Editorial

Impact of Electronic Data on the Development of Care in Critically Ill Children

Michael Sauthier^{1,2} Philippe Juvet^{1,2}

¹ Pediatric ICU, Sainte-Justine Hospital, Montreal, Québec, Canada

² Research Center, Sainte-Justine Hospital, Montreal, Québec, Canada

J Pediatr Intensive Care 2016;5:79–80.

Major changes are occurring in pediatric intensive care due to the transition from paper to electronic clinical data collection. In this supplement of the *Journal of Pediatric Intensive Care*, a panel of experts review the literature and report their experience on the progress of this revolution. The electronic platform allows for data to be collected in a systematic way. Matton et al¹ report the customized implementation of a paperless pediatric intensive care electronic medical record (EMR). They used a 20-month preparation period and a living laboratory approach after the “go-live” (continuous monitoring of issues and problems and rapid intervention to correct them). Their report focuses on safety issues and staff satisfaction, both of which are major challenges during such transitions.

Storage of electronic clinical data can contribute to improved quality of medical care and can facilitate clinical research. Such databases can help describe practice variation, allow for hypothesis generation, test for feasibility of clinical trials, and can perform comparative effectiveness research. Several examples that demonstrate this can be evoked. Wetzel² used the vast experience acquired from Virtual Pediatric Systems (VPSs) to describe the registry design needed to improve quality of care. Khemani³ used the example of pediatric acute respiratory distress syndrome and reported on the major issues that arose when anyone plans to aggregate several databases, to improve knowledge and to provide preliminary data for research on rare diseases.

As soon as patient data are electronically available, they can be organized and processed in a manner that allows for the use of this clinical knowledge to enhance clinical decision making. This area of innovation refers to the creation of clinical decision support systems (CDSSs). A CDSS can deliver timely general clinical knowledge and guidance, intelligently processed patient data, or a combination of both. Information delivery formats can include data and order entry facilitators, filtered data displays, reference information, and alerts. At the bedside, CDSS can be used to improve compliance to

guidelines and protocols. Sward and Newth⁴ reviewed CDSS for mechanical ventilation in children that are designed to make mechanical ventilation management safer, more consistent, and more lung protective. Fartoumi et al⁵ reviewed a CDSS created to minimize secondary brain injury after traumatic brain injury, which helps clinicians quickly analyze and respond to ongoing clinical changes, thus optimizing patient status and guiding management. Adams and Longhurst⁶ created a CDSS for pediatric blood product prescriptions and reported its impact on our adherence to evidence-based red blood cell and plasma transfusion practices. Zaglam et al⁷ reviewed CDSSs for lung disease diagnosis on chest radiographs in intensive care; this was justified because interpretation of chest radiographs is difficult due to the lack of a standardized interpretation.

Dynamic databases that collect prospectively synchronized patient data at a high frequency rate ($< 0.1\text{Hz}$) from various medical devices (monitoring systems, ventilators, infusion pumps, extracorporeal circulation, ...) can estimate patient physiologic behaviors. Brossier et al⁸ reported the clinical and teaching interest of cardiorespiratory physiology modeling systems (i.e., virtual patients) and studied the methodologies that can be used to validate such virtual patients using dynamic databases (also referred to as *perpetual patients*).

All the manuscripts in this supplement reflect the tremendous efforts that are currently being made to bring to the bedside a maximum of useful knowledge that is integrated into the workflow and that will ultimately improve the management of critically ill children.

Note

Philippe Juvet received funding from the Fonds de recherche en Santé du Québec, Ministère de la Santé et des Services Sociaux du Québec and Sainte-Justine Hospital.

Address for correspondence
Philippe Juvet, MD, PhD, Soins
Intensifs Pédiatriques, Hôpital
Sainte Justine, 3175 chemin Côte
Sainte Catherine, Montréal, QC
H3T 1C5–Canada
(e-mail: philippe.
juvet@umontreal.ca).

Issue Theme Databases and
Computerized Systems in PICU;
Guest Editor: Philippe
Juvet, MD, PhD

Copyright © 2016 by Georg Thieme
Verlag KG, Stuttgart · New York

DOI <http://dx.doi.org/10.1055/s-0035-1568147>.
ISSN 2146-4618.

References

- 1 Matton M, Toledano B, Litalien C, Valle D, Brunet F, Juvet P. Electronic medical record in pediatric intensive care: implementation process assessment. *J Pediatr Intensive Care* 2016;5(3):129–138
- 2 Wetzel R. Pediatric intensive care databases for quality improvement. *J Pediatr Intensive Care* 2016;5(3):81–88
- 3 Khemani R. Databases for research in pediatric acute respiratory distress syndrome. *J Pediatr Intensive Care* 2016;5(3):89–94
- 4 Sward K, Newth C. Computerized decision support systems for mechanical ventilation in children. *J Pediatr Intensive Care* 2016;5(3):95–100
- 5 Fartoumi S, Emeriaud G, Roumeliotis N, Brossier D, Sawad M. Computerized decision support system for traumatic brain injury management. *J Pediatr Intensive Care* 2016;5(3):101–107
- 6 Adams E Longhurst CA. Clinical decision support for pediatric blood product prescriptions. *J Pediatr Intensive Care* 2016;5(3):108–112
- 7 Zaglam N, Cheriet F, Juvet P. Computer-aided diagnosis for chest radiographs in intensive care. *J Pediatr Intensive Care* 2016;5(3):113–121
- 8 Brossier D, Sauthier M, Alacoque X, et al. Perpetual and virtual patients for cardio-respiratory physiological studies. *J Pediatr Intensive Care* 2016;5(3):122–128