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ORIGINAL ARTICLE

Relation between safe use of medicines and Clinical Pharmacy Services at Pediatric Intensive Care Units

Q2 Lucas Miyake Okumura^{a,*}, Daniella Matsubara da Silva^b, Larissa Comarella^b

^a Hospital de Clínicas de Porto Alegre, Porto Alegre, RS, Brazil

^b Waldemar Monastier Children's Hospital, Campo Largo, PR, Brazil

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Critical care;
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Patient safety;
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Abstract

Objective: Clinical Pharmacy Services (CPS) is considered a standard of care and is endorsed by the *Joint Commission International*, the *American Academy of Pediatrics*, and the *American College of Clinical Pharmacy*. In Brazil, single experiences have been discreetly arising and the importance of these services to children and adolescents care has led to interesting results, but certainly are under reported. This short report aims to discuss the effect of implementing a bedside CPS at a Brazilian Pediatric Intensive Care Unit (PICU).

Methods: This is a cross-sectional study conducted in a 12 bed PICU community hospital, from Campo Largo/Brazil. Subjects with <18 years old admitted to PICU were included for descriptive analysis if received a CPS intervention.

Results: Of 53 patients accompanied, we detected 141 preventable drug-related problems (DRPs) which were solved within clinicians (89% acceptance of all interventions). The most common interventions performed to improve drug therapy included: preventing incompatible intravenous solutions (21%) and a composite of inadequate doses (17% due to low, high and non-optimized doses). Among the top ten medications associated with DRPs, five were antimicrobials. By analyzing the correlation between DRPs and PICU length of stay, we found that 74% of all variations on length of stay were associated with the number of DRPs.

Conclusions: Adverse drug reactions due to avoidable DRPs can be prevented by CPS in a multifaceted collaboration with other health care professionals, who should attempt to prevent such avoidable problems by using active and evidence-based strategies to reduce avoidable morbidity-related to medications.

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* Corresponding author.

E-mail: lucasokumura@yahoo.com.br (L.M. Okumura).

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PALAVRAS-CHAVE

Cuidados intensivos;
Efeitos colaterais
relacionados a
medicamentos e
reações adversas;
Unidades de Cuidado
Intensivo Pediátrico;
Serviço de Farmácia,
Hospital;
Segurança do
paciente;
Erros de medicação

Relação entre o uso seguro de medicamentos e serviços de farmácia clínica em Unidades de Cuidados Intensivos Pediátricos

Resumo

Objetivo: Serviços de Farmácia Clínica (SFC) são considerados um padrão de atendimento e são endossados pela *Joint Commission International*, a *American Academy of Pediatrics*, e a *American College of Clinical Pharmacy*. No Brasil, as experiências individuais foram surgindo discretamente e a importância desses serviços para o cuidado de crianças e adolescentes levou a resultados interessantes, mas que certamente são sub-relatados. Este breve relatório tem como objetivo discutir o efeito da implantação de um SFC à beira do leito em uma Unidade de Cuidados Intensivos Pediátricos (UCIP) brasileira.

Métodos: Esse é um estudo transversal, realizado em uma UCIP de hospital da comunidade com 12 leitos, em Campo Largo, Brasil. Foram incluídos indivíduos com <18 anos internados em UCIP para análise descritiva, quando receberam uma intervenção de SFC.

Resultados: De 53 pacientes acompanhados, foram detectados 141 Problemas Relacionados a Medicamentos (PRM) evitáveis que foram resolvidos com médicos (89% de aceitação de todas as intervenções). As intervenções mais comuns realizadas para melhorar a terapia medicamentosa foram: prevenção de soluções intravenosas incompatíveis (21%) e composto de doses inadequadas (17% devido a doses baixa, alta e não otimizadas). Entre os dez principais medicamentos associados à PRM, cinco eram antimicrobianos. Ao analisar a correlação entre o PRM e tempo de permanência na UCIP, verificamos que 74% de todas as variações no tempo de permanência eram associadas com o número de PRM.

Conclusões: Reações adversas a medicamentos devido a PRM evitáveis podem ser evitadas por SFC em uma colaboração multifacetada com outros profissionais de saúde, que devem tentar prevenir este tipo de problemas por meio de estratégias ativas e baseadas em evidências para reduzir a morbidade relacionada a medicamentos evitável.

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Introduction

The increasing number of medications being approved to adults with potential use on Pediatrics,¹ the need to treat clinically challenging diseases, and the ethical issues surrounding Pediatrics research put children and adolescents at more risks associated to medication adverse events.^{2,3} To illustrate this scenario, a nested-cohort study conducted by Bellis and colleagues² demonstrated that unapproved prescriptions were associated with an augmented hazard of having an adverse event (hazard ratio 1.30, 95%CI 1.20–1.30, $p < 0.001$).

To detect medication adverse reactions and to avoid preventable drug-related problems (DRPs), many accredited hospitals^{4–7} have been putting efforts to implement Clinical Pharmacy Services (CPS). Since the last decade, the multifaceted collaboration between Pediatricians, Critical Care Physicians and Clinical Pharmacists were endorsed by the American Academy of Pediatrics,⁵ American College of Clinical Pharmacy and many studies in the field.^{5–9}

Despite the well-established importance^{5–9} of CPS to children and adolescents, in the last years, Brazil has started the implementation of single experiences around the country, especially for PICU patients, which has led to interesting but under reported results.

This study is endorsed by the evolving role of CPS in Brazil, which has been due to the recent approval of a legislation about clinical activities developed by

pharmacists¹⁰; and the increasing interest of Latin American health institutions to get accredited.¹¹ Noteworthy, Accreditation Organizations, such as the Joint Commission International, advocates that strategies to prevent medication errors, likewise pharmacists-driven clinical services, should be implemented to reduce the number of drug-related undesired events.¹²

The aim of this short report is to describe the implementation and results of a CPS directed to PICU inpatients in a Brazilian setting.

Method

This study complies with Helsinki's Declaration and was approved by the Local Ethics Committee.

In one 12 bed community's hospital PICU located in Campo Largo, Brazil, we started the implementation of a CPS in 2012, due to accreditation processes and Clinical Director incentives to improve local health assistance. The aforementioned hospital attends all critically ill children who live approximately 200km distance from Curitiba (the biggest city in Paraná State, southern Brazil). Some of the main features of such hospital include: the presence of a computerized physician order entry, where all clinical documentations and prescriptions are electronically registered and can be remotely monitored by an online system; and, by the time of the study, one part-time pharmacist was

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