Medication List Discrepancies and Therapeutic Duplications Among Dual Use Veterans

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A concerning level of discrepancies exists between the VA and non-VA medication lists of dual use veterans, raising the risk of adverse drug events.

In the U.S., 4.5 million ambulatory care visits occur annually due to adverse drug reactions (ADRs) of prescription medications.[1] Many ADRs are severe, and they result in more than 100,000 death per year.[2] A significant number of these ADRs are preventable and are a result of inappropriate prescribing.[3] It is well-documented that inappropriate prescribing is exacerbated by the number of patients who see multiple prescribers and use many different prescription medications.[4] This situation results in many versions of a patient's medication list and in discrepancies across data sources.[5]

Medication list discrepancies have been researched in the context of care transitions between the hospital and home.[6,7] However, less attention has been given to community-dwelling adults who use multiple outpatient prescribers, a practice common among older adults with chronic conditions who see a primary care provider and several specialists.[4] Also, veterans are a growing patient population who use providers from multiple health care systems.[8] Up to 70% of veterans enrolled in VA health care use both VA and non-VA providers. These patients are referred to as dual users.[9,10]

There has been an increasing push for patients to be more actively engaged in their own health care, including maintenance of their medication list and other personal health information.[11-13] Providers have realized that patients have important experiences and preferences to share about how they use medications at home.[14,15] Research suggests that patient interest and ability to use patient portals is variable and dependent on age, technical abilities, health literacy, and endorsement by their providers.[16] Greater patient engagement in the medication management process is potentially advantageous, especially because providers from different health care systems often lack the capability to share medication list information.[12,17]

My Health*e*Vet, the VA's patient portal, offers veterans several features. For example, users can securely message providers, refill prescriptions, check appointments, self-enter information, and download their VA health record (including medication history) using the Blue Button (BB) feature. The BB is managed by the HHS to provide consistency across electronic health record platforms.[18,19]

This BB medication list gives VA patients the tool they need to inform their providers about the medications they take, particularly dual users. VA patients that use multiple prescribers are subject to medication list discrepancies because of the fragmentation of information.[4,20]

OBJECTIVES

The objectives of this study were to (1) describe discrepancies between VA medication lists and non-VA provider medication lists for a group of veteran dual users; (2) identify therapeutic duplications in these lists; and (3) contextualize discrepancies by interviewing non-VA providers about their medication reconciliation processes and management of dual use patients.

METHODS

This analysis is based on data collected as part of a pilot randomized

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controlled trial by Turvey and colleagues.[21] Veterans with a diagnosis of ≥ 1 chronic health condition (eg, diabetes, hypertension) were invited by letter to participate in a study about using online management of their health information. Interested patients were screened to meet additional inclusion criteria, such as taking ≥ 5 medications, receiving care from a non-VA provider, an appointment with a non-VA provider within the study time frame, and access to a computer, online access, and printer.

Eligible veterans were randomized to receive either (1) BB training (intervention group) instructing patients to download the Continuity of Care Document and bring it to their non-VA provider visit; or (2) a training evaluating medical information online (control group). Training information was mailed, including written materials and phone support, to both groups. The intervention group could also access an online training link.

One of the objectives was to test whether downloading and bringing the health information to a non-VA appointment decreased medication list discrepancies. The sample was small, and differences in discrepancy rates between groups were not significant. Therefore, groups were combined for the present analysis. Visits occurred between December 2013 and December 2014. Greater detail about study design and primary results are available in the study by Turvey and colleagues.[21]

Study procedures were approved by the University of Iowa Institutional Review Board and the Iowa City VA Health Care System Research and Development Committee. All participants provided consent.

Identifying Discrepancies

A 4-phase process was used to address medication discrepancies.[22,23] The first phase defined medication discrepancy categories. The mutually exclusive categories were dose, frequency, and missing discrepancies. In cases where a medication was both dose and frequency discrepant, only dose discrepancy was applied. For missing medications, entities on only the VA list were marked as "non-VA missing" and medications appearing on only the non-VA list would be denoted as "VA missing." Medications with no discrepancy were marked as such.

Phase 2 involved collecting medication data. Medication lists from the VA medical record were printed at the time of the non-VA provider appointment. Non-VA medication lists were obtained by sending a medical record request for the visit note, medication list, and any associated visit test results to the non-VA provider office within 2 to 3 weeks of the appointment. Patient names from both lists were replaced with unique patient identifiers.

In phase 3, a research assistant abstracted the hard copy medication lists into a database and identified discrepancies. Variables included medication name, dose, frequency, and administration route. Although administration routes were collected, discrepancies were not assessed because this information commonly was not specified. Medications also were coded as prescription or over-the-counter (OTC). Durable medical equipment often was present on VA lists (eg, syringes, test strips) and was excluded from all analyses. Medications also were not coded as discrepant if they were referenced in a visit note as being changed by the non-VA provider. These combined lists were evaluated by the research assistant

Table 1. Patient Characteristics (n = 50)

Characteristics	Mean (SD)
Age, y	68.5 (6.2)
Male, %	90
Health status rating[a,b]	2.84 (0.9)
Chronic conditions[a]	5.90 (2.5)
Total medicines	15.8 (7.0)
Prescription medications	10.4 (5.6)
OTCs/supplements	5.4 (3.5)

Abbreviation: OTCs, over-the-counter medications.
[a]Patient self-reported.
[b]Health status: 1 = poor; 2 = fair; 3 = good; 4 = very good; 5 = excellent.

based on the discrepancy categories specified in phase 1 and were verified by a pharmacist.

Phase 4 involved counting medication discrepancies. Medication discrepancy rates were calculated at the patient level, both descriptively (mean number of discrepancies per patient) and as a proportion of medications discrepant (number of discrepancies divided by total medications).

Identifying Duplications and High-Risk Medications

A pharmacist examined each combined medication list to identify therapeutic duplications, defined as a patient using ≥ 2 medications from the same medication class (eg, patient taking 2 statin drugs) but not 2 drugs for the same condition (eg, fish oil and atorvastatin for dyslipidemia). High-risk medications also were noted, including anticoagulants, certain nonsteroidal anti-inflammatory drugs, oral and injectable hypoglycemics, opioids, sedatives,

Table 2. Medication Discrepancies by Type (n = 50)

Type	Medications, Mean (SD)	All Types of Discrepancy, Mean (SD)	VA Missing, Mean (SD)	Non-VA Missing, Mean (SD)	Dose, Mean (SD)	Frequency, Mean (SD)
All medications	15.8 (7.0)	10.0 (6.1)	4.2 (3.8)	2.7 (3.1)	2.3 (1.9)	0.8 (1.0)
Prescription	10.4 (5.6)	6.0 (5.0)	2.6 (3.0)	1.6 (2.3)	1.4 (1.4)	0.5 (0.7)
OTC	5.4 (3.5)	4.0 (2.8)	1.6 (1.8)	1.2 (1.6)	0.9 (1.3)	0.3 (0.7)

Abbreviation: OTC, over-the-counter medication.

and hypnotics.[24-26] These medications received special focus because of their link to a high risk for ADRs.[27]

Descriptive statistics were calculated for patient characteristics and for each discrepancy type, both overall and according to prescription OTC, and high-risk medications. The proportion of discrepant medications was calculated for each category. Bivariate correlations were calculated for select variables to understand potential relationships.

Interviews With Non-VA Providers

All patients were instructed to bring a consent letter and the 1-page questionnaire to their non-VA provider appointment. The questionnaire contained an item asking whether non-VA providers could be contacted for a 15- to 30-minute follow-up interview. The semistructured, qualitative interviews assessed their experiences working with VA providers and VA patients, experiences with VA documents or records, preferences for receiving information from the VA, experience with personal health records, and sharing information with the VA. Eight interviews were conducted, audio-recorded, and transcribed. The goal of the interviews was to explore and understand provider perspectives on managing dual use veterans, including medication reconciliation processes to add con-

text to the interpretation of medication list analysis. Because the data set was relatively small, summaries of each interview were created to highlight main points. These main points were sorted into topics, summarized, and representative quotes were selected.

RESULTS

Fifty veterans were included in the analysis (Table 1). The mean age was 68.5 (SD 6.2); 90% were men. On average, they reported having 6 chronic health conditions and a fair-to-good health status. Based on the combined medication lists from VA and non-VA providers, veterans took an average of 15.8 (SD 7.0) unique medications (combined prescription and OTC/vitamins) and had an average of 10.0 (SD 6.1) all-type discrepancies (Table 2).

Overall, 58% of the prescription medications were discrepant: The most common discrepancy between the 2 lists was medication missing on one of the lists, which occurred 3.9 times per patient on average for prescription medications and 2.8 times per patient for OTCs. Frequency or dose discrepancies also were common between the lists at a rate of 1.9 discrepancies per patient for prescription medications and 1.2 discrepancies per patient for OTCs.

For high-risk medications, opiates and sedative medications had the most discrepancies between the lists because the VA practitioner may not have known that the patient was taking an opiate, although other discrepancies were present (Table 3). Anticoagulant discrepancies were the most consistent, most of these occurring with aspirin. Last, insulin commonly was dose discrepant between the 2 lists, although it also was missing from one list for a number of patients. Overall, high-risk medications shared a discrepancy rate (46.9%) similar to the overall rate.

Twelve therapeutic duplications were identified in the sample. Ten were between-list duplications, that is, "provider A" thought the patient was on a particular medication and "provider B" thought that the patient was on a different medication (Table 4). In 6 instances, within-list duplications were identified (ie, a provider had 2 medications on the list that should not be taken together because they were in the same drug class). In 4 cases, both between- and within-list duplications were present.

Interview Summaries

Veterans and medication. Multiple non-VA providers said that the primary reason veteran patients were going to a VA provider was to obtain

Table 3. High-Risk Medication Discrepancies

Medication	Total Medications	No Discrepancies (%)	Discrepancies				
			VA Only	Non-VA Only	Dose	Frequency	Total Discrepant, No. (%)
All anticoagulants	62	38 (61.3)	5	11	4	4	24 (38.7)
Aspirin	45	25 (55.6)	2	10	3	5	20 (44.4)
Warfarin	5	2 (40.0)	0	1	1	1	3 (60.0)
Other anticoagulants/antithrombotics	13	11 (84.6)	2	0	0	0	2 (15.4)
All hypoglycemic	46	18 (39.1)	7	5	12	4	28 (60.9)
Insulins	23	6 (26.1)	3	3	9	2	17 (79.9)
Other hypoglycemics	23	12 (52.2)	4	2	3	2	11 (47.8)
All opioid/sedative	36	11 (30.6)	4	13	4	4	25 (69.4)
Opioids	24	5 (20.8)	4	8	4	3	19 (79.2)
Sedative/hypnotic anxiolytic	12	6 (50.0)	0	5	0	1	6 (50.0)
Other high risk[a]	16	8 (50.0)	3	3	0	2	8 (50.0)
Total high risk	160	75 (46.9)	19	32	20	14	85 (53.1)

[a]Other high-risk medications include first-generation antihistamines, tricyclic antidepressants, and scheduled nonsteroidal anti-inflammatory drugs.

discounted medications. The use of the VA for medications also was a way for the non-VA provider to discover that the patient was a veteran. One non-VA provider was particularly concerned about the impact of new or different medications from VA prescribers on efforts to stabilize the patient's chronic condition.

Several non-VA providers reported that veterans often brought a medication list to the appointment, and several providers recommended the practice to their patients. Non-VA providers preferred to have patients transfer information from VA, sometimes requesting that veterans bring in their records from recent appointments rather than the non-VA provider obtain the information directly from the VA.

Information sharing. Non-VA providers generally preferred hard copies of medication lists and other documents rather than scans because they were more likely to be included in decision making if the documents were presented during the visit. Also, document scans may be buried in the electronic medical record. Some providers mentioned their interest in electronic transfer of medical information like medication lists if the technology were more developed and better integrated.

"I think the long-term vision would be that it should be electronic… it wouldn't necessarily be feasible at this time. Our system scans paper documents in to an e-version. … but when the patient comes to their encounter 10 days later, you don't realize the stuff's there… Having the patient bring them in is probably a more certain way to make sure that it's actually included in your decision making as a provider."

Most non-VA providers welcomed more information such as imaging studies because they reported rarely receiving this information from the VA system. Two mentioned the po-

tential for too much information and wanted concise reports should the flow of information increase. Providers had little interest in logging in to a patient's online health record portal as a delegate for reasons related to complexity, time, privacy, and lack of mechanism to document the information accessed.

Medication reconciliation. Non-VA providers generally reported that patients bringing their own or an outside medication list would prompt a process of medication reconciliation. The providers were interested in making changes to their records based on other lists, but outside data were verified against a patient self-report of actual use before adopting changes.

"I print out my med list of what I have in the computer and then I just check off my list against their list. And then whatever's remaining, we talk about what the differences are, when they were changed, what they were

Table 4. Duplications Between Medication Lists

VA Medication	Non-VA Medication
Atorvastatin	Simvastatin + lovastatin[a]
Atorvastatin	Rosuvastatin
Atorvastatin	Atorvastatin + rosuvastatin[a]
Carvedilol	Metoprolol
Glyburide	Glyburide and glipizide
Insulin aspart	Insulin lispro
Lansoprazole	Pantoprazole
Metoprolol	Carvedilol
Metoprolol + nebivolol[a]	Nebivolol
Omeprazole	Esomeprazole
Pravastatin	Atorvastatin
Sildenafil	Tadalafil
Valsartan	Losartan
	Vardenafil + sildenafil[a]
	Vardenafil + sildenafil[a]

[a]Both medications were on the list for the given column. A blank means the medication type was not present on the list corresponding to the column.

changed for, if they were taken off of something, and if I don't agree, then I'll tell the patient, 'look, there's a disagreement here, they've told you not to be on this. I want you on this."

Should a discrepancy arise, non-VA providers generally had a negative view of attempting to contact VA providers. Other mechanisms such as calling a local pharmacy would be done first.

DISCUSSION

This study provided initial evidence that medication list discrepancies exist for dual use veterans. Other studies of medication list discrepancies have linked such inconsistencies to medication-related problems and negative outcomes for patients.[27] Although efforts to increase access to care for veterans have advantages related to expediency, consequences to fragmenting care exist. More robust mechanisms for establishing and maintaining medication list consistency are needed, especially given the lack of a universally accepted medical record format or repository. A multifaceted approach, including patient engagement, seems necessary.

This study also showed that discrepancies of high-risk medications are common for veteran participants, placing them at risk for medication-related problems and harm. These risks included dose and frequency discrepancies that could result in over- or underdosing of medications and in medication omissions, which could cause duplicative therapies and unnecessary risks. For example, aspirin frequently was listed on non-VA lists but was omitted from VA medication lists. This could be problematic for patients who present to the VA for a procedure in which no information about aspirin could jeopardize their safety. Insulin doses also were commonly discrepant, which could impact glycemic control.

Many providers also had incomplete prescribing information for opiates. Those prescriptions are particularly relevant given the link between veterans, posttraumatic stress disorder, depression, and substance abuse.[28-30] However, it was beyond the scope of this pilot study to link these discrepancies to ADRs, such as emergency department visits or hospital admissions. Other studies have demonstrated that discrepancies at hospital discharge can result in these types of negative outcomes.[27,31] Subsequent research should determine the clinical significance of discrepancies that occur when veterans are dual users.

The qualitative interviews provided some initial context on prescriber perspectives about the role of veterans participating in the medication list sharing process and personal health records. It seemed that for the portion of patients who brought a list to their non-VA provider appointment, the information was welcomed but fell outside the usual visit workflow. Many provider visits are dominated by current patient symptoms, and issues of reconciling medications may be a lower priority.[32] Also, some providers may delegate medication reconciliation functions to a nurse or other support staff. One physician offered that he delegated logging in to a patient's online medication information to a health coach on staff. These findings were consistent with perspectives shared by non-VA family practice physicians about personal health records.[33]

The most common way to integrate outside medication lists into the non-VA provider's medical record seemed to be scanning the document. Scanning had its limitations because the provider might be unaware of the scanned document, and there were no mechanisms to import medication names and doses. However, the process may improve only the non-VA providers' records, as they reported that they had no easy or consistent way to transmit medication changes to notes to the VA.

In general, communicating with VA providers was seen as not feasible and not worth their time or effort. It may be beneficial to address this non-VA provider concern because it

seems to inhibit the transfer of important health information and the maintenance of a concordant medication record. Information transfer is particularly relevant for veterans who are primarily cared for by non-VA providers and use the VA only to get prescription medications.

In the current approach, non-VA providers have no simple, direct way to update the VA medication list. Transmitting updates carries the risk of inappropriate changes and is concerning if neither or both prescribers consider themselves to be responsible for the patient's medications. Also, the potential exists for all medication lists to be inaccurate if the lists do not reflect the medications patients take when left on their own. Patient nonadherence rates can exceed 50%, depending on the medication.[34,35] Several interviewed non-VA physicians stressed the importance of asking patients to list the medications they were using during the medication reconciliation process.

This study offers several areas for additional inquiry, including understanding how providers make sense of medication lists from other sources and what technologies can be applied to increase list consistency without increasing the burden on providers.

Practice Implications
Although patient involvement in medication list sharing has the potential to improve information consistency, health systems, providers, and other stakeholders should be cautious in assuming that other prescribers will work to combat medication list entropy, especially if no systems exist to seamlessly incorporate this information into clinic workflow. Devising standardized procedures when patients bring in their records from other providers increases the likelihood that this information will be

incorporated into clinical decision making and maintaining up-to-date medication information for patients who use multiple prescribers.

Limitations
These analyses are based on a small sample size (n = 50 for chart review) and (n = 8 for the semistructured interviews) from a single Midwestern state. These findings should be used as evidence for further inquiry.

CONCLUSION
This study illuminates the level of discrepancies between the medication lists of veteran dual users, including high rates of discrepancies for high-risk medications, such as anticoagulants and opiates. This study also provides evidence of deficiencies in the health care system to decrease medication list entropy that may place veterans at an elevated risk for adverse medication events. ●

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