

SPA Fall Meeting Program
October 16, 2009
Theme – Practice Improvement

Databases for practice improvement:
Successes of the Virtual PICU

Randall Wetzel

Learning Objectives:

- Understand the utility of a multi-institutional database
- Discuss the use of comparative data in practice improvement
- Provide specific clinical examples of practice change through the use of multi-centered data

In 1997, a grant from the LK Whittier Foundation enabled several pediatric intensivists to meet and develop the concepts behind the Virtual Pediatric Intensive Care Unit (1). The vision of the VPICU is to create a common information space for the international community of care givers providing critical care for children. Every critically ill child will have access to the Virtual PICU which will provide the essential information required to optimize their outcome. There are four goals to achieve this vision:

1. The Creation of Extended Databases
2. Education and Distance Learning
3. Quality enhancement
4. Improving Access to PICU services and Telemedicine

Since then, the VPICU has collaborated with many organizations to develop databases to define, understand and improve pediatric critical care. One of the most fruitful collaborations was with the National Association of Children's Hospitals and related institutions (NACHRI). Working with their PICU focus groups software was developed to initiate data collection in a so called minimal dataset. This was originally a collaboration among 12 hospital PICUs to begin to

understand critical care, the distribution of demographics, diagnoses and outcomes and to form a basis for clinical research, quality improvement and ultimately comparative data analysis. The vision always included prospectively collecting patient level data on diagnoses, patient demographics, outcomes and procedures. Over the years there was significant ‘scope creep’ and the minimal database evolved in to a comprehensive tool for understanding pediatric critical care and exploring outcomes in a comparative fashion. To improve data quality and supplement statistical rigor the National Outcomes Centre located at Milwaukee Children’s Hospital and Medical System joined the collaboration.

In 2005, to assure independence, longevity and a successful continuation of this project, a not-for –profit limited liability company was established: Virtual PICU systems, LLC or VPS, LLC. It is currently co-owned by Childrens Hospital Los Angeles, The National Outcomes Center and NACHRI, but functions independently with its own board of directors and executive officers. There are currently 85 PICUs participating in the VPS. There are over 250,000 patient admissions to the database, growing at a rate of over 70,000 patients a year. Participating institutions participate in an advisory committee, a users group organization with annual meetings, a research committee and receive periodic comparative quality reports detailing the performance of their ICUS along multiple axes, modeled on the Institute of Medicines ‘Six Dimensions of Quality.’

A key feature of comparative databases is the necessity to assure comparing patients with similar illnesses and similar severity of illnesses. Questions such as age or gender dependent effects of critical illness require some method of comparing severity of illness. The VPS database uses both PRISM (2) and PIM (3) severity of illness adjustment tools and this methodology will be briefly discussed and new data concerning drift presented (4).

The VPS database has been used extensively to inform pediatric critical care research. Merely providing demographics and descriptions and diagnostic patterns in critical care has aided the design of multiple national research projects and NIH funded projects.. However, the core purpose of the prospective data collection was quality improvement. The chief characteristics of the quality improvement

effort include comparative data reporting, the provision of multiple reports for individual institutions and the availability of comprehensive quality reports and tracking for individual institutions. These reports have enable intensivists to demonstrate the quality of the care they provide to their institutions and nationally to such organizations as The Joint Commission. We will discuss these reports in detail.

Two other projects will be presented in some detail to demonstrate the value of these data sets. One will concern quality and outcomes assessment in one PICU and how mortality was decreased over time by developing a rapid response team. Another will detail a project on reducing unplanned PICU readmissions.

Finally a brief discussion of a recent paper from the Cravero et al. and the Pediatric Sedation Research Consortium (5) will be used to further demonstrate the utility of large patient databases in understanding sedation/anesthesia practice provided by non-anesthesiologists (6).

Has the Virtual PICU database been a success? So how do we define success:

- 1.) Reliable quality assessment of quality data
- 2.) Improved quality of care
- 3.) Research support and collaboration
- 4.) A better understanding of pediatric critical care
- 5.) Economic viability and long term survival

If these are acceptable measures of success, as they have all been achieved by VPS, LLC., then this is a successful prospective very large data repository, whose benefits we have just begin to unlock.

References:

- 1.) Wetzel RC. The Virtual Pediatric Intensive Care Unit: Practice in the New Millennium. *Peds Clin North Am* 48: 795-814, 2001
- 2.) Pollack MM, Patel KM, Ruttimann UE. The Pediatric Risk of Mortality III-Acute Physiology Score (PRISM III-APS): a method of assessing physiologic instability for pediatric intensive care unit patients. *J Pediatr.* 1997 Oct;131(4):575-81.
- 3.) Slater A, Shann F; ANZICS Paediatric Study Group. The suitability of the Pediatric Index of Mortality (PIM), PIM2, the Pediatric Risk of Mortality (PRISM), and PRISM III for monitoring the quality of pediatric intensive care in Australia and New Zealand. *Pediatr Crit Care Med.* 2004 Sep;5(5):447-54.
- 4.) Wetzel RC, Kuhn E, Gall C, Rice T, Sachdeva S. Demonstrating Time-Dependent Drift in a Validated Risk Adjustment Tool.
- 5.) Cravero JP, Beach M, Blike GT, Gallagher SM. The Incidence and Nature of Adverse Events during Pediatric sedation/anesthesia with Propofol for Procedures Outside the Operating Room
- 6.) Wetzel RC. Who is doing what to whom: a large prospective study of propofol anesthesia in children. *Anesth Analg.* 2009 Mar;108(3):695-8.