ORIGINAL RESEARCH

MedSafer to Support Deprescribing for Residents of Long-Term Care: a Mixed-Methods Study

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https://doi.org/10.5770/cgj.25.545

ABSTRACT

Background

Polypharmacy is prevalent in long-term care homes (LTCH) and increases the risk of adverse drug events. Feasible and effective deprescribing interventions applicable in the LTCH environment are needed.

Methods

We performed a mixed methods study to evaluate the feasibility, applicability, and effectiveness of an electronic deprescribing tool, MedSafer, to facilitate quarterly medication reviews (QMRs) on two pilot units in an academic long-term care home (LTCH). Chart reviews collected resident health data. The prevalence of deprescribing at a standard QMR was compared with a QMR conducted three months later with MedSafer. Feedback from physicians on their experience with MedSafer was obtained through semi-structured interviews.

Results

Physicians found MedSafer helpful in guiding deprescribing decisions and suggested software improvements to increase the feasibility in LTCH. The average number of medications deprescribed per resident was significantly higher at the MedSafer QMR (mean reduction = 1.1 medications, SD = 1.3) compared to the standard QMR (mean reduction = 0.5, SD = 0.9) (absolute difference of 0.5; SD 1.1; $p = .02$).

Conclusion

MedSafer has the potential to increase deprescribing in LTCHs by flagging potentially inappropriate medications. Integration in the electronic medical record might increase uptake in LTCHs. Further research should investigate the generalizability of MedSafer in a larger population and in non-academic LTCHs.

Key words: polypharmacy, deprescribing, long-term care, clinical decision support system, medication review

INTRODUCTION

Polypharmacy broadly refers to the use of multiple medications for comorbid conditions and often a cut-off of five or more regular medications is applied.[1,2] Polypharmacy is inappropriate when it is causes more harm to the patient than actual or future clinical benefits.[3] In long-term care homes (LTCHs), polypharmacy is a growing challenge, with a prevalence as high as 85–90% of residents, compared to 27–59% of community-dwelling older adults.[1] In addition to an increase in drug–drug and drug–condition interactions observed with polypharmacy, age-related decline in organ function and altered metabolism can affect medication clearance in older adults, which further increases their risk of ADEs.[4] Adverse drug events associated with inappropriate polypharmacy can range in severity from changes in cognition and falls to hospitalization and death.[2,5]

Deprescribing aims to address polypharmacy by identifying and discontinuing medications that are potentially inappropriate or no longer necessary, to maximize medication efficacy and safety, all the while contextualizing an individual's current level of functioning, life expectancy, values and preferences.[6] However, deprescribing can be challenging due to a number of factors.[7] Some medications may have been prescribed by a different physician, the original indication might not be clear, and there is also the possibility of re-emergence of symptoms that can occur when tapering or discontinuing potentially inappropriate medications (PIMs). This is especially true for medications that have been taken long-term, which can include medications such as psychotropics and opioids.[8] More specifically, in the long-term care setting, clinician preferences, clinical inertia, and lack of time and training are some of the many barriers that are observed.[2,9]

MedSafer is a deprescribing software that cross-references patient demographic information, medical history, and medication data with evidence-based deprescribing guidelines to identify opportunities for deprescribing and facilitate safer

prescribing.[10] MedSafer is effective at reducing polypharmacy in acute care hospital settings;[11] however, there is a clear lack of research into the applicability of deprescribing softwares in LTCHs, where patient populations and clinical presentations are notably different. MedSafer provides an exhaustive deprescribing report based on the analysis of data input into the software. Patient preferences are accounted for upon review of the report (which provides prompts for the incorporation of patient values), and upon discussion of the report by the clinician with the patient and their loved ones.[11]

In Ontario, Canada, quarterly medication reviews (QMRs) are government-mandated for residents of LTCHs. The QMR involves a pharmacist who completes a medication review (MedsCheck LTC),[12] and makes recommendations for medication changes that are subsequently reviewed by the physician. There is no standardized process to incorporate deprescribing, but the QMR presents an excellent opportunity to reassess and reduce medication burden.[12] We identified the QMR as a potentially useful work process to pair with an electronic deprescribing intervention. The purpose of this study was to investigate the feasibility, applicability, and effectiveness of MedSafer during a regularly scheduled QMR and compare this to usual care.

METHODS

Design and Setting

A mixed-methods study design was used to investigate MedSafer during a QMR on two pilot LTCH units at Baycrest Health Sciences (Baycrest), an academic geriatric centre of care in Toronto, Ontario. At Baycrest, a pharmacist, nurse, and physician meet every quarter to review residents' medications during the provincially mandated QMR. We collected and analyzed qualitative and quantitative data to assess feasibility, applicability, and effectiveness of the software in the LTCH. Feasibility was assessed quantitatively through retention rates (the proportion of QMRs during the intervention process to which physicians applied the tool), and qualitatively via semi-structured interviews with subjective questions that related to facilitators and barriers identified while using the software, including how easily the software was incorporated into the usual workflow and whether it led to additional time requirements when performing the QMRs. Applicability was assessed through interviews with physicians, using questions to determine the extent to which the software application was likely to impact their future practice and whether or not deprescribing recommendations were applicable to their specific patient population. Efficacy was assessed by the uptake of the deprescribing opportunities on physician practice during the QMR by comparing the number of medications deprescribed at the MedSafer QMRs to a standard QMRs conducted three months prior on the same pilot units. The research protocol was approved by the Baycrest Research Ethics Board (REB #18-31).

Intervention

MedSafer was incorporated into regularly scheduled QMRs for two pilot units to identify opportunities for deprescribing and support clinical decision-making. To generate MedSafer recommendations, the study team conducted a chart review and manually entered resident data (medications and medical conditions) in the MedSafer web-based portal. MedSafer cross-references resident data with evidence-based deprescribing recommendations[8,11] and identifies opportunities for deprescribing PIMs. The clinical team reviewed the individualized reports generated during the QMR (January 17, 2019, for Unit 1 and November 28, 2018, for Unit 2) for appropriateness of deprescribing during the intervention phase. Reports were generated by the research team, printed out and provided to the QMR team for review.

Data Collection & Measures

Physician experience with reviewing the deprescribing opportunities during the QMR was assessed using semi-structured interviews.

Physicians were interviewed for the study as they were the primary decision-makers at the QMR. Interviews were approximately 30-minutes in length and were conducted in-person by a research assistant using a semi-structured interview guide developed by the study team. Physicians were asked open-ended questions about the impact of reviewing the deprescribing opportunities on their practice during the QMR, integration into the workflow, whether they agreed or disagreed with the deprescribing opportunities (were the recommendations applicable to their patient population), and if any facilitators or barriers were identified with using MedSafer (feasibility). Questions from the interview guide can be found in Appendix A.

Two physicians on the pilot units were eligible to participate in the study. The research assistant obtained written informed consent from the physicians. Interviews were audio-recorded and manually transcribed by the study team. The research assistant provided the physicians with the MedSafer recommendations such that training with the software was not required. Neither physician had any prior experience with using MedSafer.

A chart review collected demographics, comorbidities, medications, and recent lab values (electrolytes and creatinine), as well as hemoglobin A1C for residents living with diabetes. Residents' medication lists were collected at four time points: pre- and post-standard QMR and pre- and post-MedSafer QMR, to compare medication changes made during the intervention with historical changes that occurred in the review that took place in the prior quarter. Deprescribing rates were calculated for each QMR by calculating the average decrease in the number of medications per resident pre- vs. post-QMR.

Resident health outcomes were collected from the Resident Assessment Inventory Minimum Data Set (RAI-MDS) 2.0, which is administered every quarter in Ontario LTCHs.

RAI-MDS outcome scales collected before and after the MedSafer QMR included the Aggressive Behaviour Scale; Activities of Daily Living; Changes in Health, End-Stage Disease and Signs and Symptoms Scale; Cognitive Performance Scale; and Depression Rating Scale.[12]

Data Analysis

Interviews were transcribed and coded using Microsoft Excel by two raters for agreement and inter-rater reliability. Qualitative coding was both inductive (based on observed patterns) and deductive (based on the study purpose). Interview data were grouped into prevalent themes, and categorized under the headings of feasibility, applicability, and efficacy of MedSafer to augment the usual processes of the QMR. No formal means was used to reach data saturation during the interview process.

Descriptive statistics reported resident characteristics, medication orders, and deprescribing outcomes. Changes in resident health outcomes pre-post MedSafer QMR were assessed using chi-square or Fisher's exact tests. Paired *t*-tests assessed deprescribing by comparing the number of medications before and after the standard and MedSafer QMRs. Deprescribing rates, or the mean reduction in medications at the standard and MedSafer QMRs, were compared using the independent *t*-test. Effect sizes are reported as standardized response means using the ratio of the mean difference and the standard deviation of the mean difference. Effect size values: 0.20, 0.50, and 0.80+ were interpreted as small, medium, and large effects.[13]

RESULTS

Qualitative Interviews with Physicians

Two physicians participated in the interviews—one from each pilot unit. The qualitative data were grouped into the following three prevalent categories: 1) feasibility of using MedSafer during the QMR, 2) applicability of MedSafer in the LTCH setting, and 3) effectiveness of MedSafer in identifying medication deprescribing opportunities.

Feasibility

In this study, physicians only reviewed the deprescribing opportunities at the time of the QMR session. The reports were easily integrated into the workflow, and the time to complete a QMR did not increase (on average a QMR took 20 minutes with or without MedSafer). Retention was high and all reports were reviewed for all residents. Although the software recommendations were prioritized into high, medium, and low-risk categories, physicians reported that they reviewed all the deprescribing opportunities to determine the applicability to the resident's clinical case. To allow for time to review the deprescribing opportunities, physicians suggested reviewing the deprescribing opportunities in advance of the QMR and on an ongoing basis, between QMRs. Since resident data, including lab results, were manually entered in the software, physicians suggested integrating the lab portal's results with the software algorithm to increase the feasibility of using the software.

Applicability

Physicians felt that most recommendations from the reports were applicable to the LTCH population, but they identified information to incorporate from the electronic medical record (EMR) into MedSafer's algorithm such as medication administration instructions (i.e., crushed vs. whole tablets), additional lab results, and goals of care that would increase the applicability of the software to LTCH residents. In line with this, they reported that some deprescribing opportunities identified by MedSafer were not applicable due to the resident's goals of care, such as a resident's life expectancy being less than a year or palliative care provision. In considering medication deprescribing opportunities and resident goals of care, it was suggested that MedSafer include the Changes in Health, End-Stage Disease, Signs and Symptoms Scale scores to indicate the level of health instability, including end-stage disease, as well as a palliative care screening question including a note regarding high-risk medications used for comfort care and symptom management.

Effectiveness

Physicians noted that the software fulfilled its purpose of flagging potential drug interactions and high-risk medications which helped guide their decisions regarding medications to potentially deprescribe. Although physicians reported they were often familiar with the PIMs and risks that MedSafer identified, due to their experience of medication management in LTCH, they commented that MedSafer was effective at increasing awareness and drawing their attention to PIMs that required regular and ongoing review. Physicians also highlighted the helpfulness of MedSafer as a decision-making tool for prescribers new to LTCH, when a clinical pharmacist cannot be consulted at the QMR, as a useful means to guide their reflections on deprescribing.

Resident Characteristics

Residents of the two pilot units (N = 55) had a mean age of 86.6 years (SD = 11.9) and 72.7% were female. Units were mostly similar in prevalence of common medical conditions, aside from dementia, which was more prevalent on Unit 2 (92.6%) than Unit 1 (46.4%). The median Aggressive Behaviour Scale score was 0 (IQR = 0.0, Q1, Q3 = 0), indicating an absence of aggressive behaviour. Over half of residents (50.9%) were "dependent" or "totally dependent" in their activities of daily living. The Changes in Health, End-Stage Disease, Signs and Symptoms Scale showed that 56.4% had "minimal" to "moderate" health instability. The median Cognitive Performance Scale score was 3 (IQR = 5.0, Q1 = 1.0, Q3 = 6.0), indicating "moderate" impairment, and 41.8% of residents had "moderate/severe" to "very severe" cognitive impairment (Table 1).

Deprescribing Intervention

MedSafer identified deprescribing opportunities for 53 out of the 55 residents across both units (96.4%; Table 2). Commonly flagged PIMs included psychotropics and opioid

analgesics for chronic non-cancer pain. Nearly a third of residents (32.7%) had a PIM deprescribed at the MedSafer QMR. The reasons for deprescribing included: 1) MedSafer identified the PIM as potentially having little added benefit (5 deprescribed/25 identified or 20.0%), 2) reduced resident life expectancy (4/16 or 25.0%), and 3) overly tight control of diabetes (6/14 or 42.9%).

Overall, an average of 0.5 (SD = 0.9) medications per resident were deprescribed in the standard QMR and an average of 1.1 (SD = 1.3) medications per resident were deprescribed at the MedSafer QMR. In comparing deprescribing rates, there was an average of 0.5 (SD = 1.1) more medications deprescribed per resident at the MedSafer QMR than the standard QMR (p = .02 ES = 0.5 or medium effect size). On one study unit, the intervention was more effective and the MedSafer QMR resulted in a mean reduction of 1.6 (IQR = 1.0) medications per resident, while the standard QMR on that unit resulted to a mean reduction of 0.3 (IQR = 1.0) medications per resident. The mean difference of 1.4 (IQR = 1.0) more medications deprescribed at the MedSafer QMR compared to the standard QMR was significant (p < .001, ES = 1.3 or large effect size). Across the two units, there was also a larger reduction in average medication orders per resident observed at the MedSafer QMR (mean = -1.1, SD = 1.3, ES = -0.8 or large effect, IQR = 2.0) compared to the standard QMR (mean = -0.5, SD = 0.9; ES = 0.6 or moderate effect, IQR = 1.0).

TABLE 1.
Resident demographics and clinical characteristics

Variable	*Unit 1 (n=28)*	*Unit 2 (n=27)*	*Overall (N=55)*
Age in years, mean (SD)	86.1 (10.8)	87.1 (13.1)	86.6 (11.9)
Sex: Female, n (%)	17 (60.7)	23 (85.2)	40 (72.7)
Code Status: DNR, n (%)	18 (64.3)	18 (66.7)	36 (65.5)
Length of Stay in Months			
Admission to standard QMR, mean (SD)	40.1 (47.7)	46.6 (46.8)	43.3 (46.9)
Admission to MedSafer QMR, mean (SD)	43.5 (47.6)	47.8 (46.8)	45.6 (46.8)
Resident Assessment Inventory Minimum Data Set 2.0			
Aggressive Behaviour Scale			
No behaviours, n (%)	28 (100.0)	17 (63.0)	45 (81.8)
Mild/moderate to severe/very severe behaviours, n (%)	0 (0.0)	10 (37.0)	10 (18.2)
Activities of Daily Living Self-Performance Hierarchy			
Independent to limited impairment, n (%)	5 (17.9)	0 (0.0)	5 (9.1)
Extensive assistance, n (%)	13 (46.4)	9 (33.3)	22 (40.0)
Dependent to total dependence, n (%)	10 (35.7)	18 (66.7)	28 (50.9)
Changes in Health, End-Stage Disease and Signs & Symptoms			
No health instability, n (%)	11 (39.3)	13 (48.2)	24 (43.6)
Minimal to low/moderate health instability, n (%)	17 (60.7)	14 (51.9)	31 (56.4)
Cognitive Performance Scale			
Intact/borderline intact to mild/moderate impairment, n (%)	28 (100.0)	4 (14.8)	32 (58.2)
Moderate/severe to very severe impairment, n (%)	0 (0.0)	23 (85.2)	23 (41.8)
Depression Rating Scale			
No depressive symptoms, n (%)	19 (67.9)	17 (63.0)	36 (65.5)
Some depressive symptoms to possible depressive disorder, n (%)	9 (32.1)	10 (37.0)	19 (34.5)
Palliative Performance Scale version 2[a]			
≤30% level, n (%)	---	13 (48.1)	---
> 30% level, n (%)	---	14 (51.9)	---
Prevalent Comorbidities[b]			
Dementia	13 (46.4)	25 (92.6)	38 (69.1)
Hypertension	15 (53.6)	14 (51.9)	29 (52.7)
Depression	10 (35.7)	12 (44.4)	22 (40.0)
Comorbidity Category Prevalence[b]			
Neurologic, n (%)	20 (71.4)	26 (96.3)	46 (83.6)
Endocrine/ metabolic, n (%)	17 (60.7)	16 (59.3)	33 (60.0)
Psychiatric, n (%)	17 (60.7)	13 (48.2)	30 (54.6)

[a] Not available for Unit 1.
[b] Residents had combinations of comorbidities.

DISCUSSION

Deprescribing software has been identified as a sustainable intervention to assist in safer prescribing for older adults.[11] This study demonstrated that an electronic deprescribing tool was applicable to the LTCH population, feasible to incorporate into the workflow, and effective at increasing deprescribing. This was the case even in the presence of pharmacy support and on an academic geriatric unit with expert knowledge in medication reviews. Elements to increase feasibility and applicability were identified through the interview process.

Physician feedback included recommendations to improve applicability of the software to LTCHs by incorporating additional lab results and goals of care within the software algorithm. Areas for improvement identified through this study have been subsequently addressed through software modifications. For example, MedSafer is now integrated in two Canadian EMRs (Point Click Care[14] and Med e-Care[15]) and is currently being evaluated in that setting. This addresses the need for manual data input which is no longer required.

Physicians reported that the software fulfilled its purpose in flagging potential drug interactions and high-risk

TABLE 2.
MedSafer Outcomes

Outcomes	*Unit 1*	*Unit 2*	*Overall*
Medication Orders*			
Total number of medication orders before the MedSafer QMR	447	374	821
Medications orders per resident, mean (SD)	16.0 (5.5)	13.9 (4.5)	14.9 (5.1)
Medications with MedSafer deprescribing opportunities, n (%)	128 (28.6)	110 (29.4)	238 (29.0)
Deprescribing Opportunities			
Total number of deprescribing opportunities†	118	90	208
Residents with one or more deprescribing opportunities, n (%)	26 (92.9)	27 (100.0)	53 (96.4)
Deprescribing opportunities per resident, mean (SD)	4.2 (3.3)	3.3 (2.0)	3.8 (2.8)
Deprescribing opportunities implemented during the MedSafer QMR, n (%)	13 (11.0)	13 (14.4)	26 (12.5)
Deprescribing opportunities not implemented during the QMR, n (%)‡	105 (89.0)	77 (85.6)	182 (87.5)
Categories of deprescribing opportunities			
Risk for adverse drug event			
High risk, n (%)	69 (58.5)	45 (50.0)	114 (54.8)
Intermediate risk, n (%)	38 (32.2)	31 (34.4)	69 (33.2)
Lower risk but of potentially little benefit or value, n (%)	11 (9.3)	14 (15.6)	25 (12.0)
Cause for deprescribing opportunity			
Medical condition, n (%)	70 (59.3)	37 (41.1)	107 (51.4)
Drug interaction, n (%)	4 (3.4)	8 (8.9)	12 (5.8)
Reduced life expectancy, n (%)§	---	16 (17.8)	16 (7.7)
Other causes, n (%)‖	44 (37.3)	29 (32.2)	73 (35.1)
Medication class			
Psychotropics, n (%)	24 (20.3)	31 (34.4)	55 (26.4)
Analgesics, n (%)	32 (27.1)	15 (16.7)	47 (22.6)
Bone Health, n (%)	8 (6.8)	15 (16.7)	23 (11.1)
Gastrointestinal, n (%)	14 (11.9)	9 (10.0)	23 (11.1)
Diabetes, n (%)	8 (6.8)	6 (6.7)	14 (6.7)
Other, n (%)	32 (27.1)	14 (15.6)	46 (22.1)
No. of residents with a low-medium risk PIM deprescribed at the MedSafer QMR, n (%)	12 (42.9)	24 (88.9)	36 (65.5)
No. of residents with a high-risk PIM deprescribed at the MedSafer QMR, n (%)	8 (28.6)	10 (37.0)	18 (32.7)

Note: Unit 1 = 28 residents, Unit 2 = 27 residents, Overall = 55 residents

* Certain medications had multiple orders (e.g., separate orders for PRN vs. scheduled) or had multiple deprescribing opportunities with different causes

† Excludes opportunities for a certain medication that had inconsistencies between the electronic health record and MedSafer

‡ Changes may have been made at a later date after the MedSafer QMR

§ Other causes for deprescribing opportunities included potentially inappropriate medications flagged due to reduced life expectancy may offer little benefit or potentially be of harm to the resident. Reduced life expectancy was calculated using a Palliative Performance Scale cut-off score of 30%. Palliative Performance Scale data was only available for Unit 2 residents.

‖ Some medications were always flagged as potentially inappropriate medications regardless of resident health status (e.g. psychotropic medications and some analgesics)

medications. In this study, one-third of residents had one or more PIMs deprescribed at the MedSafer QMR. The overall deprescribing rate was lower than previous research in acute care, which in one study showed a deprescribing rate of 54.7% among patients in the intervention group.[16] Our study took place on an academic geriatric unit and therefore physicians had some baseline knowledge of deprescribing. This, along with the small sample size and the short follow-up time, could explain lower rates than might be observed in a non-academic LTCH, or with repeated software facilitated mediation reviews over time.

Furthermore, medication management differs between acute and long-term care for various reasons. Residents in LTCHs have chronic, multiple comorbidities and are generally medically stable compared with patients in acute care.[17-19] Workflow, lengths of stay, and barriers to deprescribing are impacted differently in each of these settings.[19-21] Given the prevalence of comorbidities in this population, the indication for medications can sometimes be unclear, and drugs could have been initiated and maintained by another clinician.[7] Finally, an important barrier resides in deprescribing in LTCHs: there is a known culture of maintenance of status quo for residents, which can dissuade physicians in initiating a deprescribing attempt.[22] The above factors and the short study duration could explain, in part, why the deprescribing rates were statistically significant, but not as high as those reported in acute care settings.

There were several limitations in this single-site pilot study. Although the present study benefited from the involvement of a pharmacist, physician, and nurse in completing the QMR, it should be noted that these resources are not always available in all LTCHs. The applicability of a deprescribing software facilitated QMR without the involvement of pharmacy or nursing still requires further study. As mentioned previously, this study took place on an academic geriatric unit and so study outside of this setting would increase the generalizability of the intervention. We only evaluated the software during a single QMR on two pilot units, with a focus on the feasibility and applicability of software, rather than proving efficacy, which would require a larger sample size, a longer study duration, and a different study design. Feedback on the MedSafer recommendations was only obtained from two physicians involved in the QMR, and the views of pharmacists, nurses, residents and families, who are also heavily implicated in deprescribing process, were not captured. Finally, the software was not integrated in the EMR; therefore, physicians reviewed reports on paper and had to log into the EMR in order to deprescribe. Now that the software is integrated into the EMR,[14,15] future research will need to include a larger study population, longitudinal evaluations, and assessment of the impact on important resident and family-reported health outcomes. One strength of our study was that, to the authors' knowledge, there have been few studies evaluating the implementation of deprescribing softwares in LTC, let alone one that addresses all possible classes of PIMs, as opposed to just a targeted class of medications (e.g., sedative hypnotics or antipsychotics). Most studies of deprescribing in long-term care have been limited to a single drug class or a few harmful medications.[7,23]

CONCLUSION

When using MedSafer electronic deprescribing software at the QMR, deprescribing events were increased and the number of medications per resident was reduced on two units of an academic LTCH. Software augmented QMRs are likely effective for deprescribing in this setting given a higher observed deprescribing rate when electronically generated deprescribing opportunities were paired with the QMR. Future research is needed to determine the feasibility and applicability in non-academic LTCHs and for larger populations over time. Integration with EMRs could make this a scalable intervention to support physicians in LTCH medication management.

ACKNOWLEDGEMENTS

Not applicable.

CONFLICT OF INTEREST DISCLOSURES

Drs. Todd C. Lee and Emily G. McDonald hold the copyright for the MedSafer software in conjunction with McGill University, and have received grant funding from the Canadian Institutes of Health Research, Centre for Aging and Brain Health Innovation, and Canadian Frailty Network related to the development of MedSafer. All other authors state that they are in no position of conflicts of interest that are directly relevant to the content of this article.

FUNDING

This work was completed with a grant from Academic Health Science Centre Alternative Funding Plan (Project BMS-18-003).

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APPENDIX A. Standard QMR Outcomes[a]

	Unit 1	*Unit 2*	*Overall*
Total Number of Medication Orders			
Standard Quarterly Medication Review (QMR)			
Before	428	354	782
After	408	347	755
Absolute difference (% difference)	-20 (-4.7)	-7 (-2.0)	-27 (-3.5)
MedSafer-LTCFs QMR			
Before	447	374	821
After	434	332	766
Absolute difference (% difference)	-13 (-2.9)	-42 (-11.2)	-55 (-6.7)
Average Number of Medication Orders per Resident, mean (SD)			
Standard Quarterly Medication Review (QMR)			
Before	16.5 (5.6)	14.2 (4.4)	15.3 (5.2)
After	15.7 (5.1)	13.9 (4.4)	14.8 (4.8)
Mean Difference[b]	-0.8 (1.0)	-0.3 (0.7)	-0.5 (0.9)
MedSafer-LTCFs QMR			
Before	16.0 (5.5)	13.9 (4.5)	14.9 (5.1)
After	15.5 (5.8)	12.3 (4.3)	13.9 (5.3)
Mean Difference[c]	-0.5 (1.1)	-1.6 (1.3)	-1.1 (1.3)
Difference in number of deprescriptions at MedSafer-LTCH vs. Standard QMR, mean (SD)[d]	+0.3 (1.0)	+1.3 (1.0)	+0.6 (1.1)

[a]Four residents were excluded from the standard QMR comparisons because they either (1) had admission dates after the standard QMR, (2) were transferred from a different unit after their standard QMR, or (3) were in acute care at the time of the standard QMR.
[b]Unit 1 unadj. paired [t]-test $p < .001$, ES = -0.78; Unit 2 unadj. paired *t*-test $p = .07$, ES = -0.38; Overall unadj. paired [t]-test $p < .001$, ES = -0.59.
[c]Unit 1 unadj. paired t-test p = 0.030, ES = -0.45; Unit 2 unadj. paired t-test p <0.001, ES = -1.19; Overall unadj. paired t-test p < 0.001, ES = -0.77.
[d]Unit 1 unadj. independent *t*-test $p = .35$, ES = 0.26[CB3] ; Unit 2 unadj. independent *t*-test $p < .001$, ES = -1.32[CB4] ; Overall unadj. independent *t*-test $p = .018$, ES = -0.48 [CB5].