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Medication Administration Evaluation and Feedback Tool: Inter-rater reliability in the clinical setting

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ABSTRACT

Aims: This study assessed the inter-rater reliability, acceptability and usability of the Medication Administration Evaluation and Feedback Tool for nurses in the clinical setting.
Background: Medication administration is a complex nursing task requiring multiple steps to ensure safe and accurate delivery of medications to patients. Currently, registered nurses are not routinely provided the opportunity for regular review of their practice. The Medication Administration Evaluation and Feedback Tool has been previously validated in the simulated environment.
Methods: Four nurse observers were trained to use the tool. Thirty nurses participated to be observed in the clinical setting. Each nurse was assessed simultaneously by two observers. Inter-rater reliability was assessed using Fleiss' Kappa coefficient. A post-observation survey was conducted to assess user acceptability. The Guideline for Reporting Reliability and Agreement Studies Enhancing the Quality and Transparency of Health Research was used.
Results: The observed agreement between observers using the Medication Administration Evaluation and Feedback Tool in clinical practice was 0.90 and Fleiss' kappa coefficient was 0.77 demonstrating excellent agreement and inter-rater reliability. Both nurses and observers reported the tool was useful and practical for use in evaluating medication administration practice in the clinical environment.
Conclusions: Inter-rater reliability testing of the Medication Administration Evaluation and Feedback Tool in the clinical environment demonstrated it is a reliable and valid tool when used by different observers. Both nurses and observers found using the tool a positive and useful experience when evaluating medication administration practice.

Summary of relevance
Problem
Medication administration is a complex task and medication administration errors continue to contribute to patient harm, yet nurses are not routinely evaluated and provided feedback on their practice. **What is already Known About the Topic?** Self-assessment and appropriate formative feedback are an essential part of clinical performance review.

What this Paper Adds
A reliable, valid, practical and user-friendly tool with criteria to evaluate nurses' medication administration practice by using self-assessment, observation and feedback to develop a mutually agreed performance improvement plan. A harm reduction strategy for preventing avoidable medication errors consistent with the World Health Organization's global patient safety challenge.

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1. Introduction

Few studies focus on regular review, self-assessment and feedback of nurses' medication administration practice throughout their nursing careers. The Medication Administration Evaluation and Feedback Tool (MAEFT) was designed using a multidisciplinary panel of experts who rated the item-content validity index (I-CVI) of each evaluation criteria based on the content of three tools identified in the literature (Davies, Coombes, Keogh, & Whitfield, 2019). Data analysis measures of agreement and acceptable ratings for the relevance of items were calculated with Kappa corrected for agreement by chance (Polit & Beck, 2008). See Table 1 for MAEFT criteria.

Reliability testing establishes the reliability of a tool across different raters and settings. To test intra-rater reliability of the MAEFT it was necessary to have fixed scenarios recorded in a simulated environment. Eight simulation-based experiences (SBEs) of a simulation nurse (SN) administering medications were digitally recorded. Three simulation nurse educators (SNE) independently viewed the recorded SBEs and evaluated the nurse's medication administration practice using the MAEFT and repeated the process a week later. This also tested the inter-rater reliability, or consistency between raters. Fleiss Kappa coefficient for multiple raters was used to calculate agreement (Davies, Coombes, Keogh, Hay et al., 2019). However, to determine inter-rater reliability with a variety of situations with different subjects (nurses and observers) it was necessary to conduct the testing in the clinical environment (Gisev, Bell, & Chen, 2013). All phases of the study are illustrated in Fig. 1 to provide overall context.

Medication administration is an integral part of nursing care, constituting a fifth of a nurse's day (Westbrook, Rob, Woods, & Parry, 2011; Westbrook, Duffield, Li, & Creswick, 2011). It is a complex task with multiple clinical and procedural steps to ensure safe delivery of medications according to individual patients' needs. If all steps are not followed there is potential for error and patient harm (Hardmeier et al., 2014). Regardless of the environment, adult inpatient ward, intensive care unit or paediatric intensive care, the prevalence of errors, especially intravenous errors are unacceptably high (69%, 59% and 37% respectively) (Hermanspann et al., 2019; Westbrook, Rob et al., 2011; Westbrook, Duffield et al., 2011). The causes of errors in medication administration are multifactorial: system flaws, human factor issues and the underlying safety culture of organisations (Agency for Healthcare Research & Quality, 2019). Contributing factors may include personal neglect, workload, new staff, multitasking, advanced drug preparation without rechecking and non-compliance with administration sequence (Kim & Bates, 2013). Nurses are frequently interrupted when administering medications, with each interruption increasing the likelihood of error (Reed, Minnick, & Dietrich, 2018). Omission of medications is a significant contributor with one third of reported medication errors attributed to missed dosage (Härkänen, Vehviläinen-Julkunen, Murrells, Rafferty, & Franklin, 2018).

The World Health Organization's (WHO) "Third Global Patient Safety Challenge: Medication without Harm" aims to reduce avoidable medication-related harm by 50%, globally over five years (World Health Organization, 2017). Strategies to prevent errors in medication administration need to address all contributing factors to achieve this (Australian Commission on Safety & Quality in Health Care, 2017). Multifaceted approaches are required with a combination of education and risk management strategies such as bar code technology and intravenous infusion safety software (Lapkin, Levett-Jones, Chenoweth, & Johnson, 2016). However, the evidence of effective strategies to reduce interruptions and medication administration errors is weak and further research is required (Raban & Westbrook, 2014). These all highlight the importance of not only the correct clinical components of medications administered but also the correct process.

Table 1
Medication Administration Evaluation and Feedback Tool (MAEFT) Questions.

Medication Administration Evaluation and Feedback Tool (MAEFT)
Right Patient
1. Asked the patient to state their name and date of birth (DOB).
2. Checked the patient name, DOB and the hospital record number (HRN) against the identification (ID) band and the medication record ID.
3. Asked the patient if they have any allergies or previous adverse drug reactions (ADRs) to any medicines and checked the patient response against the allergies section on the medication record and confirmed they are not allergic to the medicine or similar class of medicine.
4. If required, updated the allergies section of the medication record and / or discussed discrepancies with the prescriber.
Right Medication
5. Checked the medication against the medication order and confirmed the medication name and formulation are correct.
6. Confirmed the medication is indicated for the patient diagnosis and checked there are no duplicate orders of the medicine or of similar class of medicine.
7. Checked the medication expiry is within date.
Right Dose
8. Checked the medication dose against the medication order and confirmed the dose is correct for the patient, age, weight, renal function, drug levels and the calculation is correct. Including IV rate is set correctly.
Right Route
9. Checked the medication route against the medication order and confirmed the route is correct for the medication and the patient.
Right Time
10. Checked the time against the medication order and confirmed the frequency is correct and the interval since the last dose is correct.
Right to Refuse
11. If for any reason the medication order is not complete, is unclear, requires clarification, is outside of the nurses or the environmental scope, inappropriate for the patient or the patient refuses, the nurse does not administer and follows up with the prescriber to discuss.
Right Procedure
12. Nurse conducts patient observations prior to administering the medication as required.
13. Nurse conducts hand hygiene and uses appropriate personal protective equipment as required when administering the medication.
14. Nurse uses standard non-touch or aseptic technique when preparing and administering medication.
15. Correct administration technique is used. I.e. IV bolus or infusion, dilution, compatibility, one injectable at a time, IV-line setup.
16. Added correct and completed additive, medicine and line labels for correct route if required.
17. Nurse confirms if medication requires 2 nurses to check. If so, both nurses perform an independent check and calculation.
18. Both nurses witness the preparation of the medication.
19. If double check required, both nurses go to the bedside to check the patient administration.
20. Nurse asks the patient if they know what the medicine is for and informs the patient if they are unclear.
21. Nurse/s witnesses the patient takes / or correctly self-administers the medicine.
22. Nurse/s administering the medication signs that the medicine has been given or documents the reason why it was not and takes appropriate action and informs the medical officer.

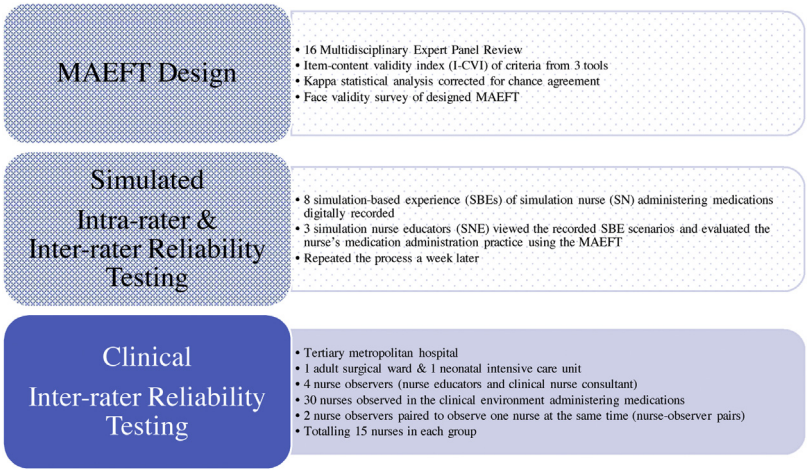

Fig. 1. Schematic Diagram of MAEFT Design and Testing Methodology.

Years of experience have been associated with risk of administration and procedural errors with more experienced, confident nurses less likely to formally cross-check a patient's identification with the medication chart prior to administration (Al Khawaldeh & Wazaify, 2018). Most studies on assessing nursing performance in administering medications focus on nursing students or new graduates (Solheim, Syvertsen, & Eideb, 2017). Self-assessment and appropriate formative feedback are an essential part of performance review as a motivation to learn and improve clinical performance.

2. Aims and Objectives

2.1. Aim

To test the reliability, utility and acceptability of an evaluation tool for self-assessment, observation and provide feedback on medication administration performance for nurses in the clinical setting.

2.2. Objectives

- To test the reliability of the developed Medication Administration Evaluation and Feedback Tool (MAEFT) in the clinical setting
- To determine acceptability and usability of the MAEFT according to staff post-evaluation

3. Method

3.1. Design

The study design was a reliability and agreement study to test the inter-rater reliability of the MAEFT in the clinical setting by two trained nurses observing the same nurses' medication administration practice at the same time. A sample size of 30 achieves at least 80% power at a significance level of 0.05 to detect a true Kappa value of 0.70 compared to a test value of 0.30 when the proportions in each of three categories are 0.60, 0.15 and 0.25; these proportions are consistent with those observed in the inter-rater reliability simulation study (Davies, Coombes, Keogh, Hay et al., 2019). The authors have used the Guidelines for Reporting Reliability and Agreement Studies (GRRAS) Checklist from EQUATOR Research Reporting Checklists in preparation of the manuscript (Kottner et al., 2011).

3.2. Ethics

This study received ethics approval from the Human Research Ethics Committee, in accordance with the National Health and Medical Research Council's (NHMRC) (National Statement on Ethical Conduct in Human Research 2007), HREC/17/QRBW/402 on 14th August 2017.

3.3. Participants and Setting

Participants for the inter-rater reliability testing were a convenience sample of volunteer nursing/midwifery staff from clinical areas who expressed interest in participating (See Fig. 1) schematic diagram for methods used for MAEFT design, reliability testing in a simulated environment and this study testing inter-rater reliability in the clinical environment.

3.4. Data Collection

The MAEFT contains 22 criteria to evaluate nurses' medication administration practice. This includes 11 clinical steps to ensure the correct medicine is given to the right patient. These are based on the five rights for prescribing and administering medications: right patient, drug, dose, route and time. The addition of the clinician's or patient's right to refuse or question an order is also included (Queensland Health, 2015). There are 11 procedural steps associated with medication administration. These are: hand hygiene, aseptic technique, administration technique, labelling, checking technique, conducting patient assessment, engaging the patient and documentation. The clinical and procedural steps are then broken down into observable and measurable behaviours (Ten Cate & Billett, 2014). See Table 1. for details of all 22 criteria. All data collected were de-identified and entered into the University of Queensland hosted Vanderbilt University designed web-based software Research Electronic Data Capture (REDcap) version 8.5.0. (Harris et al., 2009).

3.5. Inter-rater Reliability

To test the inter-rater reliability of the MAEFT, 30 nurses were observed by two pairs of senior nurse observers over a four-week period in May/June 2018. Each pair observed a variety of routes and types of medications, including oral, subcutaneous, intravenous, umbilical and controlled drugs in order to cover all components of medication administration practice.

3.6. Acceptability and Usability

Nurses and observers completed post-observation survey evaluations which were used to assess the acceptability and usability of the MAEFT. The survey was adapted from a feedback tool used to evaluate pharmacists' views on the adapted competency-based General Level Framework which is designed to evaluate pharmacists' performance, provide tailored feedback and training, and inform professional development (Coombes et al., 2010).

3.7. Consent

Volunteers agreeing to be observed using the MAEFT were consented through informed consent sessions conducted face to face with staff with posters, a standardised presentation, participant information sheets and consent forms.

3.8. Prebriefing

Ninety minute training sessions were conducted with consented observers using a PowerPoint presentation and eight simulation-based experience (SBE) digital recordings of nurses administering medications were used to practise using the MAEFT. Nurses volunteering to be observed had a one-on-one catch up with the researcher on a day prior to the observation. The nurses were provided with a copy of the MAEFT and asked to reflect on their usual practice and self-assess their own practice prior to being observed administering medications.

3.9. Procedure

Prior to the observation, dialogue between the nurse and the evaluator took place to allow the evaluator to make an assessment of whether the nurse had taken into consideration individual patient criteria to ensure the medication had been administered safely. The observer checked the patient details and medication order before observing the nurse administer the medication.

Evaluation with the MAEFT was achieved by the observer standing close to the nurse being observed and checking the medications were correct. This was done without verbal interaction with the nurse being observed. The five clinical rights and the correct procedure are either administered and conducted correctly or not, yes, no or not applicable. If any criteria not addressed or performed had the potential to result in a medication administration error and or harm to the patient, the observer would intervene and ask the nurse to recheck prior to administration to the patient. If any of the procedural steps were not performed, the nurse was prompted and given every opportunity to identify what needed to be addressed to correct the error. If they were unable to identify the error, the observer discreetly informed them so as not to undermine their confidence and patient relationship.

Any procedural steps not followed that did not lead to potential patient harm, such as performing a two-nurse check or engaging the patient, were discussed with the nurse after the observation had been completed as to the risks and benefits of conducting these to improving safer patient outcomes. If any potential errors were detected, the observer ensured the nurse would follow up with the prescriber for correction and report in the hospital incident reporting system. Any significant high-risk errors or concerns about a nurse's overall medication administration practice was managed following the hospital nursing performance improvement process.

3.10. Data Collected

- The nurse observer's and nurse's demographic data (clinical working area, gender, age, qualifications and years of experience in clinical nursing)
- Self-evaluation by the nurse using the MAEFT before they were observed administering medications
- MAEFT criteria check results from each nurse observer for each nurse observed administering medications
- Feedback from each nurse observer for each nurse observation
- Number of observations, route and types of medications administered
- Post-observation survey evaluation of each nurse and nurse observer on their experience using the MAEFT, both quantitative and qualitative.

3.11. Data Analysis

The data gathered were evaluated to determine the reliability of the developed tool. Of the tool's 22 items, possible ratings for each item were "yes", "no" or "not applicable", coded on a nominal scale from 1-3. Observations were created as combinations of nurses and items. The percentage agreement and Fleiss' kappa were determined using the *kappaetc* command in the Stata statistical software package (version 15). Fleiss' kappa corrects for chance agreement between ratings and is appropriate when there are multiple raters for nominal data (Fleiss, Levin, & Paik, 2004). The evaluation criteria used for the Fleiss' Kappa coefficient was according to the Polit and Beck scale of: Poor= $\kappa < 0.40$; fair= κ 0.40-0.59; good= κ 0.60-0.74; excellent= $\kappa > 0.74$ (Polit & Beck, 2008). The inter-rater reliability was determined overall, for each rater pair, and by route of administration.

Quantitative and qualitative data for acceptability and usability were assessed with the post-evaluation survey. Quantitative results were scored on a five-point Likert scale from 1 (negative) to 5 (positive) for each question. The higher the total score, the more acceptable the use of the MAEFT was considered. Thematic analysis was conducted for qualitative data assessing for emerging themes and common threads.

4. Results

Thirty nurses were observed administering medications via a single route to one patient on one occasion, totalling 30 episodes. The MAEFT has 22 criteria resulting in a total of 660 criteria assessed for the 30 nurses.

4.1. Demographics

Observers were typical of a representative population of experienced nurses in nurse educator and clinical nurse consultant roles. All were female with the majority aged 30 to 40 years. All were Registered General Nurses with either undergraduate or postgraduate Bachelor of Nursing degrees, half had a Master's in Nursing. The number of years experience as a Registered Nurse ranged from 10 to 40 years.

Nurses observed were a typical cohort of clinical nurses. All volunteers were female with the majority between 20 to 30 years of age, one third were 30 to 40 years of age with the remaining between 40 to 60 years. All were Registered General Nurses except for two who were Enrolled Nurses and three held an additional Midwife Endorsement. All held academic qualifications corresponding to their endorsement with only one master's qualification, however ten held additional certificates or diplomas. For details of both observer and nurse demographics see Supplementary File 1 and 2.

4.2. Inter-rater Reliability and Agreement

Inter-rater reliability percentage agreement and Fleiss' Kappa results for all 30 nurse-observer pairs from both clinical areas, the two pairs of 15 nurse-observer pairs from each clinical area, and

Table 2
Inter-rater Reliability Percentage Agreement and Fleiss' Kappa (n = 30).

Comparison	Detail	Percent agreement				Fleiss' Kappa			
		Expected due to chance	Observed	95% CI		kappa	95% CI		*Evaluation
All	30 nurse-observer pairs	0.58	0.90	0.88	0.93	0.77	0.71	0.82	Excellent
Pair1	15 nurse-observer pairs	0.57	0.91	0.88	0.94	0.79	0.72	0.86	Excellent
Pair2	15 nurse-observer pairs	0.60	0.90	0.86	0.93	0.74	0.66	0.82	Good
Oral[a]	2 nurse-observer pairs	0.57	0.95	0.89	1.00	0.90	0.75	1.00	Excellent
NG[b]	13 nurse-observer pairs	0.58	0.91	0.87	0.94	0.78	0.70	0.86	Excellent
Subcut[c]	5 nurse-observer pairs	0.52	0.90	0.84	0.96	0.79	0.67	0.91	Excellent
IV[d]	5 nurse-observer pairs	0.60	0.89	0.83	0.95	0.72	0.58	0.87	Good
CD[e]	3 nurse-observer pairs	0.69	0.95	0.90	1.00	0.85	0.69	1.00	Excellent
UA[f]	2 nurse-observer pairs	0.58	0.77	0.64	0.90	0.46	0.17	0.74	Fair

Route or type of medication a. oral, b. nasogastric, c. subcutaneous, d. intravenous, e. controlled drug,
f. umbilical arterial
* Fleiss' Kappa coefficient Agreement Evaluation Criteria:
Poor= κ < 0.40; fair= κ 0.40-0.59; good= κ 0.60-0.74; excellent= κ > 0.74

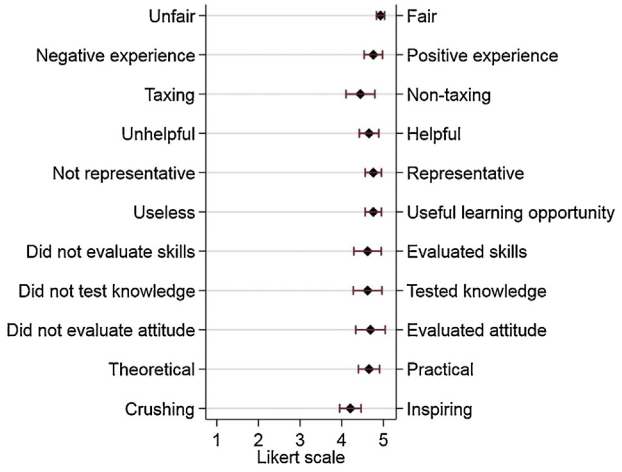

Fig. 2. Nurse Clinical Evaluation Survey Results (mean and 95% confidence intervals) n = 29.

for each individual route are shown in Table 2. The percentage agreement observed was 0.90 (95% CI: 0.88-0.93) and the inter-rater reliability overall Fleiss' kappa was 0.77 (95% CI: 0.71-0.82) giving a rating of excellent. Pair one evaluation agreement was excellent, and pair two had good agreement rating. Agreement for oral and subcutaneous routes were excellent as were controlled drug administrations. Intravenous route agreements were good with the two observations of the umbilical route evaluating as fair agreement.

4.3. Acceptability and Usability Nurse Evaluation Survey

Nurse clinical evaluation survey results are shown in Fig. 2. For full details see Supplementary File 3. Acceptability using the MAEFT showed that nurses found the process and experience positive and that it was useful in evaluation of nursing medication administration practice. Most agreed it evaluated their skills, knowledge and attitude of their medication administration practice and reflected what they usually did on the ward. Two rated low on evaluation of their attitude.

4.4. Qualitative Nurse Evaluation Survey

Qualitative feedback from the nurses being observed were predominantly positive. Themes were: that the process encouraged them to reflect on their practice and highlighted areas for improvement; "*receiving feedback at the end and being made aware of certain aspects they were unsure of*," "*in order to provide safer patient care*"; positive feedback proved they were doing things correctly. It gave them the opportunity to update with hospital policy versus ward culture and practice. That the process was "*very comfortable, non-intimidating and timely*," "*simple, no pressure, comfortable, positive, interesting, very helpful, super easy and grateful for the opportunity.*" "*Very good process. Made me much more aware of the process to follow.*" One nurse commented that "*they had two patients say they like that we practice safe medication administration*." Aspects they least enjoyed were; being nervous, particularly with multiple observers present.

4.5. Observer Evaluation Survey

Observer clinical evaluation survey results are shown in Fig. 3. For full details see Supplementary File 4. Acceptability using the MAEFT showed all observers found the process fair and the experience positive, however, one observer found the process taxing. Most of the observers found it useful in evaluation of nursing medication administration practice and reflected what the nurse usually did on the ward. All agreed it evaluated the nurse's skills, while most agreed it evaluated the nurse's knowledge and attitude of their medication administration practice.

4.6. Qualitative Observer Evaluation Survey

Qualitative feedback from the observers were mostly positive. Some of the aspects of the process they most enjoyed were: "*Observing clinical practice and providing feedback one on one for staff with a broad range of experience.*"; "*Identifying common practices and reiterating to staff correct procedures.*"; "*An opportunity to review practice and see areas of opportunity for example, gloving for nasogastric tube administration.*"; "*Thank you for involving the work area - thoroughly enjoyed the process.*"

Areas of the evaluation feedback process they least enjoyed were around the difficulty scheduling two observers with the nurses rostered shift, particularly in the neonatal intensive care environment where patient acuity was high. There were times when either the nurse or the observer was called to attend an emergency just prior to observation and rescheduling was required.

5. Discussion

The aim of the study was to evaluate reliability and acceptability of the MAEFT in the clinical setting and there was a positive outcome for both. When conducting observations, medication orders and medications were checked and confirmed prior to administration to ensure the patient received the correct medication and

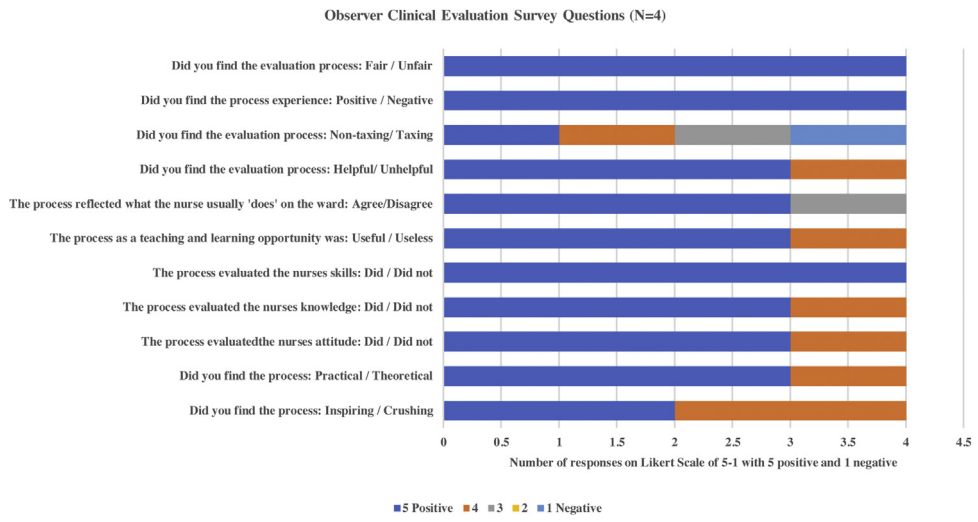

Fig. 3. Observer Clinical Evaluation Survey Results.

there was no harm. If the nurse required prompting to recheck the process it was documented as the criteria not being met.

The practical relevance of a valid and reliable MAEFT is that it encompasses the principles of adult learning where a collaborative approach of self-regulation combined with assessment can drive learning (Kaufman, 2003). Observation of clinical performance with the MAEFT is commensurate to evaluations being used by pharmacists with the General Level Framework (Stacey, Coombes, Cardiff, Wainwright, & Whitfield, 2015). Importantly, the MAEFT is aligned with the principles within the framework for assessing nurses' standards of practice in Australia (Nursing & Midwifery Board of Australia, 2015). The five key principles applied when assessing standards of practice include accountability, performance-based, evidence-based, validity and reliability, participation and collaboration. Key elements in the model for assessment include self-assessment, observation, interviewing skills of the observer, documentation of evidence, validity that the assessment meets the intended outcomes, reliability that the process is consistent and accurate, and that it is based on a participative and collaborative relationship. The MAEFT is an evaluation tool that can be used within this framework specifically to support the assessment process of medication administration standards of clinical practice.

5.1. Inter-rater Reliability

The first objective of this study was to test the reliability of the developed MAEFT in a clinical environment. Although reliability of the tool had been demonstrated in a fixed scenario simulated environment, it was important to determine clinical relevance when used by different raters and these results could be generalised to different raters in any setting (Hallgren, 2012). By testing in an adult inpatient ward and neonatal intensive care unit, the results showed that the MAEFT was reliable when used with adults, with paediatrics, in a ward and in an intensive care environment. Practically, reliability of the MAEFT could be generalised to different raters in different settings. It could be used for any nurse to administer medications at any stage of their professional career to evaluate and provide feedback on how safely they administered medications.

5.2. Acceptability and Usability

When translating research into practice it is vital that it is not only reliable and valid but practical, user friendly and acceptable to end users (Curtis, Fry, Shaban, & Considine, 2017). Evaluation survey results show that whilst most nurses and observers found the process positive, useful and practical there was a spread of responses on whether they found it taxing or non-taxing. This was similar to the findings of when a tool was evaluated for ward based clinical pharmacy performance evaluation and feedback (Coombes et al., 2010).

5.3. Limitations

All participants of this study were from the one hospital. To counter this, two different settings, an adult ward and a paediatric intensive care unit were chosen to test the MAEFT. The nurses were a convenience sample of volunteers from the nominated areas and therefore may have had a higher standard of practice as they were aware, they were being observed and assessed. The MAEFT is designed for self-assessment by the nurse using the evaluation criteria, to reflect on their practice. This reminds them of the expected standards of practice and would lead to more criteria being met.

5.4. Further Research

For research implementation to be successful, it is necessary to determine if clinician behaviour has changed. To do this, further study evaluating the impact of using the MAEFT has on practice is required. A pilot with follow up evaluation of nurses' medication administration practice has been completed.

6. Conclusion

The study demonstrated the inter-rater reliability, acceptability and usability of the MAEFT in the clinical setting, and as such it has the potential to standardise the way medication administration practice is assessed. By providing a reliable and valid generic tool with clinical and procedural criteria for safe medication administration by nurses, the MAEFT has the ability to assess compliance to safe medication administration practice standards for individuals and organisations. As part of an established and proven observation and feedback process the MAEFT is a reliable tool for both assessment and professional development in relation to nursing medication administration. As a result, the risk of harm to patients from avoidable medication errors could be minimised.

Ethical Statement

This study was granted low risk ethical approval by the Royal Brisbane and Women's Hospital Human Research Ethics Committee, in accordance with the National Health and Medical Research Council's (NHMRC) (National Statement on Ethical Conduct in Human Research 2007), on the 17th August 2017. The HREC reference is HREC/17/QRBW/402.

Conflict of interest

None.

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Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at https://doi.org/10.1016/j.colegn.2020.10.001.

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