval); the four subsequent volumes were 0.50, 0.55, 0.16, 0.13. In SP2 the baseline volume was 0.25; subsequent volumes were 0.04, 0.42, 0.23, 0.12. In contrast, with DP3 the baseline volume before starting the second pump was 0.15 ml; subsequent volumes were 0.26, 0.38, 0.40, 0.38. In DP4, the baseline value was 0.11; subsequent values were 0.13, 0.20, 0.51, 0.28.

It seems reasonable to assume that when the pump is placed on hold to change the syringe, that there would be a decrease in volume because the pump is temporarily not infusing. It was not clear why in SP1 the volume actually **increased** after the syringe was changed. Also, in SP2 there was an initial decrease in volume however the next finding revealed an increase.

The significant variability of these findings was suspected to be attributable to pump malfunction. Thus, 2 pumps that were examined by a biomedical engineer for precision, were used for a further investigation of the SP method. Two pumps with syringes containing NS were assembled; a third syringe containing NS was prepared and set aside. The tubings from the respective syringes were connected to a stopcock. Nine subsequent stopcocks were assembled. A 1-ml. syringe was inserted into the port of each stopcock. Data collection included the volume of fluid accumulated in each of the 10 syringes. Both pumps were purged and started. Fluid flowed from the port of the first stopcock into the first syringe. After each 15-second time interval, the port of the stopcock was closed and the fluid flowed into the subsequent syringe. After the first 30 seconds, the pump was placed on hold and the original syringe was replaced with another. The volume collected was manually measured. This experiment was identified as SP5. Two further experiments were repeated; they were identified as SP6 and SP7.

The findings from this last set of experiments also revealed some inconsistencies. In SP5 the baseline volume before the syringe was changed was 0.42 ml and the four subsequent volumes were 1.20, 0.53, 0.35, 0.40. SP6 the baseline volume was 0.41; subsequent volumes were 0.20, 0.20, 0.35, 0.41. SP7 the baseline value was 0.40; subsequent values were 0.21, 0.23, 0.48, 0.38. However, baseline infusion rates were restored within 30-45 seconds in all 3 cases.

Discussion

The findings from the SP method of syringe change showed, in several of the experiments, an increase in volume after the pump had been placed on hold. It is not clear why there was an

increase in the volume. As mentioned above, it is reasonable to assume that if the pump is temporarily placed on hold, even for a few seconds, an interruption in the flow of fluid will occur. This interruption in flow should result in a decrease in volume. Possible explanations for why there was an increase could include mechanical problems inherent in the pumps. Technique may account for some variation although an attempt to minimize this effect was maintained. The same person was responsible for changing the syringes in all of the experiments. In some of the SP experiments the volume did decrease after the syringe change. This finding would suggest that the delivery and dosage of the inotrope is temporarily decreased.

With the DP method the findings showed that the volume of fluid increased following the syringe change. These (anticipated) findings could be explained by the fact that there was an overlapping process of simultaneously administering an additional infusion, resulting in an increase in volume. Unlike the SP method, the DP method does not cause an interruption in the flow of fluid. Although the pump is stopped in the DP method, the termination of the pump occurs only after the overlapping process is complete. Unlike the SP method, temporary interruption in the flow of fluid does not occur.

These findings suggest that the DP method of syringe change provided greater consistency in the delivery of the fluid as compared to the SP method. It seems then, that the DP method would provide greater consistency in the delivery of an inotrope.

However, caution is necessary when considering implementing a DP method. During the overlapping process, there is an increased risk of excessive amounts of inotropes being administered. Inadvertently, this method could contribute to hemodynamic instability (e.g. with a significant over-infusion of Dopamine – resulting from a delay in stopping the first pump - which could increase afterload). Other risks involve increasing fluid intake, central line infections, and increased manipulation and potential dislodgment of the central line. This method would also significantly increase the nurses' daily workload. Other concerns include the possible dilution of inotropes and sedation infusing, at the same time and in the same lumen of the line, as the inotrope that is being changed. It is not clear what effect the DP method has on other continuous infusions of medications. More research in this area is needed.

We therefore conclude that (1) the DP method minimizes the diminution of the flow of inotropes and should thus be considered for unstable patients that are highly inotrope-dependent and (b) given that baseline infusions were restored within 30-45 seconds in the last set of experiments (wherein pump precision had been pre-evaluated and assured), the SP method could be an acceptable technique for stable patients with moderate to low inotrope dependency.

Note:
1. Limitations: these findings apply to the Alaris P-3000 model of syringe pump.
2. Additional experiments were conducted to also measure the effect of these techniques on the delivery of solutes (substitute medications), in order to examine changes in concentrations. These will be reported in the near future in a separate paper – however, they do not conflict with the conclusions of this paper.

PICU Nurse–Patient Ratios: In search of the 'right' numbers

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Montreal, Quebec, Canada

Introduction

On some occasions on the PICU-Nurse-International Internet discussion group, members have asked colleagues about their nursing staffing practices – chiefly the nurse-patient ratios that are commonly employed. This issue has also been raised on occasion on the predominantly physician-based PICU group (www.pedsccm.org).

A recurring theme is that there has been growing scrutiny of nurse-patient ratios. Whether this is for trying to reduce nursing costs or for trying to care for a larger number of patients in the face of severe shortstaffing – a common problem that emerges is that there does not appear to be a widely accepted standard of good staffing practice.

Carol Ball (Editor of Intensive and Critical Care Nursing) has recently discussed some of the pressures nurses in the U.K. are facing toward reexamining their usual staffing practices (2001). She examined the potential utility of nursing workload measures as a means for addressing this problem. She questions the reliability and validity of such tools for these purposes, arguing that we need to base nursing staffing requirements on patient needs and the nursing care that would meaningfully address these rather than a count of tasks performed.

Clarke and her associates (an Australian group) examined the literature for cross-national patterns in staffing (1999; 2000). In light of the prevalent concerns over the rising costs of intensive care services, they concluded, "continuous nursing care by trained professionals provides the best outcomes. If costs must be cut, technology, pharmaceuticals and laboratory tests should be targeted" (Clarke et al, 2000, p.228).

These papers do not provide specific statements of optimal nurse-patient ratios, nor are they PICU-specific. The American Academy of Pediatrics in collaboration with the Society of Critical Care Medicine have published *Guidelines and levels of care for pediatric intensive care units* (1993). This document indicates that nurse-patient ratios should vary according to patient needs, usually ranging from 2 to1 to 1 to 3 – however, no further detail is provided on how specific staffing determinations should be made.

The lack of any explicit guidelines for determining PICU staffing ratios seems to contribute to an ongoing pressure to further consider staffing reductions or workload increases. This pressure can be justified by (a) the need to contain escalating critical care costs, and (b) the need to ensure timely access to critical care for children presenting in emergency rooms or placed on long waiting lists for critical surgery.

Comments from PICU-Nurse-International

Given the extraordinary importance that staffing ratios have for patient safety – inside AND outside the PICU – I posted an inquiry on the PICU-Nurse-International Internet egroup in February 2001. I asked members to report on any PICU nursing staffing guidelines or initiatives that might exist in their region.

Some members reported:

In the UK: The bridge to the Future Report (July 1997) sets out minimum requirements for staffing. However, most lead centres for PICU need to turn patients away. There are not any recognized guidelines for PICU nursing staff to date – but some groups are currently trying to establish some in the near future.

In Australia: The Australian Council of Healthcare Standards has published guidelines that recommend 1:1 nurse patient ratios. There is also a statement to the effect that some patients may not require this, and some may need more than 1 nurse. Depending on circumstances, this document can be interpreted as either optimum or minimum standards. There is a separate section for PICUs, but it generally is identical to that for Level 3 ICUs.

The issue of 1:1 staffing and the replacement of RNs with other staff comes up with regularity. A group of adult ICU nurses from Sydney did a comprehensive review of the literature as a response to the issue being raised. It is all adult literature. They produced a detailed interesting report, but a shortened version has been published (see Clarke et al. references below). The full report can be purchased (fairly cheaply) from Royal Prince Alfred Hospital in Sydney.

In Canada: No specific PICU or other type of intensive care nursing standards for staffing has been developed.

In United States: No specific PICU or other type of intensive care nursing standards for staffing were reported, except for the AAP-SCCM report listed in the references below.

Establishing a Project Group

I also proposed an initiative to develop PICU nursing staffing guidelines that could potentially be endorsed by the various intensive care nursing societies/associations that egroup members belong to. Seven members of the egroup have volunteered to assist/participate on such a project:

Bev Copnell (Australia)
Angela Ledsham (UK)
Tracie Northway (Canada)
Judy Rashotte (Canada)
Nancy Rollins Ganz (United States)
Franco Carnevale (Canada)

We look forward to convening a collaboration among this project group in the near future – on behalf of the International Pediatric Intensive Care Nursing Network - toward the development of guidelines that could be submitted to our respective national intensive care nursing societies/associations for their endorsement.

References

American Academy of Pediatrics and the Guidelines/Practice Parameters Committee of the American College of critical Care Medicine, Society of Critical Care Medicine: Guidelines and levels of care for pediatric intensive care units. (1993). *Critical Care Medicine*, 21, 1077-1086.

Ball, C. (2001). Patient:nurse ratios in critical care - time for some radical thinking. *Intensive and Critical Care Nursing*, 17, 125-127.

Clarke, T., MacKinnon, E., England, K., Burr, G., Fowler, S. and Fairservice, L. (1999). A review of intensive care nurse staffing practices overseas: what lessons for Australia? Australian Critical Care. 12(3): 109-118.

Clarke, T., Mackinnon, E., England, K., Burr, G., Fowler, S., & Fairservice, L. (2000). A review of intensive care nurse staffing practices overseas: what lessons for Australia? *Intensive and Critical Care Nursing*, 16, 228.242.

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News From PICU-Nurse-International@yahoogroups.com

This Internet discussion egroup was founded on July 4, 2000, to help foster ongoing international dialogue among pediatric intensive care nurses and serve as a principal forum for promoting the activities of the International Pediatric Intensive Care Nursing Network. If you are interested in further information visit our website at http://groups.yahoo.com/group/PICU-Nurse-International, or contact the moderator (Franco Carnevale) by email at frank.carnevale@muhc.mcgill.ca

Egroup members continue to use this forum to discuss a wide range of topics. Ownership of the system on which this group runs changed over in December/January when YahooGroups bought Egroups.com. This has given rise to some technical difficulties and frustrations for some members in their ability to post messages.

The following table outlines the number of messages posted since the last Newsletter.

Messages Posted:

2000	December	49
2001	January	88
	February	109
	March	48
	April	78
	May	59

PICU-Nurse-International Membership

This Internet egroup has continued to grow. Membership now spreads across 23 countries spanning every continent (except Antartica of course!).

Egroup Membership by Country

Number after each country indicates the number of members from that country

Argentina	1
Australia	37
Austria	1
Belgium	1
Brazil	2
Canada	77
Czech Republic	1
Denmark	2
Finland	2
France	1
Germany	4
Hong Kong/China	2
Iceland	2
Indonesia	1
Japan	1
Netherlands	10
New Zealand	1
Norway	4
Singapore	1
South Africa	1
Spain	2
United Kingdom	31
United States	86

Total Members: 271 from 23 Countries

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Announcements

Annual Pediatric Conference
The Association of Pediatric Intensive Care Nurses & Doctor's College
Brasov, Romania
May 3-5 2001

12th Congress of the European Society for Pediatric and Neonatal Intensive Care
(www.espnic.org)
Lubeck, Germany
June 21-23 2001

The child in focus: Investing in the future
International Conference and Exhibition of the
Royal College of Nursing of the United Kingdom Children and Young People Field of Practice
Manchester, United Kingdom
July 5-7 2001

2nd International Congress on Pediatric Nursing & 23rd International Congress of Pediatrics
(www.chinamed.com.cn/pediatrics)
Beijing, China
September 9-14 2001

14th Annual Congress of the European Society of Intensive Care Medicine
Pediatric Nursing Program (www.esicm.org)
Geneva, Switzerland
September 30 - October 3 2001

4th World Congress on Pediatric Intensive Care
Buenos Aires, Argentina
March 30 – April 3, 2003 (www.pic2003.com)

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Editorial Note

Pediatric Intensive Care Nursing : *The Newsletter of the International Pediatric Intensive Care Nursing Network* aims to: (a) promote international communication among nurses interested in the care of critically ill children; and (b) foster the ongoing development of the International Pediatric Intensive Care Nursing Network (a semi-formal network of national and regional pediatric intensive care nursing associations, as well as interested individual nursing members). We hope you enjoy OUR Newsletter!

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