Evaluation of a medication order writing standards policy in a regional health authority

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We sought to evaluate the impact of a medication order writing standards policy on prescribing across our health region. We additionally wanted input from policy users on how to improve compliance with this important safety initiative.

Nous avons cherché à évaluer l'impact d'une politique de normalisation de la rédaction des ordonnances sur les prescriptions dans toute notre région sanitaire. De plus, nous souhaitions obtenir l'avis des utilisateurs de la politique en vue d'améliorer la conformité à cette initiative importante.

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ABSTRACT

Background: The Winnipeg Regional Health Authority (WRHA) implemented a medication order writing standards (MOWS) policy (including banned abbreviations) to improve patient safety. Widespread educational campaigns and direct prescriber feedback were implemented.

Methods: We audited orders within the WRHA from 2005 to 2009 and surveyed all WRHA staff in 2011 about the policy and suggestions for improving education and compliance.

Results: Overall, orders containing banned abbreviations, acronyms or symbols numbered 2261/8565 (26.4%) preimplementation. After WRHA-wide didactic education, the proportion declined to 1358/5461 (24.9%) ($p = 0.043$) and then, with targeted prescriber feedback, to 1186/6198 (19.1%) ($p < 0.0001$). A survey of

723 employees showed frequent violations of the MOWS, despite widespread knowledge of the policy. Respondents supported ongoing efforts to enforce the policy within the WRHA. Nonprescribers were significantly more likely than prescribers to agree with statements regarding enhancing compliance by defining prescriber/transcriber responsibilities and placing sanctions on noncompliant prescribers.

Discussion: Education, raising general awareness and targeted feedback to prescribers alone are insufficient to ensure compliance with MOWS policies. WRHA staff supported ongoing communication, improved tools such as compliant preprinted orders and reporting and feedback about medication incidents. A surprising number of respondents supported placing sanctions on noncompliant prescribers.

Conclusion: Serial audits and targeted interventions such as direct prescriber feedback improve prescription quality in inpatient hospital settings. Education plus direct prescriber feedback had a greater impact than education alone on improving compliance with a MOWS policy. Future efforts at the WRHA to improve compliance will require an expanded focus on incentives, resources and development of action plans that involve all affected staff, not just prescribers. Plans include continued advertising, MOWS summaries in all charts, all-staff education, reminders and exploration of sustainable interventions for targeted feedback for prescribers. *Can Pharm J (Ott)* 2013;146:276-283.

Introduction

Illegible handwriting, dangerous abbreviations and incomplete medication orders contribute

to the occurrence of medication errors.¹⁻³ The Winnipeg Regional Health Authority (WRHA) implemented a medication order writing

standards (MOWS) policy in July 2007. The policy defines a complete medication order and lists banned abbreviations, acronyms and symbols adapted from the Institute for Safe Medication Practices' "List of error-prone abbreviations, symbols and dose designations."⁴ The policy states that no health care provider shall act upon an ambiguous medication order (i.e., one that does not comply with all criteria for a complete medication order). Finally, it states that all medication orders must be printed or written legibly by an authorized prescriber, be clear and unambiguous, and comply with WRHA Formulary restrictions.⁵ The policy was developed by an interprofessional team and was approved by all WRHA professional counsels and executive leaders. Initial policy implementation consisted of region-wide education followed by feedback to prescribers who did not comply with the MOWS policy.

Although the MOWS policy is currently in place at all WRHA facilities, the policy is not enforced on a daily basis. Most patient care within the WRHA relies on handwritten medication orders. Current practice is for WRHA pharmacists, unit clerks and nurses to evaluate each medication order for ambiguity, legibility and interpretation. Pharmacies within the WRHA fill thousands of prescriptions daily, and providing timely drug order review and access to medications is a necessary component of safe patient care. Therefore, in the interest of providing patients with medications in a timely manner, the pharmacies within WRHA facilities fill medication orders that do not comply fully with the MOWS policy (e.g., may include banned abbreviations) unless the order is ambiguous, illegible or therapeutically unacceptable.

Serial audits and targeted interventions such as education or audit and feedback are established methods to improve prescription quality in inpatient hospital settings.⁶⁻⁹ To evaluate the WRHA MOWS policy, we conducted audits comparing compliance with the MOWS policy before implementation (2007), after an education intervention (2007) and then after targeted feedback to noncompliant prescribers (2009). There is a paucity of literature that describes how health care personnel feel about medication order writing policies or risks associated with ambiguous medication orders. Therefore, we also conducted a survey among

KNOWLEDGE INTO PRACTICE

- Little data describe how health care personnel feel about medication order writing policies or risks associated with ambiguous medication orders.
- Education plus direct prescriber feedback had greater impact than education alone on improving compliance with a medication order writing standards policy.
- When surveyed, staff strongly supported ongoing communication, improved tools such as compliant preprinted orders and reporting and feedback about medication incidents.

WRHA staff (2011), the purposes of which were to quantify awareness of and strategies to improve adherence with the WRHA MOWS policy and to explore differences in responses between prescribers and nonprescribers. This article describes the outcomes of MOWS serial audits and interventions over the period July 2007 to November 2011.

Methods

This series of projects was conducted within the WRHA, a publicly funded organization that provides acute, long-term and community health services for approximately 800,000 people. The initiative was a collaboration between the Regional Pharmacy Program and the regional Medication Systems Safety Subcommittee of the WRHA Pharmacotherapeutics Committee. A medication safety pharmacist conducted all audits and coordinated MOWS interventions. Pharmacy and medical staff provided educational interventions. Medication orders and outpatient prescriptions are written at numerous WRHA-affiliated clinics, personal care homes and community health agencies, and MOWS was implemented across the WRHA. However, due to resource constraints, only orders written at 6 inpatient facilities that did not have computer-assisted prescriber order entry were audited.

Interventions and serial audits

The MOWS policy implementation from February through June 2007 consisted of widespread dissemination of the policy, WRHA-wide didactic education (Grand Rounds, inservices, lectures), a poster campaign and addition of MOWS reminders to computer screen savers.¹⁰ Additionally, unit or site champions were identified to help educate staff.

MISE EN PRATIQUE DES CONNAISSANCES

- Il existe très peu de données sur l'opinion du personnel médical au sujet des politiques en matière de rédaction d'ordonnances ou des risques liés aux ordonnances ambiguës.
- L'éducation accompagnée d'une rétroaction directe aux médecins prescripteurs a davantage d'effet que l'éducation à elle seule pour améliorer la conformité à une politique de normalisation de la rédaction des ordonnances.
- D'après un sondage, le personnel est fortement favorable à une communication continue, à des outils améliorés tels que les ordonnances conformes pré-imprimées et au signalement des incidents liés aux médicaments accompagné d'une rétroaction.

To assess compliance with the MOWS policy, 1000 sequential medication orders from 6 WRHA inpatient facilities (total approximately 1700 beds) for 3 randomly selected dates within each audit period were obtained from the pharmacies. Audits were conducted before policy implementation (February 2007), after WRHA-wide didactic education (September 2007) and after targeted prescriber feedback (October 2009). The medication safety pharmacist reviewed each order for compliance with the MOWS policy using standard methodology.¹¹ Each prescription that appeared on a medication order form was considered a separate audit item.

A targeted prescriber feedback intervention was conducted during May to September 2009. During this period, pharmacists at WRHA inpatient facilities retained copies of noncompliant orders on 16 randomly selected days (separate orders to those reviewed as part of the audit described above). Use of banned abbreviations for "once daily," units, subcutaneous, drug names and use of trailing zeros were targeted for audit and feedback, due to frequency of use as well as potential for harm to patients. Prescribers received a copy of their noncompliant medication order with a memo signed by the chief medical officer. The memo stated how the order did not comply with the MOWS policy and offered a reminder about the importance of complying with this policy. The 2-sample *t* test of proportions was used to compare baseline to posttargeted prescriber feedback.

Survey

WRHA staff who prescribe, document, read, interpret or transcribe medication orders were invited via workplace e-mail (all staff, unit and program managers, physicians and e-newsletter subscribers) to complete an online nonvalidated survey during July to August 2011. The purpose of the survey was to assess awareness and frequency of observed violations of the MOWS policy, as well as evaluate and consider methods to improve education about, awareness of and compliance with the policy. The invitation and single reminder contained an example of an illegible medication order, a request for feedback to the WRHA Medication Quality and Safety Committee, a link to the WRHA MOWS policy and a link to the survey website. Study participants completed the survey anonymously; investigators were unable to track the identity of survey respondents by Internet provider or e-mail addresses. No identifying information about survey respondents was collected, so consent to participate was inferred, and we did not seek Research Ethics Board approval. Survey data were collected with SurveyMonkey 2008 (Portland, OR). Differences in response to survey questions between prescribers and nonprescribers were compared with chi-squared tests; $p < 0.05$ was considered significant.

Results

Audit

A total of 8565 medication orders were audited preimplementation, 5461 after WRHA-wide didactic education and 6198 after targeted prescriber feedback. A total of 1485 orders with noncompliance memos were returned to prescribers during targeted feedback.

Overall, orders containing any banned abbreviations, acronyms or symbols included in the MOWS numbered 2261/8565 (26.4%) preimplementation. After WRHA-wide didactic education, the proportion declined to 1358/5461 (24.9%) ($p = 0.043$) and then, with targeted prescriber feedback, to 1186/6198 (19.1%) ($p < 0.0001$). The number of orders containing specific targeted abbreviations (daily; units; subcutaneous) decreased significantly after targeted prescriber intervention (Table 1). However, unacceptable drug name abbreviations increased significantly during the targeted prescriber feedback audit period. There were insufficient data to analyze orders with trailing zeros.

TABLE 1 Compliance with the medication order writing standards

	Aspect of the medication order writing standard policy audited	Preimplementation, February 2007: Total orders compliant/total orders audited (%)	Postdidactic education, September 2007: Total orders compliant/total orders audited (%)	Posttargeted prescriber feedback, October 2009: Total orders compliant/total orders audited (%)
Targeted elements in direct prescriber feedback campaign	Use of banned abbreviation for ONCE DAILY	1314/1620 (81.1)	753/1025 (73.5)*	662/1630 (40.6)*
	Use of banned abbreviation for UNITS	171/486 (35.1)	118/276 (42.7)*	76/278 (27.3)*
	Use of banned abbreviation for SUBCUTANEOUS	258/446 (57.8)	236/396 (59.6)	64/214 (29.9)*
	Use of unacceptable DRUG NAME abbreviation	241/8565 (2.8)	128/5461 (2.3)	265/6198 (4.3)*

* $p < 0.05$: Significantly different from preimplementation result.

Survey

A total of 723 responses to the e-mail survey were received (response to demographics plus at least one other question). Many WRHA staff on group e-mail lists do not routinely access e-mail, or write, read, transcribe or work with medication orders; therefore, the true denominator of eligible WRHA staff who received the survey (and therefore the true response rate) is unknown. Respondents consisted of nurses (65.7%), pharmacists (12.2%), physicians (10.4%), unit clerks (7.1%) and other (4.7%) groups (midwives, dieticians, etc.). Most (42.4%) were employed at a tertiary care hospital providing care to inpatients, 25.9% worked at community hospitals, 14.3% provided outpatient care, 12.1% worked at long-term care centres and 5.3% other. A total of 108 (14.9%) were prescribers.

The majority of survey respondents were aware of the MOWS policy (80.5% agreed); were familiar with the banned abbreviations, acronyms and symbols list (83% agreed); and felt that unclear or illegible medication orders contribute to medication errors within their workplace (83.3% agreed), with no statistical differences in response between prescribers and nonprescribers. Overall, 50.5% of survey respondents indicated that they had observed or used unclear or illegible orders, and 61.2% indicated that they had observed use of banned

abbreviations 2 or more times per shift. Nonprescribers indicated that they contacted prescribers about unclear or illegible orders more frequently than prescribers recalled being contacted about such orders ($p < 0.05$) (Table 2).

When results for all respondents were combined, the most commonly recommended methods to educate and increase awareness and compliance with the MOWS policy were ensuring that all preprinted orders comply with the policy (89.9% agree), improving the medication occurrence (incident) reporting system (82.9%) and posting reminders in patient care areas (80.5%). Nonprescribers were significantly more likely than prescribers to agree with statements regarding enhancing compliance by defining prescriber/transcriber responsibilities and placing sanctions on noncompliant prescribers (Table 3).

Discussion

Education and feedback have been shown in numerous studies of methods to change prescriber behaviour.¹² However, studies about strategies to measure and change the behaviour of others in the medication use system, notably those who read, interpret, transcribe and act upon ambiguous or illegible medication orders, are scarce. We observed that education of all staff plus direct prescriber feedback had a greater impact than

TABLE 2 Frequency of violations of medication order writing standards within the previous 5 shifts by prescribers/nonprescribers

Statement	Response	Nonprescribers* (n = 584), n (%)	Prescribers* (n = 106), n (%)
I came across or used unclear or illegible medication orders (NSS)	Very infrequently (0-1 time per shift)	282 (48.3)	59 (55.7)
	Infrequently (2-5 times per shift)	199 (34.1)	31 (29.2)
	Not sure/can't remember	22 (3.8)	9 (8.5)
	Frequently (6-10 times per shift)	73 (12.5)	8 (7.5)
	Very frequently (>10 times per shift)	10 (1.7)	1 (0.9)
I came across or used abbreviations, acronyms, and symbols that are banned in the medication order writing standards policy (NSS)	Very infrequently (0-1 time per shift)	224 (38.4)	44 (41.5)
	Infrequently (2-5 times per shift)	179 (30.7)	33 (31.1)
	Not sure/can't remember	60 (10.3)	14 (13.2)
	Frequently (6-10 times per shift)	92 (15.8)	11 (10.4)
	Very frequently (>10 times per shift)	35 (6.0)	4 (3.8)
I was contacted or I contacted a prescriber because a medication order was unclear or illegible ($p = 0.044$)	Very infrequently (0-1 time per shift)	363 (62.2)	80 (75.5)
	Infrequently (2-5 times per shift)	138 (23.6)	19 (17.9)
	Not sure/can't remember	27 (4.6)	6 (5.7)
	Frequently (6-10 times per shift)	46 (7.9)	3 (2.8)
	Very frequently (>10 times per shift)	15 (2.6)	0 (0)

NSS, no statistically significant difference between prescribers and nonprescribers (chi-squared test). p -value indicates a statistically significant difference between prescribers and nonprescribers (chi-squared test).

*Numbers of prescribers and nonprescribers who answered these questions and the ones in Table 3 varied.

education alone on improving compliance with the MOWS policy. We also observed that WRHA staff members and physicians are generally aware and supportive of the importance of the MOWS policy for safe patient care. Despite this fact, and despite approximately 4 years of interventions aimed at improving medication order writing, more than 50% of survey respondents observed noncompliant medication orders more than twice per shift. This reinforces that the interventions performed at the WRHA (education, raising general awareness and targeted feedback to prescribers alone) are insufficient to ensure compliance with MOWS policies.

Change initiatives involving many health professionals dispersed across large regional health authorities can be difficult to accomplish. Successful change initiatives are earmarked by skilful integration of 5 key components: vision, skills (re)development, incentives, resources and action plans.¹³ Within the WRHA, the MOWS

policy provides the vision, most skills (e.g., prescribing, transcribing) required minimal modification, and resources and action plans were provided. That change has been gradual may be due, in part, to the fact that incentives were not incorporated into the change initiative from inception.

Numerous potential solutions to enhance compliance have been proposed in the literature, and most are supported by WRHA staff who responded to the survey. Strategies that are relatively easy and economical from an organizational perspective include staff reminders in various formats. Simple system-improvement strategies that are supported by survey respondents relate to skills, such as clearly stated medication order writing and transcription roles and responsibilities, and resources to aid the change initiative, such as improving the quality of preprinted orders. Ideally, computer-assisted prescriber order entry would provide the forcing

TABLE 3 Methods to educate and increase awareness and to improve compliance with the medication order writing standard (prescribers/nonprescribers)

	Nonprescribers: % agree/ strongly agree (<i>n</i> = 594), <i>n</i> (%)	Prescribers: % agree/ strongly agree (<i>n</i> = 108), <i>n</i> (%)
The following would educate and increase awareness with the medication order writing standards:		
Regular reminders at staff meetings (NSS)	407 (68.5)	62 (57.4)
Electronic reminders through e-mail (NSS)	337 (56.7)	58 (53.7)
Reminders through the WRHA newsletter (<i>p</i> = 0.008)	272 (45.8)	40 (37.0)
Posting reminders in patient care areas—for example, posters with the banned abbreviation list (NSS)	478 (80.5)	87 (80.5)
Attaching laminated copies of the banned abbreviation list to the back of the medication order divider in the patient chart (NSS)	453 (76.3)	72 (66.7)
In-person, in-service presentations (<i>p</i> < 0.001)	382 (64.3)	44 (40.7)
The following improve compliance with the medication order writing standards:		
Clearly stating roles and responsibilities of prescribers and transcribers in the medication order writing policy (<i>p</i> = 0.001)	443 (74.6)	65 (60.2)
Placing sanctions on noncompliant prescribers (<i>p</i> < 0.001)	415 (69.9)	61 (56.4)
Introducing computerized medication administration records throughout the WRHA (<i>p</i> = 0.005)	456 (76.8)	96 (88.9)
Ensuring that all preprinted orders comply with the policy (NSS)	530 (89.2)	101 (93.5)
Improving the medication occurrence (incident) reporting system and providing feedback about occurrences where medication order writing was considered a contributing factor (<i>p</i> < 0.001)	488 (82.1)	94 (87.0)

NSS, no statistically significant difference in answers (strongly agree, agree, neutral, disagree, strongly disagree) between prescribers and nonprescribers (chi-squared test); WRHA, Winnipeg Regional Health Authority. *p*-value indicates a statistically significant difference in answers (strongly agree, agree, neutral, disagree, strongly disagree) between prescribers and nonprescribers (chi-squared test).

*Numbers of prescribers and nonprescribers who answered these questions and the ones in Table 2 varied.

function needed to limit medication order writing errors and improve patient safety.² However, such systems are costly and take significant time to implement¹³; therefore, handwritten medication orders will likely persist in Canadian health care settings for some time to come, and continued efforts to improve medication order writing skills are required.

Previous studies have demonstrated that serial audits are an effective method to improve prescription quality in inpatient hospital settings.⁶⁻⁹ In comparison, this study showed that only targeted prescriber feedback was effective

and that didactic education (rounds, inservices, lectures, posters and computer screen savers) with serial audit were not generally effective in improving prescriber compliance. Differences in the health care systems and number and types of facilities may account for some of these difference.^{6,7,9} In a similar Canadian health region, Horon et al.⁸ describe an 81.5% reduction in banned abbreviations (64.4% reduction for medications and 98.5% for total parenteral nutrition orders) over a 4-year period through the use of educational interventions followed by sustained use of reminder stickers for medical

charts and self-adhesive notes attached to orders. Possible explanations for greater reduction in banned abbreviations through targeted education in the Horon study, as compared with our 27.6% reduction in banned abbreviations with targeted prescriber feedback, could include prescriber turnover, smaller number of prescriber-auditor interactions than adhesive notes, or the nonpunitive/nonaccusatory nature of adhesive notes. The results of the Horon study, as well as the findings from our study, suggest that low-technology interventions can be effective in reducing inappropriate prescribing; however, sustained effort and reminders are required. In nonhospital settings where prescriptions are handwritten, a similar effect might be achieved by placing a banned abbreviation watermark on the prescription blank rather than the patient chart.

An unanticipated study finding was the unexpectedly high level of support, even among prescribers, for disincentives to improve compliance, such as “placing sanctions against noncompliant prescribers.” However, statistically significantly fewer prescribers agree with this course of action compared to nonprescribers (Table 3). The WRHA (as in other Canadian health regions⁸) chose not to adopt one popular form of sanctions—employing a strict “no-fill” policy for medication orders noncompliant with every aspect of the MOWS policy.¹⁴ This decision was based on the belief that although a “no-fill” policy might improve overall compliance with the policy, it would do so at a high cost to patients and others in the medication use system. “No-fill” policies sanction prescribers indirectly, and the direct negative impact on health care staff and patients (e.g., time spent on order clarification; delayed delivery of necessary medication to patients) is likely to offset any indirect positive effect on prescriber behaviour.

Combining the findings of this study with the literature will prove useful in guiding the WRHA and other health regions facing similar lack of compliance with MOWS policies. Simply using education is ineffective in changing practice, and resources should be directed towards targeted feedback. Future work to improve medication

order writing in the WRHA requires an expanded focus on incentives, resources and development of action plans that involve all affected staff (including those who act on and transcribe orders), not just prescribers. Plans include continued advertising, MOWS summaries in all charts, all-staff education, reminders and exploration of sustainable interventions for targeted feedback for prescribers.

This study is subject to several limitations. First, despite numerous e-mail attempts, the response rate was likely a small proportion of the many staff, including prescribers, who work at WRHA inpatient facilities, which may suggest a responder bias. This may have affected prescribers more so than other staff, due to limited e-mail access through hospital e-mail; however, the survey invitation was sent out through the chief medical officer of the WRHA and through clinical programs. All staff members have a workplace e-mail account, and we received survey responses from all types of facility staff. Additionally, we conducted numerous statistical comparisons between prescribers and nonprescribers to determine the extent of differences between these important groups of health care workers. Multiple comparisons may increase the chance of detecting a statistical difference between groups when in fact the groups are not different; however, the differences in scope of practice between prescribers and nonprescribers are sufficient to justify exploring a potential for differences in responses among these groups.

Conclusions

Serial audits and targeted interventions such as direct prescriber feedback improve prescription quality in inpatient hospital settings. The current study demonstrated that only targeted prescriber feedback was effective in changing prescriber behaviour and that didactic education (rounds, inservices, lectures, posters and computer screen savers) were not effective at improving prescriber compliance. Future work to improve medication order writing in the WRHA requires an expanded focus on incentives, resources and development of action plans that involve all affected staff, not just prescribers. ■

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