

ORIGINAL ARTICLE

Evaluation of a Guideline on Potassium Chloride Intravenous Supplementation: Safety, Effectiveness and Cost Implications

Melissa Mohammad Hirman^{1,2} and *Chee Ping Chong³

¹ Department of Paraclinical Sciences, Faculty of Medicine and Health Sciences, Universiti Malaysia Sarawak, 93400 Kota Samarahan, Sarawak, Malaysia

² Normah Medical Specialist Centre, Jalan Tun Abdul Rahman Yaakub, Petra Jaya, Kuching, Sarawak, Malaysia

³ Discipline of Clinical Pharmacy, School of Pharmaceutical Sciences, Universiti Sains Malaysia, 11800 Minden, Penang, Malaysia

ABSTRACT

Introduction: The use of concentrated potassium chloride formulation in the intravenous potassium supplementation of hypokalemia treatment is associated with risks of hyperkalemia. This study aimed to assess the safety and effectiveness of a developed guideline on potassium chloride intravenous supplementation with the emphasis on using premixed formulations. The cost implications of using the premixed formulations were compared with the diluted concentrated formulation as well. **Methods:** This was a prospective interventional study conducted in Normah Medical Specialist Centre, Malaysia. A guideline on potassium chloride intravenous supplementation with the emphasis on using premixed formulation was developed and implemented in the treatment of hypokalemia. The safety, effectiveness and cost of using diluted concentrated potassium chloride formulation before the guideline implementation was compared with premixed formulation during the guideline implementation. **Results:** A total of 154 hypokalemia patients in the pre-guideline phase was compared with 28 patients in the guideline implementation phase. None of the patients experienced hyperkalemia during guideline implementation phase as compared to pre-guideline phase (0.0% versus 3.2%), but the difference was not significant ($p = 1.000$). The proportion of hypokalemia patients with successful corrected potassium levels during guideline implementation phase were not differed significantly from pre-guideline phase (71.4% versus 59.1%, $p = 0.218$). The use of premixed formulations led to an overall cost reduction due to reduced labour costs as compared to concentrated formulations which was seen in both cases of mild hypokalaemia and moderate to severe hypokalaemia. This labour cost reduction was contributed by a lower total infusion time and elimination of drug preparation time during guideline implementation phase where premixed formulations were solely used. The mean total cost per case of intravenous potassium supplementation in mild hypokalaemia was reduced from RM 376.19 in pre-guideline phase to RM 263.19 during guideline implementation phase. Meanwhile, the moderate to severe hypokalaemia cases showed similar trend whereby the mean total cost per case was reduced from RM 304.17 in pre-guideline phase to RM 207.29 during guideline implementation phase. **Conclusion:** The developed guideline with the emphasis of premixed formulations is safe and effective with impact of cost savings.

Keywords: Potassium chloride injection; Hypokalemia; Intravenous potassium replacement guideline; Premixed formulation

Corresponding Author:

Chee Ping Chong, PhD
Email: cheeping@usm.my
Tel: +6012-534 2685

INTRODUCTION

The use of concentrated potassium chloride formulation in the potassium supplement of hypokalaemia treatment is associated with risks of hyperkalemia and medication errors (1–3). In order to mitigate these risks, implementing guidelines on the use of premixed potassium chloride formulation to replace the concentrated formulation have been recommended (4). Several institutions have implemented

local guidelines on potassium intravenous supplementation (5–7). In Malaysia, information on potassium replacement in hypokalaemia is mentioned in The Critical Care Handbook by the Malaysian Pharmaceutical Services Division and The Malaysian Clinical Practice Guideline for Diabetes Mellitus (8,9). Nevertheless, there is no standard national guideline for the potassium chloride supplementation in Malaysia. It is unknown whether the hospitals in Malaysia have their local guidelines on intravenous potassium supplementation for hypokalaemia, though dilution protocols for potassium chloride may exist (10).

Despite the available of recommendations and guidelines on intravenous potassium supplementation,