



Applying Human Factors to Improve High-Alert Medication Administration Safety

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Objectives

Taiwan Patient-safety Reporting data continue to show that medication error is a great threat to patient safety. The purpose of this study is to investigate the safety status of high-alert medication administration. It is expected that human factors knowledge can be applied to improve the infrastructure design, to prevent systematic problem and to reduce medication administration errors eventually.

Methods

This study conducted a qualitative observation assessment and semi-structured interview to the front line personnel in order to realize and focus on the risk factors of medication administration associated with chemotherapeutic agents and insulin injection, as well as the ways to reduce medication errors occurred via applying human factors approach. On-site visiting was scheduled to hospitals by their accredited levels including 4 medical centers, 4 regional hospitals and 1 district hospital in Taiwan. Before visiting, every individual hospital was asked to submit documents of operating standards or procedures in medication administration and also their RCA/FMEA/PDCA reports on medication incidents. The experts of patient safety or human factors engineering inspected the medication delivery procedures in the wards of internal medicine, hematology, or oncology via observation. In addition, these procedures involving the stage of preparation and medication delivery, as well as nursing information system were assessed from the perspectives of five major human factors domains including individuals, working procedures and methods, external environment, equipment, and organizational culture.

Results

The finding shows that highly potential risks remained in the domains of “working procedures and methods”, “equipment” and “external environment” through on-site observation while performing administration of chemotherapeutic agents and insulin injection. As a result, human factors approaches were recommended as follows:

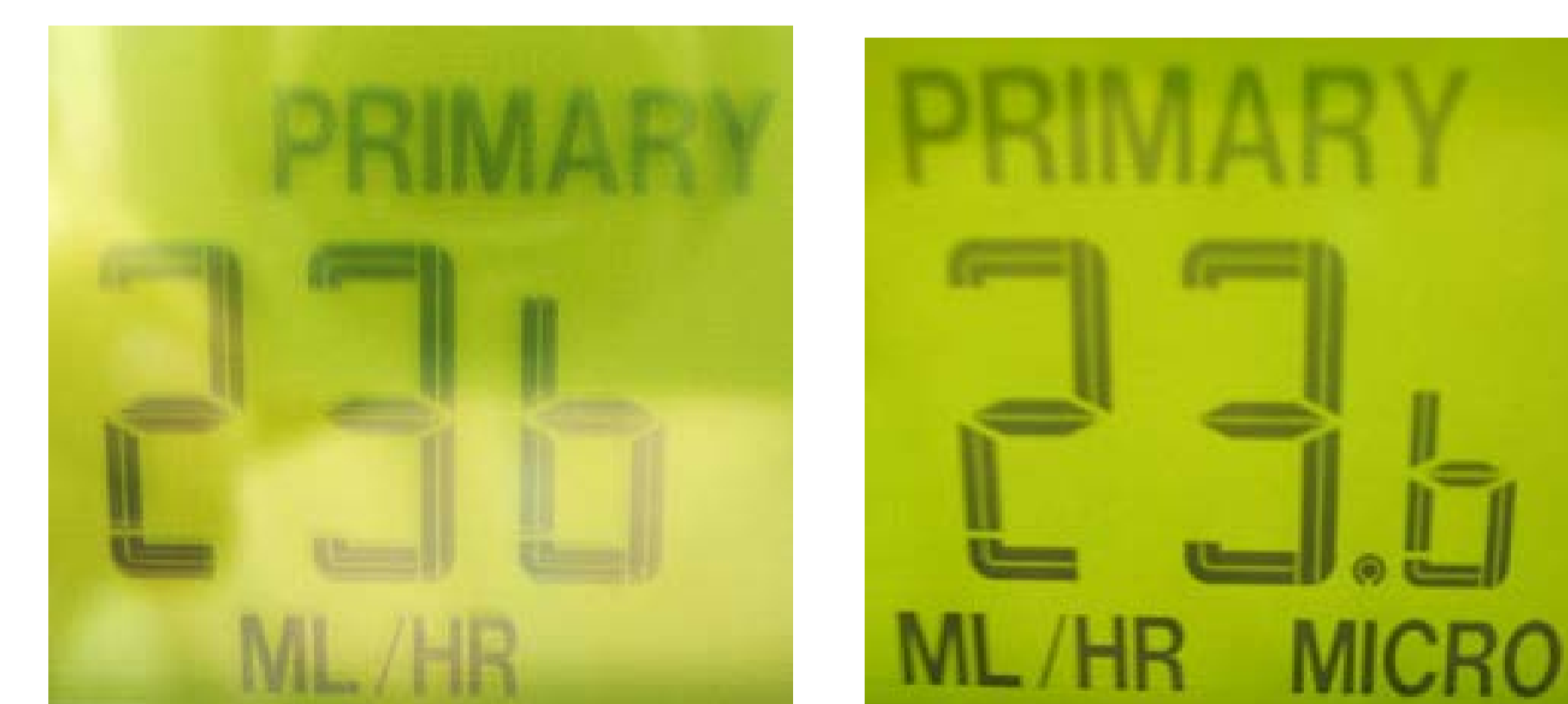
- (1) **Working procedures and methods:** (a) “read back” and “pointing and calling” to enhance the correction of double-check. (b) decreasing the use of abbreviations or set up the common standard of abbreviations to avoid misunderstanding, for example IV, IVD, IVF, IVP. (c) reducing staff’s mental workload via healthcare information system such as using automatic reminder/display of special inject routes on the medical ordering system (eg: chemotherapy agent via CVC or PICC routes; subcutaneous injection for insulin pen usage); automatically calculating of IV rate; automatic display of rotating injection areas; showing distinct colors when order renew for notification.
- (2) **Equipment:** showing different size of numbers between the decimal point in case of misreading of dosage on infusion pumps such as 23.6, instead of 23.6 (Fig)
- (3) **External environment:** reducing interruption while giving medication. For example, vests showed “Do not disturb” or “chemical protective clothing” should be provided to health care professionals in order to help enhance their concentration and correct medication administration. Providing education to patients and family that they should not interrupt while meeting health care workers with these special dresses on.

Conclusion

Job interruption and distraction are usually seen for health care professionals while performing risky procedures, especially for nurses, who are most likely to suffer from all kinds of interruption such as phone ring, people, warning signals or alerts from nursing carts, pumps, or life-supporting machines. Offering simple designs and intuitive user interfaces helps reduce medication administrative procedures complexity, such as infusion rate calculation, checking right medication for right patients, even for distinguishable routine order and standing order for patients’ care plan. Overall, “using information system to improve working procedure and method” and “reducing environmental distress” are essential factors to enhance the safe of medication administration.

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1. Infusion Pump