Automated documentation - from the syringe infusion pump to the clinical information system

Degree programme : MAS | Specialisation : MAS Medical Informatics

A data integration project within the Lindenhofgruppe AG on the intensive care unit (ICU) aims to transfer information from syringe infusion pumps directly to the clinical information system (CIS), thus allowing for automated documentation of medication administered via infusion pump in the electronic health record (EMR) of the patient. This master thesis analysed the effect on documentation quality.

Introduction

Since its introduction within the Lindenhofgruppe AG in 2013, there has been a focus on continuously integrating other stand-alone medical systems or devices into the CIS. The next data integration project aims to eliminate the need for manually documenting medication administered via syringe infusion pumps on the ICU. During a four month pilot beginning in September 2019 medication administered via syringe infusion pump was automatically documented in the CIS test system (KISIM Test) and continued to be documented manually by the ICU staff in the live CIS (KISIM Prod). The parallel documentation facilitated a retrospective explorative analysis of both documentation methods.

Methods

The obtained documentation records exhibited their own specific structure pro documentation method. As such, it was determined, that all data be transformed into a newly defined generic structure using an algorithm written in Visual Basic for Applications (VBA). Following transformation of the data, database queries were designed, which grouped the automatic and manual documentation records by patient, date and medication ID. The deviation in medication dose between the data records for both documentation methods were then calculated as a percentage. Different medication administration types (continuous infusion versus bolus) were also investigated.
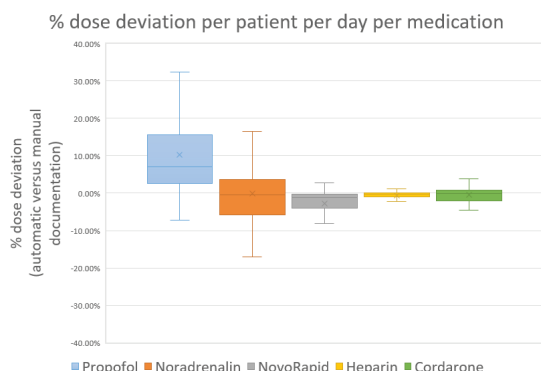
Results

For continuous infusions, there was no large difference determined between the total documented dose for both documentation methods. Missing gaps in administered medication documented manually were seen. Manually documented long running continuous infusions were often not stopped when the syringe was empty. Over 10% of all manually documented records deviated ±25% away from the actual medication dose. Only 26% of Propofol bolus injections were correctly documented manually, resulting in almost 10 bolus injections (9.6 ± 10.3, p < .0001) going unaccounted for daily. As a result, over 180mg of Propofol (183.0 ± 227.8, p < .0001) was administered to patients without any manual documentation.
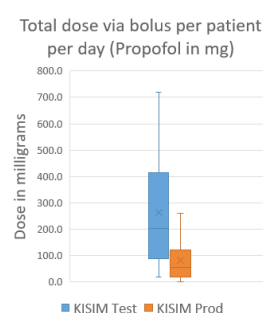
Discussion

Manual documentation with an acceptably high level of precision is inherently affiliated with high labour costs. Taking this into account, the inherent cost/time pressure in the healthcare system naturally calls into question the quality of the documentation. The findings of this study demonstrate, that the documentation accuracy improves significantly through automation, especially for bolus injections.

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% dose deviation per patient per day per medication

Dose deviation per medication

Total dose via bolus per patient per day (Propofol in mg)

No. documented boli per patient per day (Propofol)

Propofol bolus injections