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Review of medication errors in a mother-child University Hospital Center[☆]

L'insuline dans un centre hospitalier universitaire mère-enfant : une revue des erreurs médicamenteuses

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Summary

Introduction. Insulin is used for the treatment of diabetes since at least one century. Taking into account this high amount of clinical experience, the computerization of the drug use process, the creation of clinical decision tools and robotization, it is surprising that insulin is still considered a high risk medication.

Materials and methods. Descriptive and retrospective study. The main objective was to describe incidents and accidents that occurred with insulin in a mother-child University Hospital Center. Preventive and corrective measures are discussed.

Results. A total of 94 incidents and accidents that occurred with insulin were identified in the incidents and accidents registry of our center, between November 9th 2010 and November 8th, 2012. Insulin-related events represented 1.5% (94/6242) of the total number of events that involved at least one medication. Almost all (95% – 89/94) of events were accidents, but no accident caused permanent consequences to the patient.

Conclusion. Preliminary actions were identified as necessary in order to improve the management of insulin use in our center.

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Keywords : Insulin, Safe delivery of care, Drug-related incidents and accidents, Drug-use process, Medication errors

R sum 

Introduction. L'insuline est utilis e dans le traitement du diab te depuis pr s d'un si cle. Avec autant de recul clinique, l'informatisation du circuit du m dicament, la cr ation d'outils d'aide   la d cision et la robotisation, il est  tonnant de constater qu'elle fait toujours partie des m dicaments   risque  lev  d'incidents et d'accidents.

Mat riel et m thodes. Il s'agit d'une  tude descriptive r trospective. L'objectif principal est de d crire les incidents et accidents m dicamenteux relatifs   l'insuline et de discuter de mesures pr ventives et correctrices. L' tude est r alis e dans un centre hospitalier universitaire m re-enfant.

R sultats. Un total de 94 incidents et accidents portant sur l'insuline a  t  identifi    partir du registre des incidents et accidents du 9 novembre 2010 au 8 novembre 2012. Les  v nements relatifs   l'insuline repr sentaient 1,5 % (94/6242) de l'ensemble des  v nements comportant au moins un m dicament. Pr s de 95 % (89/94) des  v nements  taient des accidents, mais aucun des accidents ne comportait de cons quences permanentes pour le patient.

Conclusion. Dans le cadre de notre r flexion sur les meilleures pratiques du circuit du m dicament et de l'analyse de ces incidents/accidents, nous avons identifi  une liste d'actions pr liminaires n cessaires afin de mieux encadrer l'utilisation de l'insuline au sein de notre  tablissement.

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Mots cl s : Insuline, Prestation s curitaire de soins, Incidents et accidents m dicamenteux, Circuit du m dicament, Erreurs m dicamenteuses

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Introduction

Insulin has been used in the treatment of diabetes for nearly a century. Given all the clinical experience, computerization, robotization and number of decision-making tools, it is surprising to note that insulin is still one of the medications associated with a high risk of incidents/accidents and that it ranks among the top events linked to negative patient outcomes [1,2].

Many organizations have proposed guidelines or compliance criteria in order to reduce the inherent risks of using insulin in healthcare facilities [3–7]. For example, in 2006, the American Society of Health-System Pharmacists published guidelines on the safe use of insulin [8]. The guidelines comprise 10 themes (caregiver competency, patient information, prescribing practices, order transcription, order review, distribution, preparation and dispensing, administration, monitoring and documenting, nutrition, patient and family involvement and education) and nearly 200 compliance criteria, and they constitute a major challenge for physicians, pharmacists, healthcare workers and risk managers.

In order to better outline the problems involved in using insulin in healthcare facilities, we focused on insulin-related drug incidents/accidents that occurred at our facility.

Materials and methods

This is a retrospective descriptive study. The main aim was to describe insulin-related drug incidents/accidents and discuss preventive and corrective measures. The study was conducted at a 500-bed mother-child university hospital center. There were 17 trade names for forms of insulin and 31 distinct entries in the table of medications approved by the hospital's pharmacology committee listed in the computerized pharmacological file. Annual insulin expenses for the 2012–2013 financial year were approximately CAN \$20,000. Generally speaking, insulin is used just as much in neonatology as it is in pediatrics and obstetrics-gynecology. Each of the three sectors of the facility has its own way of organizing the management of diabetic patients. Children and adolescents who are admitted for *de novo* or uncontrolled diabetes are first treated in pediatrics for a few days. Insulin prescriptions are made jointly by the hospital unit's medical team and the diabetes team. Patients are then managed by the diabetes outpatient clinic's medical team, which takes care of follow-up and therapeutic education for patients and their close circle of relatives/contacts. Women who suffer from gestational diabetes and diabetic women with gynecological pathologies are followed by the Gynecology-Obstetrics Internal Medicine Unit's medical team, which writes insulin prescriptions independently from the department where the women are located. Finally, the Neonatology Department's medical team writes insulin prescriptions primarily within a context of

prematurity- and/or hyperkalemia-related deficit. With respect to the drug circuit, the three sectors use a number of forms for available floorstock insulin (ex.: ultra-rapid-acting, rapid-acting, intermediate-acting) in case of need to deal with emergencies. Insulin is dispensed by prescription in vials or cartridges with the patient's name when each treatment is initiated. Given its multi-dose use, insulin is an exception to the individual daily nominative way of dispensing medications. Intravenous insulin treatment doses are prepared on the floor except in neonatology where all the intravenous syringes are prepared by the pharmacy and dispensed daily for use within 24 hours. Exceptionally, insulin is added to parenteral nutrition preparations. Prewritten prescription forms are used notably in neonatology and obstetrics-gynecology. Currently, pharmacists are not regularly involved in managing diabetic patients in pediatrics and obstetrics-gynecology apart from problem cases flagged by the clinical team.

Using the local incident/accident register, we compiled all of the insulin events over a 24-month period from November 9, 2010, to November 8, 2012. Under the Quebec Act Respecting Health Services and Social Services (RSQcS-4.2), an incident is defined as “an action or situation that does not have consequences for the state of health or welfare of a user... but the outcome of which is unusual and could have had consequences under different circumstances” and an accident is defined as “an action or situation where a risk event occurs which has or could have consequences for the state of health or welfare of the user” [authors translation] [9].

In addition, each health facility is required to update a local registry of incidents/accidents based on voluntary reports made by healthcare staff using a standard form (Appendix 1) and periodically transmit these data to a national registry that publishes results twice a year [10,11]. Using local registry data on incidents/accidents, we focused on the descriptions, causes and outcomes of each reported event. We recorded some variables so we could analyze and synthesize the results. Descriptions of events and observed outcomes, as reported by the reporters, were recorded in the form of short standardized texts using a controlled vocabulary developed by the research team for reading descriptions (ex.: “unconnected insulin infusion that dripped on the floor” was renamed “leak” for the event and “product not administered” for the outcome); in addition, categories were isolated using information available in error descriptions in order to differentiate the implicated routes of administration (intravenous vs. subcutaneous), event occurrences (potential vs. actual) and failure modes that contributed to the event occurrences. The causes of the reported events were analyzed without recoding, as the vocabulary for these categories had already been standardized on the report form's predefined list. Severity was rated by reporters using a scale in effect in Quebec (table 1) [10] and analyzed without recoding.

In health facilities, the drug circuit entails a minimum of 54 steps [12]. As part of our research team's preliminary work, we

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