From High-Risk to High-Safety: A Transition from Potassium Ampoules to Pre-Diluted Infusions

Douwe H. van der Meer / Hospital pharmacist, clinical pharmacist in training, Clinical Pharmacy, Isala, Zwolle, The Netherlands

1) Why was it done?

Potassium ampoules are concentrated electrolytes categorized as high-risk medications due to the potential for immediate cardiac arrest following accidental (undiluted) injection. Despite these risk, they are used on most of our wards in our large teaching hospital. Implementation of **pre-diluted infusion bags in stead of ampoules** are recommended by safety guidelines to eliminate this risk.

2) What was done?

We conducted a comprehensive assessment of all clinical indications for potassium ampoule usage. Based on this analysis, we developed a plan to replace ampoules with the right pre-diluted infusion bags.

The **majority of intravenous potassium indications**
- treatment of hypokalemia,
- hyperhydration during cisplatin and high-dose methotrexate
- fluid replacement in pancreatitis
- prevention of hypokalemia in diabetic ketoacidosis.

We **implemented 3 pre-diluted potassium** infusion bags
- Potassium-chloride 20 mmol in 1 L normal saline (0.9%)
- Potassium-chloride 40 mmol in 1 L normal saline (0.9%)
- Potassium-chloride 40 mmol in 500 mL saline (0.47%)

Already implemented:
- Potassium-chloride 50 mmol in 50 mL syringe
  (Ready-to-administer)

20mmol KCl / 1L
Normal Saline

40mmol KCl / 1L
Normal Saline

40mmol KCl / 500mL
Saline 0,47%

50 mmol KCl / 50 mL

Figure 1: Three types of pre-diluted potassium infusion bags and our ready-to-administer syringe

3) How was it done?

We established **standardized infusion protocols** for all indications of potassium supplementation. Then, we removed potassium ampoules from all wards, including the Intensive Care Unit (ICU) and emergency care settings. Potassium ampoules are now available **solely upon request of the prescriber** from the pharmacy.

4) What has been achieved?

Following the introduction of pre-diluted infusion bags, the utilization of ampoules **decreased by 95%**. Prior to implementation, the hospital utilized about 30.000 potassium ampoules per year; this number has now reduced to 1600 ampoules, with a continuing downward trend.
With this **switch to pre-diluted** infusion bags, we are now aligning with **safety guidelines**.

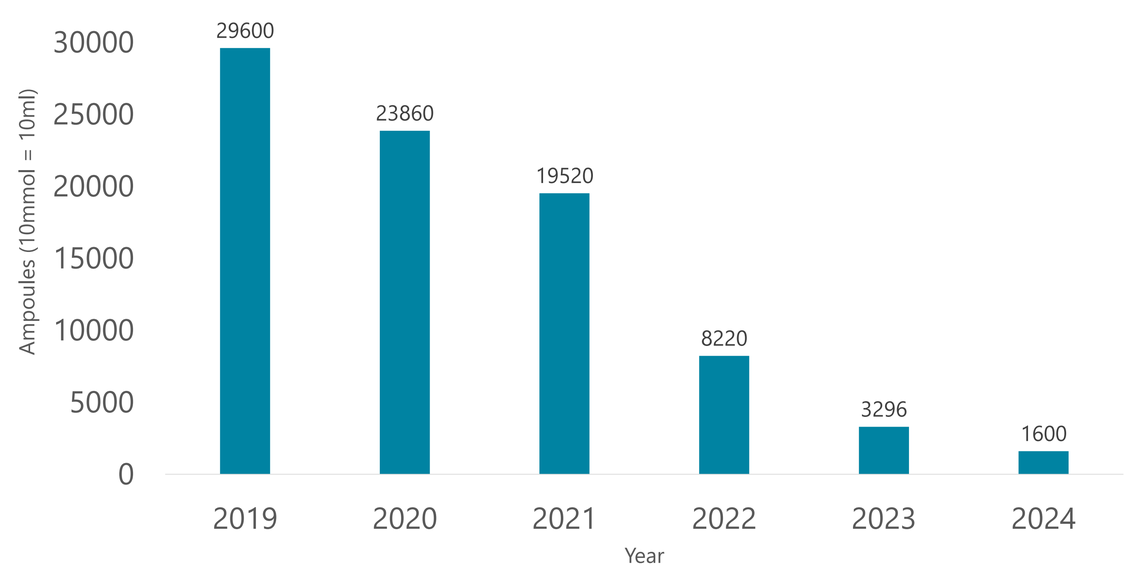

Figure 2: Potassium-ampoule usage per year
We introduced the first pre-diluted infusion bag in 2019: 40 mmol in 1L normal saline, followed by 40 mmol in 500mL saline 0.47% in 2021. In 2022 we introduced 20mmol in 1L.

5) What next?

Remove potassium ampoules from Neonatal Intensive Care Units (NICU) and from the pediatric ward
Neonates and children need tailored amounts of potassium and available pre-diluted infusion bags are not suitable to their use. In the next few years, pharmacy employees are preparing this high-risk medication. Ampoules can then be removed from their wards.

Monitor inappropriate usage of ampoules
In exceptionally circumstances, ampoules can be distributed upon request of prescribers. But, not all requests are in line with our standardized protocols, leading to inappropriate usage of ampoules. We are working on a monitoring system to identify theses cases.

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