Survey of Therapeutic Drug Monitoring Practices in Pediatric Health Care Programs Across Canada

Donna Leung, BSc(Hons), BSc(Pharm); **Mary HH Ensom,** BS(Pharm), PharmD, FASHP, FCCP, FCSHP, FCAHS; **Roxane Carr,** BSc, BSc(Pharm), ACPR, PharmD, BCPS, FCSHP

Background

- Therapeutic drug monitoring (TDM) is indicated for certain medications when:
  - A new medication regimen is started
  - An interacting medication is added or discontinued
  - A patient's clinical status changes
- It is fundamental in clinical practice, especially in pediatrics due to wide variability and changing pharmacokinetics
- To our knowledge, no published study characterizes therapeutic drug monitoring for pediatric patients; moreover, TDM practice in Canada is poorly described
- This survey study will describe current "state-of-play" in pediatric TDM and will lay foundation for identifying areas for improvement

Objectives

- ***Primary objectives***
  - To describe TDM practice for pediatric patients across Canada; specifically, to describe what drugs are being monitored and how they are being monitored
- ***Secondary objectives***
  - To identify factors which may explain differences in pediatric TDM practice in Canada

Methods

- **Design:** Electronic survey-based methodology (multiple choice, yes/no, checkbox, text response) via *FluidSurveys*
  - *Part I* – questions about general TDM practice
  - *Part II* – questions about number of serum drug concentrations ordered per site for a typical month
- **Distribution list:**
  - Pharmacists of Canadian Association of Pediatric Health Centre (CAPHC) hospitals
  - Investigator contacts
- **Study participants:**
  - Clinical coordinators, pharmacy managers, or delegate
- **Statistics**
  - Descriptive
  - Regression analysis, Kruskal-Wallis, Mann-Whitney U
  - Statistical significance deemed *a priori* at $p < 0.05$

Results

Table 1: Characteristics of Survey Respondents

Overall participation rate	48%(20/42)
Pediatric Hospital	70%(7/10)
Pediatric Ward/Service	41%(13/32)
University affiliation	90% (18/20)

Bed Size	**Total beds**	**Pediatric**
<50	0	8
50-200	4	9
201-500	11	3
>500	4	0
Unknown	1	0
Median (Q1-Q3)	425 (230-450)	115 (22-161)

Figure 1: Respondent Demographics

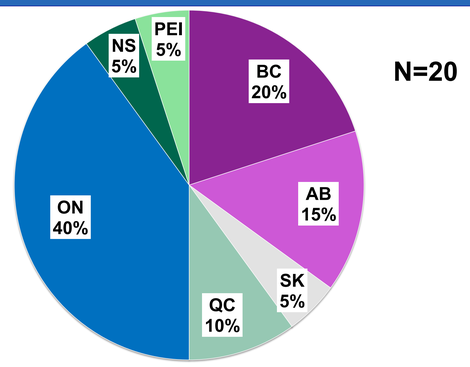
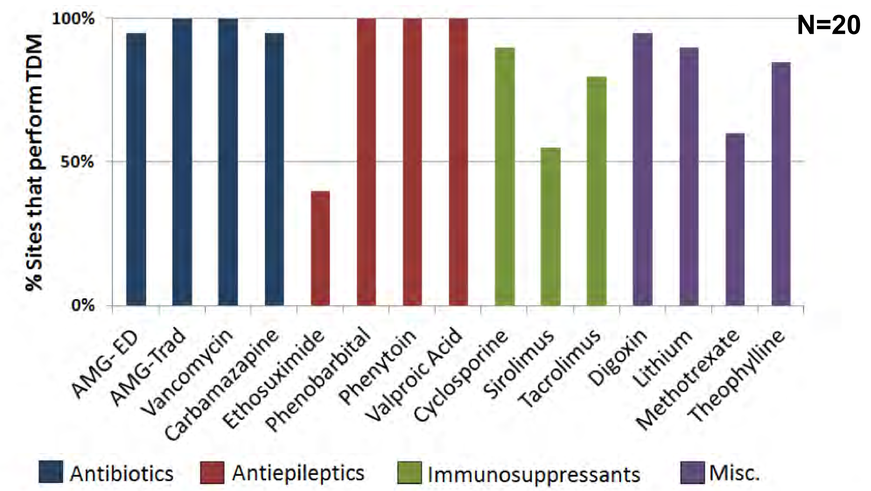


Table 2: Indications for TDM

	New Rx	Clinical Δ	Renal/ hepatic Δ	+/- Interacting Rx
Aminoglycosides (extended)	79%	84%	89%	53%
Aminoglycosides (traditional)	89%	95%	95%	58%
Antiepileptics	80%	90%	65%	80%
Immunosuppressants	88%	94%	88%	81%
Vancomycin	85%	90%	90%	55%
Mean	**84%**	**91%**	**85%**	**65%**

Figure 2: Most Frequently Monitored Drugs



Median # drugs ordered per site: 18.5 (16-21) AMG=gentamicin, ED = extended dosing, Trad = traditional dosing

Table 3: Barriers to TDM

Perceived lack of clinical value	80%
Poor access to analytic tests	50%
Time delay to test results	40%
Limited TDM operating hours	10%
Lack of training	5%
Technical difficulties in retrieving sufficient sample from patient	0%

Conclusions

- TDM service is widely available to various pediatric healthcare programs across Canada, but variations exist in the types of drugs monitored and when they are monitored. Barriers to TDM exist.
- Availability of on-site assays correlated with frequency of drug monitoring ($R^2=0.683$, $p<0.0001$)
- The following factors were not found to significantly affect TDM practice:

Pediatric hospital vs. pediatric ward	Number of beds
University affiliation	Pharmacy practice model
Ability of pharmacist to independently order TDM	Extent of pharmacist training
Extent of pharmacist involvement	

- To better utilize TDM, future efforts can be aimed towards increasing the awareness of the clinical value of TDM, and improving access to timely TDM results

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