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ORIGINAL RESEARCH ARTICLE

Documentation of Functional Medication Management in Older Adults: A Retrospective Chart Review in Acute Care Hospitalization

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Abstract

Background Functional skills can affect the ability of older adults to appropriately manage their medication regimens. Research evaluating a patient's functional ability or the assessment of medication management is limited.

Objectives Our objective was to describe the documented components of functional medication management (FMM) in adults aged ≥65 years during an acute hospital stay. The secondary objective was to describe the characteristics of the healthcare providers (HCP) who document FMM.

Methods This study was a retrospective chart review of a sample of patients aged ≥65 years admitted to medical units in a tertiary hospital from January 2013 to October 2014. FMM was defined as the steps required to take medications—including ordering, picking up, organizing, preparing, administering, and monitoring medications—and the functional abilities necessary to perform these tasks.

Results The mean (standard deviation [SD]) age of patients was 78.9 (8.4) years; 72 (52 %) were female. Of the 190 charts screened, 140 were eligible for inclusion. The mean (SD) number of documented scheduled oral medications was eight (3.1) per patient, and 108 (77.1 %) charts contained documented FMM-related information. Commonly documented FMM components included whether the patient could administer medications independently (73 [52 %]) or schedule medication (46 [33 %]). These activities were most frequently documented by physicians (124 [39 %]) and occupational therapists (108 [34 %]).

Conclusion FMM assessments for older adult inpatients with multiple comorbidities and complex medication regimens were not documented comprehensively or frequently. Given the complexity of medication regimens and the functional skills required to manage medications at home, failing to document these assessments when evaluating patients in hospital reflects a lost opportunity.

Key Points

Functional medication management (FMM; the processes and skills involved in taking medications—including ordering, picking up, organizing, preparing, administering, and monitoring—and the functional abilities required to perform these tasks) is only assessed occasionally when older adults are admitted to acute care hospitals.

FMM is primarily assessed by physicians and occupational therapists, but more comprehensive assessment could be completed prior to patient discharge from hospital with engagement from all team members.

Older adults frequently have complex medication regimens. Given the high level of functional abilities required for patients to manage medication regimens at home, these assessments need to be incorporated into the hospital-based care of older patients.

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1 Introduction

Given the high number of chronic conditions requiring medication and the level of age-dependent physical disability in older patient populations, it is important to address medication use and safety [1]. With the increasing number of chronic conditions, more medications are being prescribed, putting older adults at a higher risk of medication errors. In one large clinical study, 50 % of older adults who managed their own medication regimens had medication errors, and 12 % of patients were receiving one or more medications at an inappropriately high dose [2]. Marek et al. [3] assessed this risk and reported that approximately 30 % of older adult hospital admissions are drug related, with more than 11 % attributed to medication non-adherence and 10–17 % to adverse drug reactions.

Functional medication management (FMM) encompasses the abilities and processes involved when older adults take medications [4–7]. Multiple factors, including the complexity of the medication regimen, affect the ability of older adults (aged >65 years) to manage their medications appropriately [8]. Additionally, older adults may have physical and cognitive impairments that can hinder their ability to correctly administer medications. Functional skills such as fine motor coordination, vision, and cognitive ability are a few factors that can affect medication outcomes in older adults [9].

A number of steps should be considered when assessing FMM in the older adult. To correctly take medication, the patient must consider the type of medication, amount, frequency, and mode of administration. The physical requirements to manage a medication regimen include vision and hand dexterity, and patients must have sufficient cognitive ability to comprehend instructions.

Comprehensive medication assessments, which include an assessment of functional status, are beneficial in addressing drug-related problems, including the discontinuation of unnecessary or inappropriate medications [10]. However, limited evidence exists that specifically addresses or defines the processes or steps older adults must take to self-manage their medications. Although functional assessments are completed in an acute care setting by a number of healthcare providers (HCPs), few assessments specifically evaluate the patient's ability to manage their medication regimens, and FMM is generally not assessed consistently.

The overall aim of this study was to examine FMM assessment for older adults in an acute care setting. The primary objective was to describe the components of FMM documented for older adults on medical wards in a tertiary centre. The secondary objective of this study was to describe the characteristics of the HCPs who document FMM.

2 Methods

We undertook a retrospective chart review of adults aged ≥65 years admitted to six medical units at the University of Alberta Hospital (Edmonton, AB, Canada) from Jan 2013 to Oct 2014. The medical units included two family and four internal units; all were covered by multidisciplinary teams. A sample of charts was created by selecting the health records of every tenth patient (Fig. 1). Charts were selected if patients (1) were aged ≥65 years, (2) were receiving at least one medication, and (3) had a length of stay of 3–21 days. The minimum 3-day hospital stay was to ensure adequate time for an HCP to complete an assessment, and the 21-day maximum length of stay was determined to be a reasonable timeframe in which an acute assessment could be documented. If multiple admissions occurred during the study period, we only included the first admission. Exclusion criteria were as follows: (1) in-hospital mortality, (2) admission from a nursing home or a long-term care facility that included formal medication assistance, and (3) documentation of participation in the medication assistance program (MAP: a province-wide program in Alberta that guides home care workers to provide medication-taking support for community-dwelling seniors) prior to admission.

2.1 Functional Medication Management (FMM)

For the purposes of this study, FMM included various components and was defined as the process of taking medications within the patient's home environment and the physical and cognitive function required to manage a medication regimen (see the Electronic Supplementary Material [ESM]). We developed this list of FMM components from literature about the functional capacities of seniors and the difficulties they face with managing

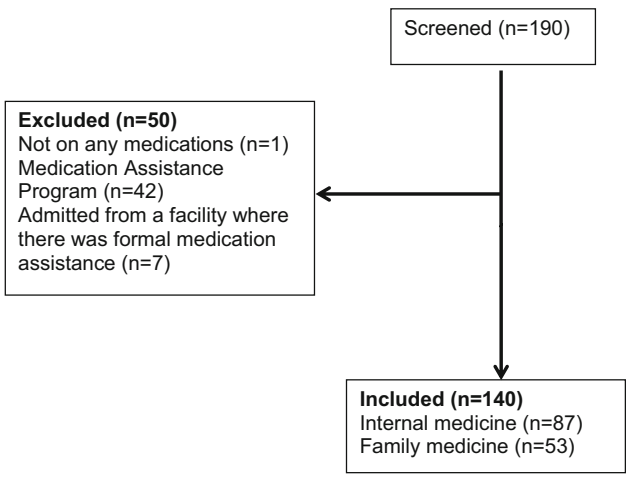

Fig. 1 Chart review criteria

medication [6, 7, 11, 12]. We used the Mini-Mental State Exam (MMSE) or Montreal Cognitive Assessment (MoCA) score to assess cognitive function, and used language and education as components to assess communication barriers and the ability to understand and comprehend information; however, these components are not explicitly included in the medication assessment context. We did not evaluate the rationale for the documentation. For example, a cognitive test could be completed to diagnose dementia or to assess a patient's ability to maintain a driver's license, not solely to assess a patient's ability to manage medications. We recorded whether a measure was documented on the chart.

2.2 Data Collection

A single reviewer (MB) used a standardized form to collect information from patient charts, and another research team member (CS) intermittently reviewed the abstraction process to identify any challenges or difficulties interpreting data from the chart. Location of documentation on the chart was pre-defined to enable consistent systematic abstraction (ESM). We collected demographic information, medical conditions relating to disability, diagnosis most responsible for the hospital admission, length of stay, complexity of medication regimen (number of oral medications and devices), support system arrangements, components of FMM, and the HCP who documented the assessment.

2.3 Analysis

The primary outcome was the proportion of charts on which each FMM component was documented. We also recorded the specific HCPs who documented the FMM. If multiple HCPs documented an FMM component, we only considered the documentation of each component once, under a separate category ('multiple HCPs').

Data were analyzed using proportions for categorical variables, with both means and standard deviations for normally distributed continuous variables, or medians and interquartile ranges for non-normally distributed continuous variables.

3 Results

3.1 Description of Subjects and their Medication Regimens

In total, 140 (73.7 %) of the 190 medical charts reviewed were included (Fig. 1). Almost half of this older adult population was male (68 [48 %]) (Table 1). Although the majority of patients (102 [73 %]) were admitted from the community, 72 (52 %) were discharged to assisted-living facilities. No differences were seen between medical conditions ($p = 0.261$) or medication regimen ($p = 0.063$) and the type of living setting (assisted vs. unassisted). Of patients discharged to assisted-living facilities, 31 (43 %) were initiated on MAP.

Language ability was described for 20 (14.3 %) patients, and education was documented for only 25. Of the patients for whom the level of education was assessed, 28 % ($n = 7$) had up to and including grade 8 education, 56 % ($n = 14$) had up to and including grade 12 education, and 16 % ($n = 4$) had any level of post secondary education.

In addition to oral medications, patients commonly (96 [69 %]) used medications in alternative dosage forms (e.g. inhalers, parenteral medications, and topical creams) (Table 2). A total of 38 (27 %) patients used a scheduled inhaler, whereas only four (3 %) used scheduled suppositories.

3.2 FMM Documentation

Of the 140 charts assessed, 108 (77.1 %) included at least one documented FMM component. Overall, the mean (standard deviation [SD]) number of FMM components documented per patient was 2.1 (1.8). Cognitive assessments were completed for 30 (21 %) patients (MMSE, $n = 14$; MoCA, $n = 16$); of these, the mean (SD) MMSE score was 21.5 (6.4) and the mean (SD) MoCA score was 19.6 (4.1). The two most common FMM components assessed were administering (73 [52 %]) and organizing medication (46 [33 %]); the least documented FMM component was manual dexterity (3 [2 %]) (Table 3).

3.3 Documentation of FMM by Healthcare Professionals

FMM assessments were most commonly documented by physicians (124 [39.4 %]) (Fig. 2); only 11 (3.5 %) assessments were documented by two or more HCPs. An assessment of swallowing ability relating to medications was mainly documented by a speech language pathologist (SLP) (17 [68 %]), ordering of medications was only documented by a pharmacist, and cognitive function was primarily documented by an occupational therapist (OT) (19 [63 %]). Physicians documented 12 of 13 FMM components, OTs documented 11 of 13 components, and pharmacists assessed and documented 8 of 13. In contrast, SLPs focused on only one functional aspect: swallowing ability (Table 4).

Patients discharged on an MAP had a higher mean (SD) number of documented FMM assessments (3.5 [1.9]) than patients not discharged on an MAP (2.4 [1.7]) ($p = 0.01$).

Table 1 Characteristics of study sample ($n = 140$)

Characteristic	($n = 140$)
Age, years	78.9 ± 8.4
Sex, female	72 (52)
Admitting diagnoses	
Infection (pneumonia, UTI, others)	32 (23)
Musculoskeletal (falls, fractures and pain)	28 (20)
Respiratory	20 (14)
Congestive heart failure	12 (8.5)
Electrolyte abnormalities/anemia	10 (7)
Cancer	9 (6)
Others	29 (21)
Medical conditions documented on discharge, relating to disability[a]	3.1 ± 1.5
≥5 medical conditions	25 (17.9)
<5 medical conditions	115 (82.1)
Length of stay, days, median (IQR)	6 (4.11)
Residence prior to admission	
Community	102 (72.9)
Assisted living or long-term care facility	38 (27.1)
Living arrangement at admission	
Alone	59 (42.1)
Partner	58 (41.4)
With another family member	20 (14.3)
Not reported	3 (2.1)

Data are presented as *n* (%) or mean ± standard deviation unless otherwise indicated

IQR interquartile range, *UTI* urinary tract infection

[a] Medical conditions include arthritis, chronic pain, type 1 or 2 diabetes mellitus, cardiovascular disease, cerebrovascular disease, Alzheimer disease/dementia, Parkinson disease, depression or anxiety, lung disease, cancer, hearing impairment, and vision impairment

No significant differences were seen between the number of medical conditions ($p = 0.351$) or the complexity of medication regimen, including devices ($p = 0.420$) and oral medications ($p = 0.260$), and the number of documented FMM assessments. Patients discharged to an assisted-living facility had a significantly higher mean (SD) number of documented assessments (2.8 [1.8]) than patients discharged to the community (0.87 [1.1]) ($p < 0.001$).

4 Discussion

Findings from this chart review indicate that HCPs in family and medical units of an acute care facility did not consistently assess FMM for older adults. Although patients were prescribed complex medication regimens, assessment of whether patients were able to manage the regimen once they were discharged was lacking. In a sample of medically complex seniors receiving numerous medications, HCPs typically documented two FMM components and rarely included physical and cognitive function components. The majority of HCPs who documented FMM were physicians and OTs. Another interesting observation was that pharmacists did not extensively document FMM.

The majority of medication regimens documented were complex, reflecting the mean age of our sample. Canadian seniors have complex medication regimens, with nearly two-thirds prescribed five or more medications [13]. The types of admitting diagnoses and living situations (the majority were in unassisted-living situations at admission) were consistent with Canadian data, which indicate that the most common reasons for hospitalization are infections, respiratory issues, and fractures [14, 15].

The majority of FMM documentation discussed the administration and organization of medications; however, numerous components were rarely assessed, such as the dexterity required to handle medications and the ability to order and pick up medications. Patients were assessed on how they organized their medications (e.g. dosette); however, how the dosettes were prepared or whether patients had the manual dexterity to administer medications from the dosette was not frequently assessed or documented. Similar to our findings, a clinical study that assessed functional capacity found that 41 % of older adults were unable to perform one or more tasks, including opening—or removing tablets from—a container, necessary to successfully administer their medication regimen [11]. Another study of community-based and institutionalized older adults reported 9.4 % could not read instructions on a medicine bottle label and 14.6 % could not open a flip-top vial, highlighting that it is important to assess physical function such as vision and hand dexterity for medication management [16]. Older adults have been previously identified as experiencing difficulty using inhaler devices [17]; we found inhalation technique was assessed by either a physician or a pharmacist and only in 11 % of patients who used one.

Our study has demonstrated that the medication regimens of older adults can be complex, with patients receiving an average of eight scheduled oral medications per day, 27 % using a regular scheduled inhaler, and 20 % requiring medication self-administered via an injectable device. Sino et al. [7] assessed the medication management capacity of 95 geriatric patients receiving five or more medications and found that only 48.4 % were able to independently manage their medication at home. About 40 % of participants were unable to state the names of their medications, even with the aid of a medication list, and about 25 % reported having problems with opening medication packages. Patients in this study were also noted as

Table 2 Frequency of the type of medications in hospital at discharge

Medication	n^a
Regimen	
Oral scheduled medications	8 ± 3.1
Oral PRN medications	1 ± 1.2
Devices	1.4 ± 1.36
Patients using medication devices at discharge	
Scheduled inhaler	38 (27.1)
PRN inhaler	33 (23.6)
Scheduled injection	28 (20)
Scheduled topical preparation	24 (17.1)
PRN topical preparation	7 (5)
Scheduled ophthalmic preparation	14 (10)
Scheduled nasal preparation	5 (3.6)
PRN nasal preparation	1 (1.2)
Scheduled suppository	4 (2.9)
PRN suppository	8 (5.7)

PRN when necessary

[a] Data are presented as *n* (%) or mean ± standard deviation

Table 3 Frequency of documentation of functional medication management components ($n = 140$)

FMM components documented	*n* (%)
Medication use process	
Ordering of medications	5 (3.6)
Picking up medications	12 (8.6)
Organizing medications	46 (32.9)
Preparing	19 (13.6)
Administration	73 (52.1)
Self-monitoring of therapy	17 (12.1)
Function	
Physical (hand dexterity)	3 (2.1)
Sensory (vision)	35 (25)
Swallowing ability	25 (17.9)
Inhalation technique assessed if using inhaler ($n = 46$)	5 (10.9)
Cognitive (MMSE/MoCA)	30 (21.4)
Language	20 (14.3)
Education	25 (17.8)
Number of patients with a component of FMM documented	108 (77.1)

FMM functional medication management, *MMSE* Mini-Mental State Exam, *MoCA* Montreal Cognitive Assessment

receiving 'as needed' (PRN) medications, including devices, which often require a higher level of functioning, involving knowing and understanding when it is appropriate to take that medication [18].

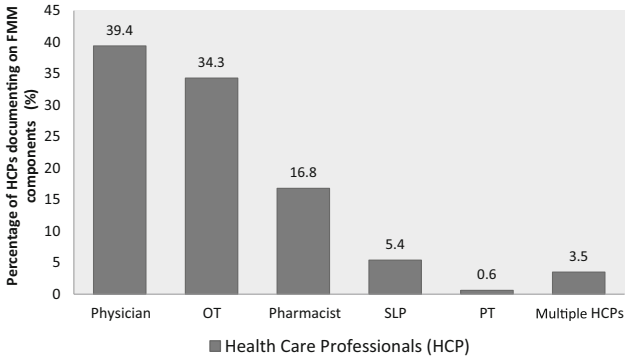

Fig. 2 Percentage of healthcare providers who documented any functional medication management components. *HCP* healthcare providers, *OT* occupational therapist, *PT* physiotherapist, *SLP* speech language pathologist

Certain medications that require detailed administration schedules or complex multi-step techniques can affect health outcomes if not managed appropriately [18]. Self-administered injectable therapies such as insulin have previously been documented as complex multi-step tasks that can be further complicated by co-existing impairments such as vision loss, decreased mobility, and poor manual dexterity [19]. Tasks associated with complex medication regimens emphasize the need for functional components to be incorporated in medication management assessment.

We found that physicians reported on the highest number of FMM components, which may be related to a physician's overall assessment of a patient, rather than concern about the patient's FMM abilities. While pharmacists have been shown to focus on medication regimen appropriateness or safety [19], very few charts in our study included documentation of FMM components being assessed by a pharmacist. Not surprisingly, pharmacists focused their assessments on medication use process rather than functional components. As expected, SLPs assessed only a small proportion of patients as SLPs only assess patients referred to them by other HCPs for swallowing issues.

Given the complexity of medication regimens and the functional skills required to handle these medications, FMM assessments should be incorporated into standard practice when evaluating older patients. Comprehensive geriatric assessment (CGA) is a validated process that incorporates assessment of the functional health status of older adults. Data as far back as the 1980s show that CGA combined with multidisciplinary interventions have improved survival and function and decreased the need for admission and institutionalization of elderly patients [20]; however, it may not be feasible or appropriate to conduct CGAs for every patient admitted to an acute care setting. Therefore, a tool that assesses the functional abilities of older patients to self-administer medications, or including

Table 4 Frequency of documentation of functional medication management by component and healthcare provider ($n = 140$)

	RPh	OT	PT	SLP	Physician	Multiple HCPs
Ordering of medications ($n = 5$)	5	0	0	0	0	–
Picking up medications ($n = 12$)	1	7	0	0	4	–
Organizing medications ($n = 46$)	11	16	0	0	16	3
Preparing ($n = 19$)	7	7	0	0	4	1
Administration ($n = 73$)	20	25	1	0	24	3
Self-monitoring of therapy ($n = 17$)	5	1	0	0	11	–
Dexterity ($n = 3$)	0	1	0	0	2	–
Vision ($n = 35$)	0	10	0	0	25	–
Swallowing ability ($n = 25$)	2	0	1	17	5	–
Inhalation technique if using inhaled medications ($n = 5$)	2	0	0	0	3	–
Cognitive assessor ($n = 30$)	0	19	0	0	10	1
Language ($n = 20$)	0	5	0	0	12	3
Education ($n = 25$)	0	17	0	0	8	–
Total	**53**	**108**	**2**	**17**	**124**	**11**

HCP healthcare provider, *OT* occupational therapist, *PT* physiotherapist, *RPh* registered pharmacist, *SLP* speech language pathologist

this component in the Best Possible Medication History form or in medication reconciliation, may help team members identify and address the FMM components their patient requires. A recent study involving the development of a discharge information tool for patients showed that incorporation of medication management issues was important for patients leaving hospital [21]. Our study suggests an example of FMM components that may be considered when assessing medication therapy. Additional issues include education and support for HCPs, not only in assessing FMM but also in the application of FMM to patient care (e.g. once a patient is assessed as having cognitive or physical impairment, how are these data incorporated into assessing medication appropriateness?). Educating all team members as to how they can contribute to safe medication use through FMM assessment may lead to improved documentation and minimize task duplication once roles and responsibilities are clarified. Previous initiatives have attempted to address medication appropriateness in seniors or interventions to reduce polypharmacy [22], but FMM has received little research attention [23].

A few limitations of our study need to be considered. No universally accepted definition of FMM exists. We used literature that investigated the functional capacity [6, 7, 11] of older adults and functional difficulties that are typically faced with medication therapy to define these components, and termed it 'FMM'. We also weighted all FMM components equally, which may not be applicable to all patients. We included all documentation of pre-specified functional measures, even if the reason for conducting the assessment did not pertain to FMM. The data were collected from medical units at one hospital site, which may constitute a selection bias. The frequency of FMM assessments may vary according to hospital setting, patient characteristics, admitting diagnosis, and medical complexity. Finally, this was a retrospective chart review, with data extracted primarily by one person. This kind of review depends on the quality of documentation, and the task was hampered by issues such as unrecoverable or unrecorded information, difficulty interpreting jargon or acronyms and verifying information, and the varying quality of information recorded by HCPs. Charts were pre-screened and reviewed by a single reviewer systematically using a data-collection sheet to minimize these limitations. Documentation may also be under-represented, and HCPs may not have systematically documented their assessments on FMM.

Future work is needed to address whether other components could have been considered in the definition of FMM, and further research is required in this area to help standardize the definition. For example, a complete assessment of all sensory functions, including hearing, or other functions involved in understanding and comprehending new instructions may be included in future tools defining FMM. In addition, interventions to improve HCP understanding of FMM, and interventions to improve application in practice, are necessary. The quality of documentation recorded by HCPs may also need improvement, which could include the development of a tool that captures these data.

5 Conclusion

We found older adults with multiple comorbidities and complex medication regimens do not consistently undergo or have documented an FMM assessment when admitted to

an acute care facility on medical wards. Some team members did not contribute extensively to the documentation of assessments, despite older adults in this sample being in the hospital for a reasonably long length of stay. To provide the most appropriate interventions for independent medication management for older adults, assessments of function should be included as a component of medication management, and further research should focus on creating a standardized FMM form and process. Staff education targeted toward HCPs likely to be completing this process is necessary.

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Compliance with Ethical Standards

Ethics approval for the study was obtained from the University of Alberta Health Research Ethics Board.

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Conflict of interest MB, CAJ, SK, EJ, and CS have no conflicts of interest.

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