Chelonian Conservation And Biology

Vol. 17No.2 (2022) | https://www.acgpublishing.com/ | ISSN - 1071-8443

DOI:doi.org/10.18011/2022.04(1) 1522.1530

MEDICATION ADMINISTRATION TIME STUDY (MATS): HEALTH PROFESSIONALS PERFORMANCE OF MEDICATION ADMINISTRATION

Waleed Ashawy Alshammari 1, Salah Asmair Alharbi 2, Amer Maseer Aldhafeeri 3, Mohammad Owaid Aldhafeeri 4, Sultan Abdullah Alharbi 5, Waleed Owaid Aldhafeeri 6

1. Pharmacy Technician, 2. Pharmacy Technician, 3. Technician Nursing, 4. Pharmacy Technician, 5. Dental Assistant, 6. Health Care Administration

Abstract

Medication administration is a critical component of patient care that requires precision, attention to detail, and adherence to established protocols. Errors in medication administration can lead to adverse patient outcomes, increased healthcare costs, and legal liabilities. This study aims to investigate the performance of health professionals in medication administration and identify factors that influence the time taken to complete the process. The Medication Administration Time Study (MATS) employed a cross-sectional observational design to collect data from a sample of health professionals across various healthcare settings. Participants were observed during medication administration rounds, and data on time taken, interruptions, distractions, and adherence to protocols were recorded. The findings revealed significant variations in medication administration times among health professionals, with factors such as experience, workload, and work environment contributing to the observed differences. The study highlights the need for targeted interventions to improve medication administration efficiency and reduce the risk of errors. Recommendations include the implementation of standardized protocols, enhanced training programs, and the use of technology to support medication administration processes. The insights gained from this study can inform policy and practice changes to enhance patient safety and optimize healthcare delivery.

Keywords: medication administration, health professionals, time study, patient safety, healthcare quality

Introduction

Medication administration is a fundamental aspect of healthcare delivery that directly impacts patient safety and outcomes. Health professionals, including nurses, pharmacists, and other allied health workers, play a crucial role in ensuring the accurate and timely administration of

ıian Conservation and BiologyarelicensedunderaCreativeCommonsAttribution-lLicenseBasedonaworkathttps://www.acgpublishing.com/

medications to patients. However, the process of medication administration is complex and prone to errors, which can have serious consequences for patients, healthcare organizations, and society as a whole.

Medication errors are a significant concern in healthcare, with an estimated 7,000 to 9,000 patients dying annually in the United States due to such errors (Makary & Daniel, 2016). These errors can occur at various stages of the medication use process, including prescribing, dispensing, and administration. Medication administration errors (MAEs) are particularly problematic, as they occur at the point of patient contact and can directly harm patients. MAEs can include administering the wrong medication, dose, route, or time, as well as omitting or duplicating doses (Keers et al., 2013).

Several factors contribute to the occurrence of MAEs, including workload, distractions, interruptions, and inadequate knowledge or skills (Westbrook et al., 2010). The time taken to administer medications is another critical factor that can influence the risk of errors. Longer administration times may indicate a higher level of complexity or the presence of barriers that hinder the efficient completion of the task. Understanding the factors that influence medication administration time is essential for developing targeted interventions to improve the safety and efficiency of the process.

The Medication Administration Time Study (MATS) aims to investigate the performance of health professionals in medication administration and identify factors that influence the time taken to complete the process. By collecting data on medication administration times, interruptions, distractions, and adherence to protocols, this study seeks to provide insights into the challenges faced by health professionals and inform the development of strategies to enhance medication safety and optimize healthcare delivery.

Literature Review

Medication administration is a complex process that involves multiple steps and requires collaboration among various healthcare professionals. The Institute for Safe Medication Practices (ISMP) has identified several key elements of safe medication administration, including patient identification, medication verification, dose calculation, and documentation (ISMP, 2018). Adherence to these elements is critical for reducing the risk of MAEs and ensuring patient safety.

Despite the importance of safe medication administration, MAEs remain a significant problem in healthcare. A systematic review by Keers et al. (2013) found that the median MAE rate across studies was 19.6% of total opportunities for error. The most common types of MAEs were wrong time, omission, and wrong dose errors. The review also identified several contributory factors to MAEs, including inadequate staffing, high workload, distractions, and interruptions.

The impact of interruptions and distractions on medication administration has been well documented in the literature. A study by Westbrook et al. (2010) found that each interruption

was associated with a 12.1% increase in procedural failures and a 12.7% increase in clinical errors during medication administration. The authors concluded that reducing interruptions and distractions during medication administration could significantly improve patient safety.

Workload and staffing levels have also been identified as key factors influencing medication administration times and the risk of errors. A study by Jennings et al. (2011) found that nurses who reported a higher workload were more likely to report MAEs. Similarly, a study by Patrician et al. (2011) found that higher nurse staffing levels were associated with fewer MAEs and shorter medication administration times.

The use of technology has been proposed as a potential solution to improve medication administration safety and efficiency. Electronic medication administration records (eMARs) and barcode medication administration (BCMA) systems have been shown to reduce the risk of MAEs and improve documentation (Poon et al., 2010). However, the implementation of these technologies can also introduce new challenges, such as alert fatigue and workarounds (Koppel et al., 2008).

Despite the growing body of research on medication administration safety, there is a need for further studies to investigate the specific factors that influence medication administration times and the performance of health professionals in different healthcare settings. The MATS study aims to address this gap in the literature by collecting data on medication administration times and identifying factors that contribute to variations in performance among health professionals.

Methods

Study Design

The Medication Administration Time Study (MATS) employed a cross-sectional observational design to investigate the performance of health professionals in medication administration. The study was conducted across multiple healthcare settings, including hospitals, long-term care facilities, and outpatient clinics, to capture a diverse range of medication administration practices and contexts.

Sample and Setting

A convenience sample of health professionals, including nurses, pharmacists, and other allied health workers, was recruited from participating healthcare organizations. Inclusion criteria for participants were: (a) licensed health professionals, (b) involved in direct patient care, and (c) responsible for administering medications as part of their job duties. Exclusion criteria included: (a) health professionals not involved in direct patient care, and (b) those who did not administer medications as part of their job duties.

The study aimed to recruit a minimum of 100 participants across different healthcare settings to ensure adequate representation of various medication administration practices and contexts. The

sample size was determined based on previous studies investigating medication administration times and the feasibility of data collection within the study timeframe.

Data Collection

Data were collected through direct observation of health professionals during medication administration rounds. Trained observers, who were familiar with medication administration procedures and protocols, accompanied participants during their scheduled medication administration rounds and recorded data using a standardized observation tool.

The observation tool was developed based on a review of the literature and input from experts in medication safety and administration. The tool included sections for recording: (a) participant demographic information, (b) medication administration details (e.g., medication name, dose, route, and time), (c) interruptions and distractions encountered during the administration process, and (d) adherence to medication administration protocols (e.g., patient identification, medication verification, and documentation).

Observers recorded the start and end times of each medication administration episode, as well as any interruptions or distractions that occurred during the process. Interruptions were defined as any event that required the participant to stop the medication administration process and attend to another task or person. Distractions were defined as any event or stimulus that diverted the participant's attention away from the medication administration process but did not require them to stop the task.

In addition to the observational data, participants completed a brief questionnaire that collected information on their demographic characteristics, work experience, and perceived workload during the observed medication administration rounds.

Data Analysis

Data were analyzed using descriptive and inferential statistics. Descriptive statistics, including means, standard deviations, and frequencies, were used to summarize participant characteristics, medication administration times, interruptions, distractions, and adherence to protocols.

Inferential statistics were used to examine the relationships between participant characteristics, work factors, and medication administration times. Independent samples t-tests and one-way analysis of variance (ANOVA) were used to compare medication administration times across different groups (e.g., professional roles, healthcare settings, and levels of experience). Pearson's correlation coefficients were calculated to assess the associations between continuous variables, such as perceived workload and medication administration times.

Multiple linear regression analysis was conducted to identify the factors that predicted medication administration times. The dependent variable was the average medication administration time per participant, and the independent variables included participant

characteristics (e.g., professional role, experience, and workload), interruptions, distractions, and adherence to protocols.

All statistical analyses were performed using SPSS version 26.0 (IBM Corp., Armonk, NY). A p-value of less than 0.05 was considered statistically significant.

Ethical Considerations

The study was approved by the Institutional Review Board (IRB) of the sponsoring institution. All participants provided written informed consent prior to data collection. Participant confidentiality was maintained by assigning unique identification numbers to each participant and storing study data in secure, password-protected electronic files. Only the research team had access to the study data.

Results

Participant Characteristics

A total of 120 health professionals participated in the study, including 80 nurses (66.7%), 25 pharmacists (20.8%), and 15 other allied health workers (12.5%). The mean age of participants was 35.6 years (SD = 9.2), and the majority were female (n = 95, 79.2%). Participants had an average of 10.5 years (SD = 8.1) of professional experience and had been working in their current role for an average of 5.2 years (SD = 4.6).

Medication Administration Times

The average medication administration time per participant was 7.8 minutes (SD = 3.2). Nurses had the longest average medication administration time (M = 8.5 minutes, SD = 3.4), followed by pharmacists (M = 7.1 minutes, SD = 2.8) and other allied health workers (M = 6.2 minutes, SD = 2.3). The difference in medication administration times across professional roles was statistically significant ($F(2, 117) = 4.6$, $p = .012$).

Participants in hospital settings had longer average medication administration times (M = 8.4 minutes, SD = 3.5) compared to those in long-term care facilities (M = 7.2 minutes, SD = 2.9) and outpatient clinics (M = 6.8 minutes, SD = 2.6). However, the difference in medication administration times across healthcare settings was not statistically significant ($F(2, 117) = 2.8$, $p = .064$).

Interruptions and Distractions

A total of 325 interruptions and 468 distractions were observed during the study period. The average number of interruptions per participant was 2.7 (SD = 1.8), and the average number of distractions was 3.9 (SD = 2.3). Nurses experienced the highest number of interruptions (M = 3.2, SD = 1.9) and distractions (M = 4.5, SD = 2.4) compared to pharmacists (interruptions: M = 2.1, SD = 1.5; distractions: M = 3.2, SD = 2.1) and other allied health workers (interruptions: M = 1.8, SD = 1.3; distractions: M = 2.7, SD = 1.8).

The most common sources of interruptions were phone calls (n = 85, 26.2%), followed by patient requests (n = 72, 22.2%) and other staff members (n = 68, 20.9%). The most common sources of distractions were conversations (n = 112, 23.9%), followed by environmental noise (n = 98, 20.9%) and patient monitoring devices (n = 87, 18.6%).

Adherence to Protocols

Overall, adherence to medication administration protocols was high, with participants correctly identifying patients (98.3%), verifying medications (96.7%), and documenting the administration (95.0%). However, adherence to hand hygiene protocols was lower, with participants performing hand hygiene before medication administration in only 82.5% of observed episodes.

Factors Influencing Medication Administration Times

Multiple linear regression analysis identified several factors that significantly predicted medication administration times. The final model included the following variables: professional role, number of interruptions, number of distractions, and adherence to hand hygiene protocols (Table 1).

Compared to nurses, pharmacists ($\beta = -0.18$, $p = .026$) and other allied health workers ($\beta = -0.21$, $p = .011$) had significantly shorter medication administration times. Each additional interruption was associated with a 0.42-minute increase in medication administration time ($\beta = 0.24$, $p = .003$), while each additional distraction was associated with a 0.28-minute increase ($\beta = 0.20$, $p = .012$). Adherence to hand hygiene protocols was associated with a 1.12-minute decrease in medication administration time ($\beta = -0.16$, $p = .037$).

The model explained 28.3% of the variance in medication administration times (adjusted $R2 = .283$, $F(4, 115) = 12.1$, $p < .001$).

Discussion

The findings of the Medication Administration Time Study (MATS) provide valuable insights into the performance of health professionals in medication administration and the factors that influence the time taken to complete the process. The study highlights the significant variations in medication administration times among health professionals, with nurses having the longest average times compared to pharmacists and other allied health workers.

The observed differences in medication administration times across professional roles may be attributed to several factors, including the complexity of the medications administered, the number of patients assigned to each professional, and the specific responsibilities associated with each role. Nurses, who are often responsible for administering a wide range of medications to multiple patients, may face a higher level of complexity and workload compared to pharmacists and other allied health workers.

The study also identified interruptions and distractions as significant predictors of medication administration times. Each additional interruption and distraction was associated with an increase in administration time, highlighting the need for strategies to minimize these disruptions during the medication administration process. Previous research has shown that interruptions and distractions can increase the risk of medication errors and compromise patient safety (Westbrook et al., 2010). Implementing measures such as designated quiet zones, no-interruption policies, and staff education on the importance of minimizing disruptions can help to reduce the impact of interruptions and distractions on medication administration times and safety.

Adherence to medication administration protocols, particularly hand hygiene, was found to be associated with shorter medication administration times. This finding suggests that following established protocols not only enhances patient safety but also contributes to the efficiency of the medication administration process. Encouraging consistent adherence to protocols through regular training, monitoring, and feedback can help to optimize medication administration times and reduce the risk of errors.

The study's findings have important implications for healthcare organizations seeking to improve the safety and efficiency of medication administration. Implementing targeted interventions, such as staffing strategies that consider the workload and complexity of medication administration tasks, can help to ensure that health professionals have adequate time and resources to complete the process safely. Additionally, investing in technology solutions, such as electronic medication administration records and barcode medication administration systems, can help to streamline the medication administration process and reduce the risk of errors (Poon et al., 2010).

Limitations and Future Research

The MATS study has several limitations that should be considered when interpreting the findings. First, the study used a convenience sample of health professionals from a limited number of healthcare settings, which may limit the generalizability of the results. Future research should aim to include a more diverse sample of health professionals and healthcare settings to provide a more comprehensive understanding of medication administration practices.

Second, the study relied on direct observation to collect data on medication administration times, interruptions, and distractions. While this method provides valuable insights into the actual performance of health professionals, it may also introduce observer bias and influence participant behavior. Future studies could consider using alternative data collection methods, such as video recording or self-reporting, to minimize the impact of observer presence on participant performance.

Third, the study did not assess the clinical outcomes associated with variations in medication administration times or the occurrence of medication errors. Future research should investigate the relationship between medication administration times, interruptions, distractions, and patient

outcomes to provide a more comprehensive understanding of the impact of these factors on patient safety and healthcare quality.

Conclusion

The Medication Administration Time Study (MATS) provides valuable insights into the performance of health professionals in medication administration and the factors that influence the time taken to complete the process. The study highlights the significant variations in medication administration times among health professionals and identifies interruptions, distractions, and adherence to protocols as key predictors of administration times.

The findings underscore the need for targeted interventions to improve the safety and efficiency of medication administration, such as staffing strategies that consider workload and complexity, measures to minimize interruptions and distractions, and initiatives to promote adherence to established protocols.

References

Institute for Safe Medication Practices. (2018). ISMP medication safety self assessment for hospitals. https://www.ismp.org/assessments/hospitals

Jennings, B. M., Sandelowski, M., & Mark, B. (2011). The nurse's medication day. Qualitative Health Research, 21(10), 1441-1451. https://doi.org/10.1177/1049732311411927

Keers, R. N., Williams, S. D., Cooke, J., & Ashcroft, D. M. (2013). Prevalence and nature of medication administration errors in health care settings: A systematic review of direct observational evidence. The Annals of Pharmacotherapy, 47(2), 237-256. https://doi.org/10.1345/aph.1R147

Koppel, R., Wetterneck, T., Telles, J. L., & Karsh, B. T. (2008). Workarounds to barcode medication administration systems: Their occurrences, causes, and threats to patient safety. Journal of the American Medical Informatics Association, 15(4), 408-423. https://doi.org/10.1197/jamia.M2616

Makary, M. A., & Daniel, M. (2016). Medical error-the third leading cause of death in the US. BMJ, 353, i2139. https://doi.org/10.1136/bmj.i2139

Patrician, P. A., Loan, L., McCarthy, M., Fridman, M., Donaldson, N., Bingham, M., & Brosch, L. R. (2011). The association of shift-level nurse staffing with adverse patient events. The Journal of Nursing Administration, 41(2), 64-70. https://doi.org/10.1097/NNA.0b013e31820594bf

Poon, E. G., Keohane, C. A., Yoon, C. S., Ditmore, M., Bane, A., Levtzion-Korach, O., Moniz, T., Rothschild, J. M., Kachalia, A. B., Hayes, J., Churchill, W. W., Lipsitz, S., Whittemore, A. D., Bates, D. W., & Gandhi, T. K. (2010). Effect of bar-code technology on the safety of

medication administration. The New England Journal of Medicine, 362(18), 1698-1707. https://doi.org/10.1056/NEJMsa0907115

Westbrook, J. I., Woods, A., Rob, M. I., Dunsmuir, W. T., & Day, R. O. (2010). Association of interruptions with an increased risk and severity of medication administration errors. Archives of Internal Medicine, 170(8), 683-690.