MEDICATION ERRORS RELATED TO HIGH-ALERT MEDICATIONS IN A TERTIARY CARE PAEDIATRIC HOSPITAL

An analysis of register-based data

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Background and importance

Paediatric patients are prone to adverse drug events, including medication errors (MEs). Although high-alert medications are often associated with serious MEs, fewer studies have focused on describing these errors within paediatric populations (1–3).

Aim and objectives

The aim of this study was to investigate the prevalence and characteristics of self-reported MEs related to high-alert medications in a paediatric university hospital setting.

Materials and methods

This was a cross-sectional study of self-reported MEs (n=2,404) in a tertiary care paediatric hospital during 2018–2020; 743 (31%) of the MEs involved high-alert medications (Figure 1) (3). A quantitative descriptive analysis (frequencies and percentages) was performed using Microsoft Excel®. The prevalence of different high-alert medications, Anatomical Therapeutic Chemical (ATC) groups, drug formulations and administration routes appearing in the study sample were defined. Finally, the most severe MEs were identified and summarized.

Results

Among the studied sample of ME reports (n=743), 71 different high-alert medications were identified. The most common ATC subgroups were blood substitutes and perfusion solutions (B05; n=345, 40%) antineoplastic agents (L01; n=139, 16%), and analgesics (N02; n=98, 11%). The most common medications comprised parenteral nutritions (n=130, 15%), hypertonic sodium chloride (n=93, 11%), potassium chloride concentrate (n=66, 8%), morphine (n=47, 5%), and heparin (n=43, 5%) (Table 1). Most high-alert medications were administered intravenously (n=636, 73%) (Figure 2). Moreover, IV preparations were administered via off-label routes (n=52, 6%), such as oral, inhalation and intranasal routes. Most serious MEs (n=16, 2%) were associated with analgesics (N02) (n=8), antineoplastic agents (L01) (n=3), and antithrombotic agents (B01) (n=3) (Figure 3).

Conclusions and relevance

According to the present and previous studies, MEs on concentrated electrolytes and parenteral nutritions represent a central risk to paediatric medication safety (1–2). While severe MEs in these groups remained low in this study, a high proportion of severe MEs associated with analgesics and antineoplastic agents represented a key finding. Preventive risk management actions should be targeted on these high-alert medications as well as to secure safety in intravenous administration and off-label drug use in paediatric patients.

REFERENCES: *1. Nydert, et al. Acta Paediatrica 2020;109(12): 2810–9. 2. Stavroudis, et al. J Perinatol 2010;30(7):459–68. 3. Institute for Safe Medication Practices. ISMP list of High-Alert Medications in Acute Care Settings, 2018.*

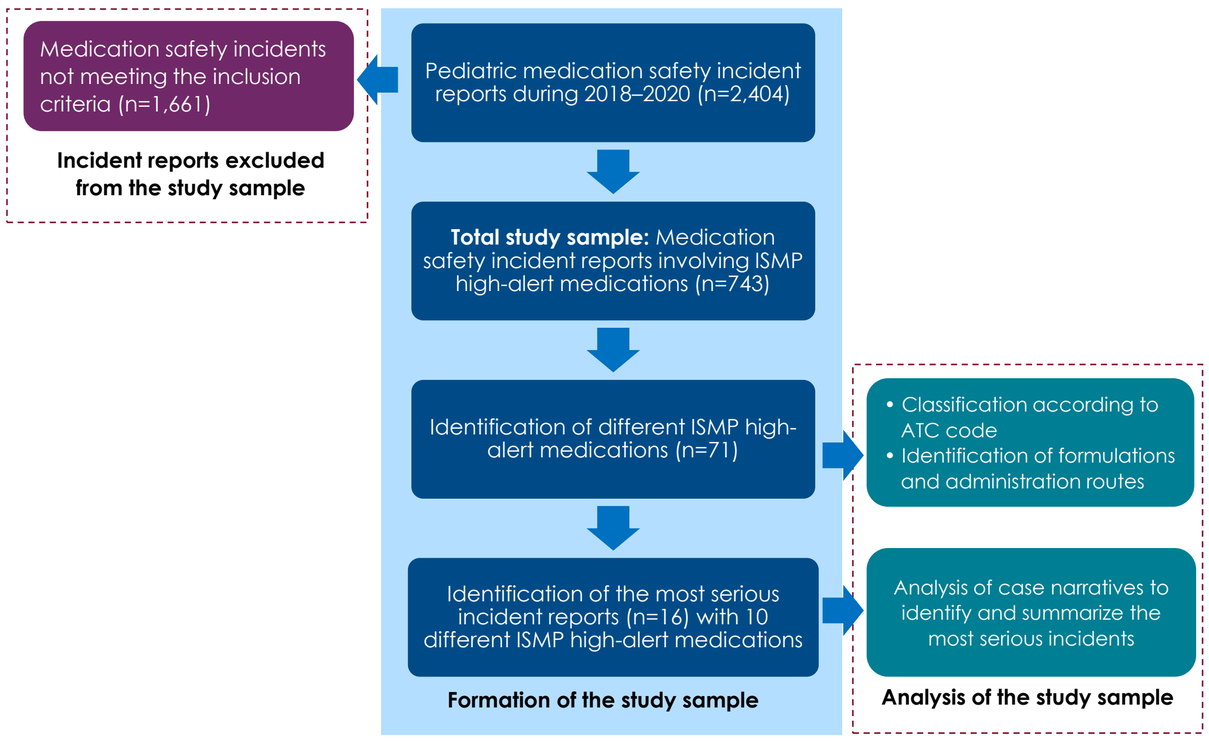

Figure 1. Flowchart of the study.

Medication	Administration route	ATC-code	n (%)
Parenteral nutrition preparations	IV	B05BA10, B05BA01, B05BA02, B05BA03, B05XA31, B05XC	130 (14.9)
Hypertonic sodium chloride (greater than 0.9%)	IH*, IV, PO*	B05XA03	93 (10.7)
Potassium chloride concentrate	IV, PO*	B05XA01	66 (7.6)
Morphine	IV, PO	N02AA01	47 (5.4)
Heparin	arteria, IV	B01AB01	43 (4.9)
Oxycodone	IM, IV, PO	N02AA05, N02AA55	42 (4.8)
Vincristine	IV	L01CA02	33 (3.8)
Fentanyl	IV, sublingual	N01AH01, N02AB03	28 (3.2)
Methotrexate	IV, IT, PO	L04AX03, L01BA01	27 (3.1)
Enoxaparin	SC	B01AB05	26 (3.0)
Others	-	-	337 (38.6)
Total	-	-	872 (100)

*Table 1. Active substances, administration routes and ATC-codes of ISMP high-alert medications (n=71) identified in the study sample (n=743 incident reports) (3). IH=inhalation, IM=intramuscular, IT=intrathecal, IV=intravenous, PO=oral, SC=subcutaneous, *=off label route.*

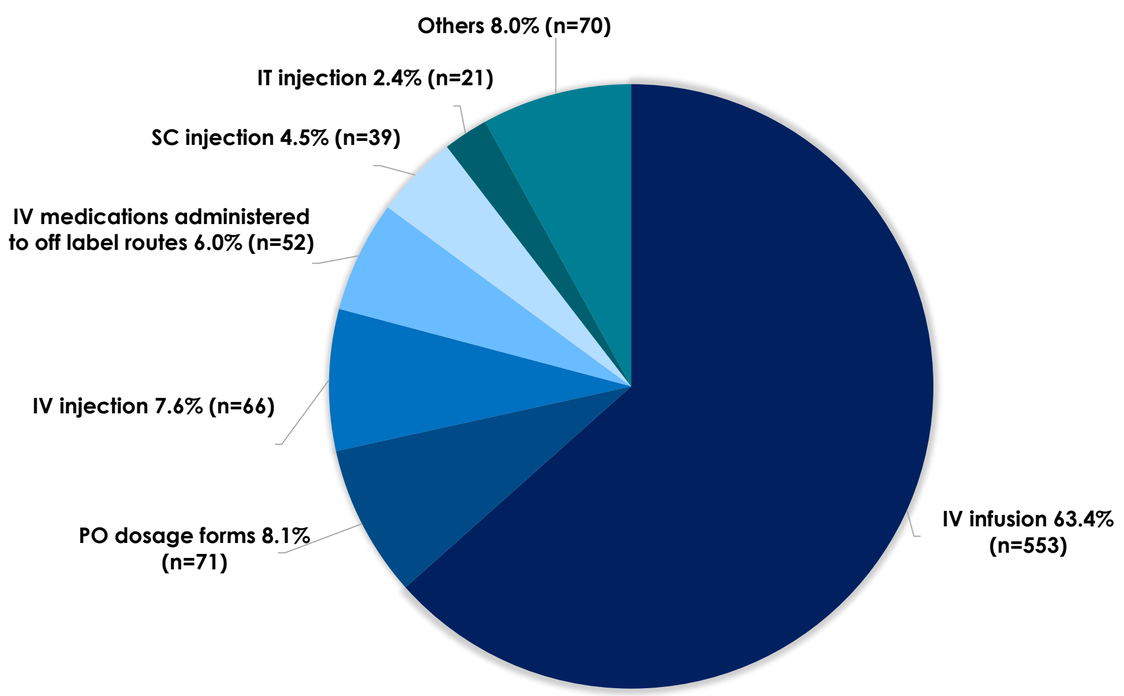

Figure 2. An overview of dosage forms (n=872) of the ISMP high-alert medications identified in the study sample (n=743 incident reports) (3). IH=inhalation, IM=intramuscular, IN=intranasal, IT=intrathecal, IV=intravenous, PCA=patient controlled analgesia, PO=oral, SC=subcutaneous.

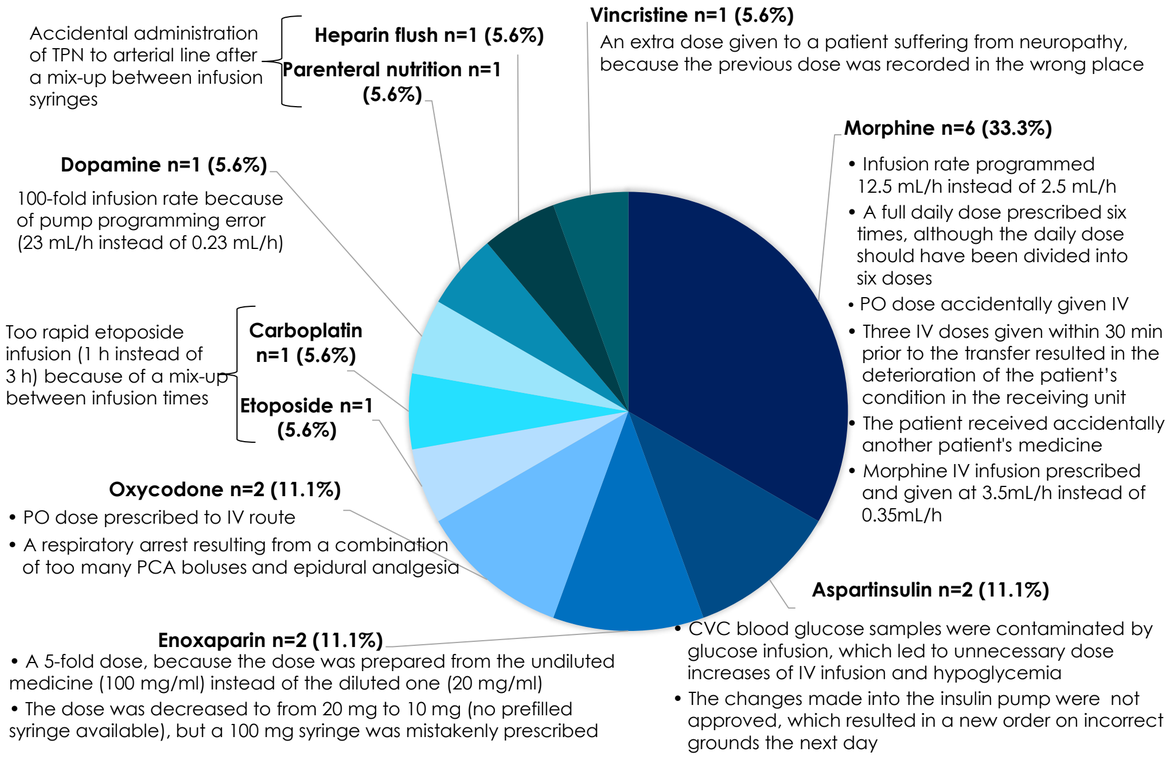

Figure 4. An overview of the most serious medication errors (n=16) related to 10 different ISMP high-alert medications (3). CVC=central venous catheter, IV=intravenous, PCA=patient-controlled analgesia, PO=oral, TPN=total parenteral nutrition.

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