How social care staff working in residential homes perceive their professional status

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Title: The role of barcode technology in reducing medication administration errors in care homes

Background

The present study, conducted between January 2008 and December 2010 by a research team at the University of the West of England, Bristol and Warwick Medical School, evaluated the impact upon medication administration of a pharmacy-led barcode medication management system (PBMS), in the care home setting (with or without on-site registered nursing staff). This system self generates automatic real-time alerts to draw the medication administrator's attention to inappropriate or unsafe attempts to administer drugs. A hand-held device holds data on the resident and the prescribed medication. The medication administrator uses the device to scan each resident's barcode identifier to access the correct file. The system provides visual confirmation of the resident (photograph) and then carries out a number of checks to ensure the following are correct: medication, time, dose, quantity and date. If the proposed drug administration is incorrect, the system alerts the medication administrator immediately. At the end of each week a report is sent to the care home manager with details of any potential mistakes and the identity of members of staff involved. Where administration of a particular medicine within the correct time frame is entirely missed, the system enters this as a 'missing record'.

Literature Review

The need to improve safety in the management of medication in care homes has been identified by several authors (Furniss 2002, Simonson and Feinberg 2005, Snowdon *et al* 2006). In England, over 18,000 homes currently provide care for more than 453,000 residents. Six out of ten residents are cared for in a residential home with no on-site nursing staff. Despite a sizeable investment in education to improve the qualifications of care workers, 45% of all care homes in England have been described as failing to meet required standards in their medication systems (Commission for Social Care Inspection 2006).

Medication errors can occur in the prescribing, dispensing and administration of medicines, all of which can have serious consequences and are invariably preventable (Department of Health 2003, Gurwitz *et al* 2000). Up to 35% of older people in the community may experience such (adverse medication events each year (Hanlon *et al* 1997). In a more recent UK study in 55 care homes, 70% of residents observed in 2 medication rounds had experienced one or more medication errors (Barber *et al* 2009).

Various technological interventions have been undertaken to reduce medication administration errors in healthcare settings with mixed success. Individual studies of the introduction of electronic medication management systems, e.g. in settings such as hospitals, have shown that these can be effective in reducing medication errors and in improving their reporting (Franklin *et al* 2007, Schnipper *et al* 2009). However, although two recent systematic reviews found evidence that the use of such systems can produce improvements in prescribing and dispensing practices, no evidence was provided on the administration of medication (Kaur *et al* 2009, Yourman *et al* 2008). In terms of the impact of barcode medication systems on medication administration errors, another review by Paoletti *et al* (2007) concluded that there is evidence of a reduction in medication administration errors in hospitals, but evidence for care homes is extremely limited

Aim

The overall aim of the study was to explore any impact from the introduction of a new PBMS on:

- staff awareness of medication administration errors,
- staff perceptions of the types of error averted by use of the system,
- staff acceptability of the new system in comparison with that formerly used in the homes, a paper-based medication administration recording (MAR) system.

Methodology

Design

A pre and post intervention design was used in 13 care homes initially entered into the study. Of these, 9 were residential homes (RHs) and 4 were nursing homes (NHs). Study sites included small and large independent care providers from both commercial and 'not for profit' sectors, representing a geographical spread covering the South West, Midlands and North West of England. The homes were rated by the Care Quality Commission as being of a 'good' or a higher standard. All care homes selected used a paper-based MAR system. Ethical approval for the study was obtained from the lead University's Research Ethics Committee.

Materials and methods

All staff administering medication received PBMS training before its introduction. Pre training, a convenience sample of the 13 homes' staff (home managers and care support and nursing staff) completed questionnaires and were interviewed to explore their awareness of errors arising from inappropriate administration of medicines when using their current paper-based MAR system. A further questionnaire was completed and interviews undertaken 12 weeks post training, once staff familiarised themselves with the new system. In the second questionnaire staff were asked to compare the efficacy of the PBMS with their previous paper MAR system, and to describe their comparative experience of the former in terms of benefits and limitations.

Study Participants

A total of 49 staff from the 13 homes, responsible for management and/or administration of medications, completed the pre PBMS survey questionnaire. Post the introduction of PBMS, a total of 40 staff responsible for the management and/or administration of medications completed the second questionnaire from 11 of the care homes (1 NH withdrew and 1 RH failed to comply).

Analysis

The 49 pre PBMS and 40 post PBMS questionnaire data were entered into SPSS 17. Comparison of the pre and post databases enabled the identification of a ***subset*** of 25 staff who had completed both questionnaires across time. Data for this subset were analysed separately in some aspects and then compared with those from the whole sample to improve the reliability of findings for the sample. The qualitative content analysis for data from a total of 43 interviews and 5 focus groups across time was conducted by two researchers, each acting independently in the first instance then coming together to agree the transcripts' themes and sub themes from the review of all comments.

Descriptions of errors

Williams (2007) describes medication errors as those that arise '*when a discrepancy occurs between the drug received by the patient and the drug therapy intended by the prescriber*.' **Common errors,** identified from the literature (Barber *et al 2009*, Young *et al* 2008) were grouped as:

- '*administering error types'* – actual errors where the medication-giver had administered medication incorrectly to the resident
- *'documenting error types'* - those where the medication-giver (or witness) had failed to make a required record of the process of administering medication.

In the present study, a further distinction was made between **common errors** that actually occurred with those that were averted, i.e. where a mistake was being made but it was stopped in time either by the person administering (or another), or by a technological system. These averted errors, known as **near misses,** could include any of the above groups' error types.

Results

Response rates

49 staff responsible for the management and/or administration of medications completed a pre PBMS questionnaire. Following training and introduction of the new system, a total of 40 staff with the same responsibility completed a post PBMS system questionnaire. A same-sample subset comprising 25 staff (8 nurses in 3 NHs and 17 care staff in 4 RHs) completed the pre and post questionnaires. Aside from non-compliance, reasons for the reduced number of subset staff, as compared with total numbers of staff participating pre and post PBMS, included staff turnover and absence due to sick leave.

Awareness of the occurrence of common errors pre and post introduction of PBMS system

The first area of inquiry concerning medication errors was to ascertain the extent of staff awareness of **common medication error** types ('administering' and 'documenting') and those identified as **near misses** occurring within their homes pre-PBMS (when using MAR) and post-PBMS. The results are as follows:

Group 1. Administering error types

In the pre-PBMS questionnaire, staff were asked to indicate from a list of *administering error types*, awareness of their actual occurrence in the home (participants could select one or more error type). As shown in Table 1, the 49 staff indicated awareness of 105 types of error. The error types most subscribed to were: *missing medication altogether* (69% of staff) and *giving medication at the wrong time* (41% of staff). The least frequently subscribed to error type was *administering discontinued medication* (20% of staff). Responses to the same question in the post-PBMS questionnaire showed that staff reported greatly reduced awareness of the occurrence of these grouped errors from pre to post PBMS.

Table 1. Impact on awareness of administering error types pre-PBMS system and potential for error post PBMS introduction ('yes' responses only)

ADMINISTERING ERROR TYPES	PRE PBMS TOTAL STAFF RESPONSES (N = 49) N (%)	POST PBMS TOTAL STAFF RESPONSES (N = 40) N (%)	PRE-PBMS SUBSET (N=25) N (%)	POST-PBMS SUBSET (N=25) N (%)
Medication missed altogether	34 (69)	6 (15)	**17 (68)**	**4 (16)**
Medication given at the wrong time	20 (41)	3 (8)	**9 (36)**	**1 (4)**
Medication given to the wrong resident	15 (31)	2 (5)	**8 (32)**	**2 (8)**
Wrong dosage given	13 (27)	6 (15)	**9 (36)**	**4 (16)**
Wrong medication given	13 (27)	2 (5)	**8 (32)**	**0**
Discontinued medications given	10 (20)	5 (13)	**8 (32)**	**3 (12)**
Total error responses ***Mean error subscriptions per respondent (total population)***	***105*** ***2.1***	***24*** ***0.6***	***59*** ***2.4***	***14*** ***0.6***

Responses from all staff were compared with those obtained from the subset, as shown above. Despite some differences on individual error types at the two points in time, the direction of both sets of data was similar, with a marked reduction of awareness of the occurrence of both individual and overall error types from pre to post introduction of the new system.

Group 2. Documenting error types (pre-PBMS only)

Information on awareness of *documenting error types* was only collected pre PBMS because the new system largely made it impossible to perpetrate such recording errors. Staff were asked, when using the paper-based MAR system, to prioritise occurrence of each listed type of error using a range of 1-7 with 1 = *most common* and 7 = *least common.* The most common of these errors were *not signing for medication* (mean=2.2*), omitting to record reasons for non-administration of medication* (mean 3.2), and *not recording actual amount given for variable dose prescriptions* (mean 3.3). The least common errors were identified as *not recording time given for PRN medications* (mean 4.6), *not*

having changes to the MAR sheet witnessed (mean=4.9*)* and *not booking in supplies* (mean=5).

Awareness of the occurrence of 'near misses' pre and post introduction of PBMS system

When staff were asked if they were aware of any '*near misses', a*s can be seen in Table 2, a higher percentage of all staff were aware of these post introduction of PBMS (75%) than before (29%). The most likely reason for this difference could be because unlike the new system, their paper-based MAR system had no mechanism to alert the perpetrator that they were about to commit an error. Indeed, many errors could occur undetected due to a lack of awareness. In contrast, using alerting technology the attention of the person would have been immediately drawn and the error averted but in addition, the experience would raise awareness of what might have been.

Table 2. Staff awareness of the occurrence of 'near misses' pre and post PBMS system

Are you aware of any near misses in the home?	PRE-PBMS (N %)	POST-PBMS N (%)
Yes	14 (29)	30 (75)
No	30 (61)	9 (23)
Missing entries	5 (10)	1 (3)
TOTAL	***49 (100)***	***40 (100)***

Using the subset of 25 staff who completed both the pre- and post-PBMS questionnaires, a Wilcoxon signed ranks test was carried out to determine the significance or not of the difference in staff awareness of the occurrence of **near misses** pre to post introduction of the new system. As shown in Table 3, this difference was found to be significant with subset staff being more aware of them post introduction of the PBMS than they had been before it ($Z = -3.6$; $p < 0.01$).

Table 3. Subset staff awareness of 'near misses' pre and post PCMS

Are you aware of any 'near misses' in the home?	SUBSET PRE PCMS N (%)	SUBSET POST PCMS (N %)
Yes	**7 (30)**	**20 (83)**
No	**16 (70)**	**4 (17)**
Missing entries	**2 (9)**	**1 (4)**
TOTAL	***25 (100)***	***25 (100)***

Staff perceptions of the impact of the PBMS in averting medication errors

Following the introduction of the new system, staff were asked to indicate types of both groups of common errors that they thought could have occurred if they had not been averted by the use of the PBMS as **near misses**. More than one error type could be selected. As shown in Table 4, of the *administering error types*, approximately half of the staff believed that the new system had averted the giving of *medication at the wrong time, giving the wrong medication* and *omitting to give medication.* Overall, the whole sample and subset means of 2.4 respectively for averted *administering errors* indicated that the new system was perceived as having had a beneficial impact on error reduction by the respective sets of staff.

Table 4. Staff perceptions of *administering error types* averted by PBMS technology

Administering Error Types	POST PBMS ALL STAFF (N = 40) N (%)	POST PBMS SUBSET (N = 25) N (%)
Wrong time	21 (53)	**13 (52)**
Wrong medication	19 (48)	**13 (52)**
Omitting medications	19 (48)	**13 (52)**
Wrong dose	15 (38)	**8 (32)**
Wrong resident	14 (35)	**9 (36)**
Administering discontinued medication	5 (13)	**3 (12)**
Other type of common error	2 (5)	**2 (8)**
Total number of averted errors perceived	*95*	***61***
Mean averted error per respondent of total and subset population	*2.4*	***2.4***

As shown in Table 5, *not signing for medication* was identified as the most frequently averted *documenting error type* (mean 2.2), and *not having changes to the MAR sheet witnessed* (mean=4.9*)* and *booking in supplies* (mean=5) were the least averted. Overall, a slightly higher level of averted errors was observed for the subset from that given for all staff.

Table 5. Staff perceptions of *documenting errors* averted by PBMS technology

Documenting Errors	POST PBMS ALL STAFF (N = 40) N (%)	POST PBMS SUBSET (N = 25) N (%)
Not signing for medications	39 (98)	**24 (96)**
Not recording reasons for non-administration	32 (80)	**21 (84)**
Not recording actual amount given for variable dose prescriptions	27 (68)	**17 (68)**
Not recording time given for PRN medications	23 (58)	**19 (76)**
Not booking in supplies	10 (25)	**9 (36)**
Incorrectly booking in medicines	12 (30)	**10 (40)**
Other type of error of accountability	1 (3)	**0**
Total number of averted errors reported	***144***	***100***
Mean averted error per respondent of total population / subset	***3.6***	***4***

Staff perceptions pre and post PBMS of the importance of medication administration

During interviews and the focus groups staff were asked to give their experience of medication administration when using the MAR system and subsequently the new PBMS. Comments illustrating attitude change from before PBMS to after its introduction are given in Box 1.

Box 1. Pre to post PBMA change in staff's perceptions of medication errors

Pre-PBMS staff attitudes towards medication errors

Home manager- RH: 'Not indicating whether it's one or two if it's a variable dose, not indicating that that's been given or why they haven't been given hasn't been recorded'

Care staff - RH: 'No. No - missing signature's not classed as a drug error. Not really, I mean okay, if there's a lot of missed signatures the Manager will say, come on - then you've got to watch what you're doing.'

Home manager (RN) – NH: '….the drug errors we don't have any major things really but it's just things like omitting to sign - sometimes drug are missed … silly things really. We have had a occasions where there's been a bit of confusion because the doctor's maybe prescribed one antibiotic, then prescribed another one but nobody's clarified whether they want the two to go together or to stop one and start another you know.'

RGN - NH: Re wrong dose: 'it's very easy to just flick them over and we all think because you do the drug round on a regular basis, you know the drugs - that looks right. But sometimes you actually think well has anybody actually stopped to read it and is it the right dosage? It's just a case of flick them over and pop them out... it can give you that sort of blasé thing.'

Post-BCMA change in staff attitudes towards medication errors

CHM-RGN - NH: 'I think you were oblivious (of) near miss because you'd pick up a bottle and then think wrong bottle and put it down but this [PBMS] highlights the number of times you're actually doing it.'

Deputy home manager - RH: 'I think they're (care staff) slowly realising how important it is, we had one issue that had to be dealt with internally and that's made all supervisors kind of sit up and think it's quite important it's a big responsibility giving out pills so they're all beginning to slowly learn the importance

Home manager-RH/EMI: 'the thought of getting rid of MAR sheets is heaven sent… I just absolutely hate them, I think they're a nightmare. There's not enough room on them you know.'

Before the new system was introduced, comments tended to focus upon what actual errors occurred, what the nature of these was, and the attitudes of staff towards them. Of particular interest was the *laissez faire* attitude expressed by some staff. This was justified in terms of errors being expected as a consequence of over familiarity with the content of medication written instructions, and that one accountability error type (failing to sign) became less

important because it so frequently occurred. In contrast, post-PBMS comments showed a greater awareness of the importance and responsibilities of medication giving, thus suggesting that when without the technological means of alerting and averting errors, staff could have been less focused upon maintaining failsafe practices.

Limitations

The main limitations of this study included the relatively small number of care homes that entered the study. Only one in two of the staff completed both pre and post questionnaires and the post PCMS sample responsible for medication administration was reduced from that pre PCMS by one fifth. Despite these issues, the use of a pre and post intervention design with a same sample subset is believed to reflect a reliable picture of the efficacy of the new system to avert medication errors in the care home sector.

Discussion

Prior to the introduction of the PBMS, staff recorded a greater awareness of the occurrence of actual errors using the MAR system than post the new system's introduction. The present results were in line with those given in other studies conducted in similar settings (Barber *et al* 2009, Young *et al* 2008) with *omitting to give medication, giving it to the wrong resident,* and *at the wrong time* identified by staff as errors they were most aware of occurring in their homes. Similarly when asked to give perceptions of the new system's impact on errors, these same errors were those considered to be most reduced by the use of this new technology. Thus, as such errors have potential for harm, our findings suggest that the new system not only reduces error but also the risk of adversity for residents.

The pre and post awareness of *near misses* presented a different pattern from that observed for the other two error groups. Staff awareness of their occurrence was markedly increased post the introduction of the PBMS from that recorded when using the MAR system. This suggests that without barcoded technology

to alert staff to these **near misses,** (with *potential* for error as opposed to *actual* error), there was a risk of the former going undetected until becoming reality. This finding echoes that reported by the National Patient Safety Agency (2009), where nurses tended towards only reporting actual errors and not near misses. By being made aware of these errors through an immediate alert, the PBMS was acting as prompt not only to potential error but also to a lapse in practice focus.

The pre and post PBMS qualitative evidence supports the view that paper-based MAR presented staff with human performance challenges both of their own making and from recording changes to GP's prescribing. In contrast the new pharmacy led system was seen as alleviating these problems.

Conclusions

The use of the PBMS was perceived by staff as successful in averting a range of medication error types in the care homes under study. Raised awareness of near miss errors, some of which could go undetected and thus unreported, could diminish the risk to residents of being in a position of waiting for a disaster to occur. Thus, using this new technology was found to encourage staff to be more focussed upon the processes involved in medication administration as well as making a major contribution to reducing errors in care homes.

Recommendations and implications for practice

Medication administration is recognised as a complex process, and the use of technology such as the PBMS that limits the capacity for human error has to be recommended in place of paper-based medication systems. However, further research is needed into the use of systems such as PBMS over a protracted period in these settings. This would ascertain its true efficacy including preventing any potential for staff to circumvent and thereby undermine its error-reducing performance.

Conflict of Interest

The study was commenced in January 2009 and was funded by Pharmacy Plus, Bristol (the provider). The study's design, qualitative methods and materials have been prepared by an independent academic team (the authors) from The University of the West of England, Bristol (Lead) in collaboration with the University of Warwick with IPR retained by the lead University. None of the authors are or have been in receipt of personal finance or any other form of personal gain from the provider. The data analysis has been conducted independent of the provider although approval to publish its outcomes has been agreed with the latter.

References

Barber ND, Alldred DP, Raynor DK *et al* (2009) Care homes' use of medicines study: prevalence, causes and potential harm of medication errors in care homes for older people. *Qual Saf Health Care*.18, 5, 341-346.

Commission for Social Care Inspection (2006) *Handled with care? Managing medication for residents of care homes and children's homes - a follow-up study*. CSCI, London.

Department of Health (2003) *Building a safer NHS: improving medication safety.* A report by the Chief Pharmaceutical Officer. Department of Health, London.

Franklin BD, O'Grady K, Donyai P, Jacklin A, Barber N (2007) The impact of closed-loop electronic prescribing and administration system on prescribing errors, administration errors and staff time: a before-and-after study. *Quality and Safety in Health Care*. 16, 4, 279-284.

Furniss L (2002) Use of medicines in nursing homes for older people. *Advances in Psychiatric Treatment*. 8,198-204.

Gurwitz JH, Field TS, Avorn J *et al* (2000) Incidence and preventability of adverse drug events in nursing homes. *The American Journal of Medicine* 109, 2, 87-94.

Kaur S, Mitchell G, Vitetta L, Roberts MS (2009) Interventions that can reduce inappropriate prescribing in the elderly: a systematic review. *Drugs Aging*. 26,12,1013-1028.

Hanlon JT, Schmader KE, Koronkowski MJ *et al* (1997) Adverse drug events in high risk older outpatients**.** *Journal of the American Geriatric Society.* 45, 945-948.

National Patient Safety Agency (2009) *Safety in doses: Improving the use of Medicines in the NHS***.** NPSA, London.

Paoletti RD, Suess TM, Lesko MG *et al* (2007) Using bar-code technology and medication observation methodology for safer medication administration. *Journal of the American Geriatric Society*. 64, 5, 536-43.

Schnipper JL, Hamann C, Ndumele CD *et al* (2009) Effect of an electronic medication reconciliation application and process redesign on potential adverse drug events: a cluster-randomized trial. *Archives of Internal Medicine.* 169, 8, 771-80.

Simonson W, Feinberg JL (2005) Medication-related problems in the elderly : defining the issues and identifying solutions. *Drugs and Aging*. 22, 7, 559-69.

Snowdon J, Day S, Baker W (2006) Audits of medication use in Sydney nursing homes. *Age and Ageing.* 35, 4, 403-408.

Young HM, Gray SL, McCormick WC *et al* (2008) Types, prevalence, and potential clinical significance of medication administration errors in assisted living. *Journal of the American Geriatric Society.* 56, 7, 1199-1205.

Yourman L, Concato J, Agostini JV (2008) Use of computer decision support interventions to improve medication prescribing in older adults: a systematic review. *The American Journal of Geriatric Pharmacotherapy*. 6, 2, 119-129.

Williams DJP (2007) Medication. *The Journal of the Royal College of Physicians of Edinburgh.* 37**,** 343–346