Impact of automated pharmacy distribution systems on missed medication doses and nursing staff time

Daniel Gregg[1], Rowena Dixon[1]

[1]Central Adelaide Local Health Network; SA Pharmacy, Government of South Australia, Adelaide, SA.

Background

- Automated Dispensing Cabinets (ADC'S) have been included in each wing since the inception of the New Royal Adelaide Hospital (RAH).
- These systems have been implemented to replace previous hospital imprest schemes for access to medications within the wards.
- The cabinets have demonstrated:
  - To improve stocking and inventory control of medications on wards.[1]
  - Safety with reduced number medication administration errors.[2]
- Little has been studied regarding the efficiency of ADC's in reducing medication administration time.
- It is hypothesized that ADC's will reduce time for medication administration, thus freeing up more time for patient-centered care.

Aims

- To assess the impact of using an automated dispensing cabinet on time for nurses to complete inpatient medication administration compared to previous practices

Methods

Inclusion Criteria
- Inpatient ward based nursing staff at the new RAH

Exclusion Criteria
- Nursing staff from outpatient areas or clinics

Recruitment
- 2 medical and 2 surgical wards randomly selected for observation
- Approval sought from Nursing Co-Directors for staff participation

Data to be collected
- Ward
- Date
- Total number of medications
- Total time required to source patient medication

- Number of injectable drugs
- Number of second checks
- Number of drugs of dependence (DDA)
- Number of medications stored outside of ADC
- Number of medications stored in ADC
- Number of medications not available

- Time for medications not available to be sourced is excluded

Assessment
- The data gathered is to be compared to timings from:
  - Old RAH Pre-ADC implementation
  - Old RAH Post-ADC implementation (introduced to a single ward)

Results

- A total of 586 medications were collected for 121 patients

	Pre-ADC old RAH	Post-ADC old RAH	Post-ADC new RAH
Total No. of Medications	671	488	586
No. of Injectables	64 (9.54%)	76 (15.57%)	63 (10.75%)
No. of 2nd Checks	167 (24.89%)	97 (19.88%)	91 (15.53%)
No. of DDA's	71 (10.58%)	21 (4.3%)	31 (5.29%)
No. of medications not in imprest/outside of ADC	357 (53.20%)	43 (8.1%)	59 (10.07%)
No. of medications on imprest/inside ADC	284 (42.32%)	445 (91.19%)	505 (86.18%)
No. of medications N/A	30 (4.47%)	3 (0.61%)	*31 (5.29%)
Total Collections	200	95	121
Mean Meds per Collection	3.36	5.14	4.84
Mean time per collection (seconds)	224.80 (3 mins 44 secs)	295.44 (4 mins 55 secs)	213.93 (3 mins 33 secs)
Mean time per medication (seconds)	67.00 (1 mins 07 secs)	57.51 (0 mins 58 secs)	44.12 (0 mins 44 secs)

* Of the unavailable medications, 48% (15) were medications that were normally stored in the ADC but had zero stock at time of data collection.

Discussion

- There has been a demonstrated decrease in time for administration from pre-ADC implementation of 1 minute 07 seconds per medication to post-ADC implementation of 0 minutes and 44 seconds, providing evidence that ADC's potentially increase efficacy and save time for other patient related tasks.
- The Pre-ADC timings consisted of a greater proportion of DDA's (10.58% vs 5.29%) and 2nd check medications (24.89% vs 15.53%) which could potentially confound results.
- At the new RAH, there appears to be greater number of medications available on ward imprest (42.2% vs 86.18%) compared to previous practices. This in turn may minimize delay in medication dosing and decrease strain on hospital inpatient pharmacy service.
- Despite there being a greater proportion of medications on imprest, the Post-ADC data shows that there was a greater proportion of medication not available (5.29%) versus the Pre-ADC data (4.47%). However of these medication not available, 48% were medications that were stored in the ADC under normal conditions, but had zero stock during the data collection period. This highlights the need to optimise ADC stock levels.

Limitations

- The study was not conducted in a a completely controlled environment e.g. different nursing staff timed, variability in types of medications used, different hospital/ward environment.

Conclusion

- The implementation of ADC's could potentially decrease the time for nurses to administer medications too patients, which may free up more time to perform other patient-centred tasks.

References

[1]Grissinger, M. (2012). Safeguards for using and designing automated dispensing cabinets. *Pharmacy and Therapeutics*, 37(9), pp.490-491.
[2]Fanning, L., Jones, N. and Manias, E. (2015). Impact of automated dispensing cabinets on medication selection and preparation error rates in an emergency department: a prospective and direct observational before-and-after study. *Journal of Evaluation in Clinical Practice*, 22(2), pp.156-163.