

Development and Evaluation of a Reliable Medication Management Self-Assessment Checklist

Brian J. Isetts, B.Sci. Pharm., Ph.D., B.C.P.S.¹; Kristine M. Talley, GNP, Ph.D.²; Ann M. Brearley, Ph.D.³

¹ University of Minnesota College of Pharmacy

² University of Minnesota School of Nursing

³ University of Minnesota School of Public Health

Abstract

An ability to effectively self-manage medications is the result of several factors influencing a person's decision to take medications. The need for new approaches to medication self-management are evident in the persistent trends of ineffective medication use and unfortunate consequences, referred to as drug-related morbidity and mortality. Fortunately, pioneering initiatives have emerged to reshape our approach for developing a rational organizational paradigm so that patients can confidently self-manage medications. Favorable outcomes of studies pertaining to the delivery of comprehensive medication therapy management services within the practice of pharmaceutical care prompts the question, 'Can patients and family members apply a consistent and systematic 4-step pharmacotherapy assessment process to better organize their decision-making and confidence in medication self-management?' To answer this question an Effective Medication Self-Management Toolkit based on this 4-step process, and a Medication Management Self-efficacy Checklist, were developed and evaluated for feasibility, acceptability, and internal consistency reliability. The first evaluation established the preliminary acceptability and feasibility of the toolkit using a convenience sample of 39 residents of independent living facilities in focus group sessions. All participants indicated they perceive that the 4-step process can help individuals successfully self-manage medications. At the conclusion of the focus group sessions, all 39 participants completed the 7-item post-session checklist. This paper presents the second evaluation to establish the internal consistency reliability of the toolkit's Medication Management Self-efficacy Checklist using Cronbach's alpha. There was good internal consistency of the self-efficacy checklist with a Cronbach's alpha value of 0.82. This investigation of a novel approach for applying the 4-step pharmacotherapy assessment process by patients suggests that the medication self-efficacy checklist provides a reliable and useful measure of a patient's confidence in self-managing medications.

Keywords: Medication self-management; Shared decision-making; Medication appropriateness; Self-efficacy

Introduction

Several factors influence a person's decisions related to effectively self-managing medications. An inability to self-manage increasingly complex medication regimens can lead to reduced treatment benefits, failed symptom management, increased hospitalizations, and adverse complications from over and under use of medications.^{1,2} Early studies of medication self-management focused on an obedience model referred to as medication compliance. Although these studies found that approximately 50% of patients take medications differently than as prescribed, they were not designed to identify characteristics of individuals successfully managing their medications.^{3,4}

The need for new approaches to medication self-management are evident in the persistent trends of ineffective medication use and unfortunate consequences, referred to as drug-related morbidity and mortality (DRMM). First measured in 1995, DRMM was estimated to cost the U.S. \$76.6 billion in the ambulatory setting.⁵ This study was replicated in 2000 estimating the cost of DRMM as exceeding \$177.4 billion, and in 2016 the estimated cost of DRMM rose to \$528.4 billion.^{6,7}

Corresponding Author:

Brian J. Isetts, PhD. BCPS, RPh

University of Minnesota College of Pharmacy

E-Mail: isett001@umn.edu ; Phone: 651-301-1804

Fortunately, pioneering initiatives have emerged to reshape our approach for developing a rational organizational paradigm so that patients can confidently self-manage medications. A seminal nursing study utilized a unique methodology by first identifying individuals who were successfully self-managing their medications, and then analyzing the common attributes of these individuals as they relate to living orderly and aging well. Key determinants revealed themes of establishing habits and routines, simplifying and tracking medication use, collaborating to address concerns and costs, and valuing medications as essential for maintaining health. Within the attribute of valuing medications as essential for maintain health is a prevailing attitude of confidence in the use of medications as essential for a daily commitment to health and well-being.²

Another important development was the establishment of a consistent and systematic 4-step process specific to assessing the appropriateness of medication use. This comprehensive medication management process, referred to as a pharmacotherapy assessment, was developed in the 1990's to first assess the intended use of each medication, then effectiveness, then safety, and finally convenience of use (or ability to take a medication as intended to achieve treatment goals).⁸ The value of this comprehensive medication management – pharmacotherapy patient care assessment process applied in interprofessional team settings has been

demonstrated to improve clinical, economic and humanistic outcomes of care.⁹⁻¹⁵

Development of a Medication Self-Management and Self-Assessment Resource for Patients

In light of favorable outcomes of studies pertaining to comprehensive medication management, it prompts the question – ‘Can patients and family members apply this 4-step process to better organize their decision-making process and confidence in medication self-management?’ To test this novel concept an educational toolkit and medication self-assessment checklist were created and tested for acceptable and feasible use in patients’ homes and for internal consistency reliability of the checklist.

The first phase of this new strategy was to develop a resource, or toolkit for effective medication self-management using the 4-step pharmacotherapy assessment process. The Effective Medication Self-Management Toolkit was designed for both interprofessional care teams as well as patients and families. It is freely available at <https://mngwep.nexusipe.org/toolkits/effective-medication>.

Resources contained in the toolkit focus on patient needs within the consistent 4-step pharmacotherapy assessment process for assessing indication, effectiveness, safety, and convenience of use.¹⁶ The toolkit contains innovative self-paced digital modules with animated case scenarios, interprofessional resources to help improve medication self-management such as motivational interviewing, patient tips and tools for reducing the financial burden of medication costs, and a medication self-management self-efficacy checklist supported by self-deficit nursing theory and principles guiding the construction of self-efficacy scales.^{2,17,18}

The second phase was to assess the feasibility and acceptability of this new approach toward improving patients’ confidence in managing medications. To address this question, focus groups of older adults were convened to gain an in-depth understanding of medication use challenges experienced by patients, and to obtain data on the acceptability and feasibility of applying the systematic 4-step pharmacotherapy assessment process in patients’ homes.

Results from two focus group sessions of 39 independent apartment facility residents found that all 39 participants answered yes to the post-survey research question, ‘Can the Minnesota Effective Medication Self-Management Toolkit 4-step approach help an individual perceive they are capable of successfully managing their medications?’¹⁹

A second component of this study was to administer the toolkit’s Medication Management Self-efficacy Checklist at the conclusion of the focus group sessions to assess the internal

consistency of the Checklist. This article describes development of the Minnesota Medication Management Self-efficacy Checklist, including evaluating the inter-relatedness of items using a measure of internal consistency.

Self-efficacy refers to an individual’s belief in his or her abilities based on feelings of self-confidence and control. Self-care agency is the ability to engage in self-care practices to meet the requirements of life. Assessing self-efficacy is supported by self-care deficit theory of nursing in which self-care is hypothesized to be a function that individuals perform to maintain life and promote health and well-being.¹⁷ Self-efficacy scales have been psychometrically validated in nursing care as a predictor of motivation and behavior.¹⁸

The Medication Management Self-efficacy Checklist is intended to be administered by any health team member or caregiver (see Appendix). The development of this checklist is consistent with a psychometrically validated 10-item instrument for measuring patient satisfaction with medication therapy management services that has been in use across Minnesota care systems since 2001.²⁰ The Minnesota Medication Management Self-efficacy Checklist is designed to help individuals gauge their level of confidence related to the intended medical reason for taking each medication, how their medications are working, how certain they are about safety of their medications, how they are taking medications, and how confident they are overall in managing their medications.

Consideration in developing the self-efficacy checklist includes collaborations between patients and their interprofessional care team in applying the checklist in practice. One way that health teams could employ using the checklist is as an initial assessment of how confident an older person is in managing their medications. If a person registers a response on the lower end of the 0 – 10 self-efficacy confidence scale, patients and providers would focus their discussion with patients and families on their understanding and confidence in that area. Therefore, the objective of this component of the study was to gather preliminary data to assess internal consistency of the Minnesota Medication Management Self-efficacy Checklist.

Methods

Purposive sampling was used to select focus group participants at two independent senior apartment buildings in the suburbs of Minneapolis. Focus group participants were offered a \$40 pre-paid gift card honorarium with light snacks, and oversight of this study was conducted through the University of Minnesota Human Research Protection Program (IRB ID: STUDY00016902). Each focus group session was 50-60 minutes in length guided by use of a Facilitator Guide, and no protected health information (PHI) was collected.

Upon concluding each focus group session, participants were asked to provide responses to the 7-item Minnesota

Medication Management Self-efficacy Checklist to obtain preliminary data on the extent to which indicators of confident medication use in the checklist measure the same concept. Administration of the 7-item checklist was performed in the last 10 minutes of the focus group session which included a five-minute overview of the 4-step pharmacotherapy assessment process and five minutes for respondents to complete the checklist.

The inter-relatedness of the items was then assessed using Cronbach's alpha which provides a measure of the internal consistency of a scale expressed as a number between 0 and 1 in which items that are correlated to each other have a high value of alpha. Acceptable values of Cronbach's alpha range from 0.70 to 0.95.²¹ Data from the post-survey and responses to the Medication Management Self-efficacy Checklist were entered into a spreadsheet by the pharmacy doctoral student and verified by the P.I. before forwarding to the statistician for analysis.

Results

There were 39 individuals who participated in the focus group sessions (19 at the first independent senior apartment complex and 20 at the second site). The participant age range was 62 to 97, including 32 female and 7 male respondents. Findings from the toolkit's acceptability and feasibility analysis, together with content analysis of participants' focus group comments, have been published elsewhere.¹⁹

All 39 participants completed the 7-item self-efficacy checklist, except that one participant had missing responses for Items 2 and 4 of the checklist. Only complete cases were used in the analysis. The internal consistency for the seven questions of the self-efficacy checklist were assessed using Cronbach's alpha value, and the results are summarized below (Table 1). The overall Cronbach's alpha value assesses all seven questions together; the conditional values are what the Cronbach's alpha value would be if each question in turn were left out of the analysis. There appears to be good internal consistency among the seven items in the questionnaire as the Cronbach's alpha value is 0.82 (95% confidence interval 0.79-0.85). The conditional Cronbach's alpha values are also relatively consistent, both with each other and with the overall value, indicating that no single question gives substantially different results than the other six.

Discussion

The persistence and magnitude of drug-related morbidity and mortality combined with the fact that approximately 50% of patients take medications differently than as prescribed, frames the need for new approaches to medication self-management. A novel organizing paradigm to help patients and families make sense of medication use serves as the basis for the Minnesota Northstar Effective Medication Self-Management initiative. The 4-step pharmacotherapy

assessment process for building confidence in the use of medications is drawn from the consistent and systematic pharmacotherapy patient care assessment process,⁸ codified in Current Procedural Terminology (CPT[®]) as medication therapy management services.²²⁻²⁴

This study provides preliminary results supporting internal reliability of the Medication Management Self-efficacy Checklist in a population of individuals residing in independent senior apartments. One limitation for assessing internal consistency of the Medication Management Self-efficacy Checklist is that Cronbach's alpha is a property of the checklist scores from a specific sample of respondents. Therefore, investigators seeking to utilize this self-efficacy checklist in the future should measure alpha each time the test is administered.²⁵ Another limitation is that our sample may possess characteristics affecting generalizability as results from different populations of patients may produce differing results. In the focus group sessions, there were 32 female, and 7 male respondents and results may have differed if there had been a higher percentage of male respondents. In addition, it would be helpful to assess the feasibility of this 4-step pharmacotherapy assessment approach and use of the medication management self-efficacy checklist in family members and caregivers of patients who manage medications for individuals who are frail or cognitively impaired.

Future implications for use of this 4-step approach are promising. Initiatives in which this approach may have immediate application include deprescribing efforts and in implementation of the updated Beers Criteria^{26,27} in assessing the appropriateness of each medication in use by patients. A common challenge of the Beers Criteria among practitioners is the need for guidance on what to do or what actions to take to stop, change or avoid a Beers Criteria medication. Use of the 4-step pharmacotherapy assessment process provides practitioners with a systematic means to better evaluate the benefit-risk ratio of Beers Criteria medications. Systematically assessing the intended medical indication, effectiveness, safety and the ability to be taken is an approach that study respondents perceive as useful in confidently understanding the appropriateness of their own medications.

There are also important interprofessional care team implications of this approach. Although patients may understand how this 4-step approach can help them make sense out of taking medications, they could need health professional collaboration in shared decision-making related to specific clinical questions they have within the 4-step process. One way that health teams could employ using the checklist is as an initial assessment of how confident an older person is in managing their medications. If a person registers a response on the lower end of the self-efficacy confidence scale, such as less than 5 on the 0 – 10 scale, it would be helpful for caregivers and providers to focus their discussions with patients and families

on their understanding and confidence in that area. This is practical guidance for collaborations between patients and providers as specific threshold values on the medication self-efficacy checklist would benefit from further study. Another possible use of the checklist is as a follow-up tool after three to six months to measure the patient's progress toward increased confidence in managing their medications. Based on the focus group experiences, the Medication Management Self-efficacy Checklist can be administered in under 10 minutes which includes a five-minute overview of the 4-step pharmacotherapy assessment process and five minutes for a patient to complete the checklist.

One of the most important interprofessional concepts embedded in this 4-step pharmacotherapy assessment process is that care team members will be better prepared to help patients self-manage medications by also knowing the intended reason for each medication a patient is taking, how each medication is supposed to work, which safety concerns are specific to that patient, and how they are able to take and afford their medications. A specific example of how a health team member could apply use of both the 4-step pharmacotherapy assessment process and corresponding checklist would be in the all-too-common case of an older person's falls risk. A patient at risk for falls may not be aware that drugs such as blood pressure medications, anticholinergic agents, and sedatives can contribute to falls. Interprofessional team members are in an excellent position to recognize this risk and assist other care providers in taking action to address medication-related falls using the 4-step process.

There are also important patient awareness implications for use of this novel 4-step approach in patients' homes. It can be argued that the systematic 4-step pharmacotherapy assessment process for ensuring the appropriateness of a patient's medications may be one of the best kept secrets in health care. This notion was reinforced when focus group session participants adamantly commented, 'If this systematic 4-step medication use process has been around for more than 30 years, how come this is the first time we're hearing about it now?'¹⁹ It can be reasoned that as more individuals learn about this approach and experience beneficial outcomes, there will be greater demand and heightened expectations for this approach and the benefits of applying the 4-step pharmacotherapy assessment process.

The results of this study provide preliminary data needed for further research related to measuring the outcomes of this medication self-management approach, and use of the Medication Self-efficacy Checklist in a larger population of older adults. Effective medication self-management does not need to be a daunting problem as health systems, interprofessional care teams, and patient advocates work together to help patients and family members confidently manage medications using a

systematic approach for making sense out of their daily use of medications.

Project Funding:

This study was supported through the University of Minnesota College of Pharmacy – Strategic Initiative Concept Proposal Program. Statistical analysis contributions were supported by the National Institutes of Health's National Center for Advancing Translational Sciences, grant UL1TR002494. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health's National Center for Advancing Translational Sciences.

Acknowledgements:

Resident and activity services directors Victoria Sliva and Lauren Mielzarek coordinated logistics and promoted focus group sessions at the independent senior living apartments.

Pharmacy doctoral student Gao Yang provided focus group logistical support and data entry.

University of Minnesota College of Pharmacy project administrative services were provided by Angel Sandriepe.

Members of the Minnesota Northstar Geriatrics Workforce Enhancement Program provided content support and peer review of the Minnesota Effective Medication Self-Management Toolkit

Preliminary Study Presentations:

Preliminary results of this study were presented on April 19, 2023, during a University of Minnesota, Office of Academic Clinical Affairs, Mini-Medical School program, and on April 20, 2023, during a Minnesota Gerontological Society monthly webinar program.

Conflicts of Interest:

The authors declare that there are no conflicts of interest.

Institutional Review Board Oversight:

Oversight of this study was conducted through the University of Minnesota Human Research Protection Program (IRB ID: STUDY00016902).

Disclaimer: The statements, opinions, and data contained in all publications are those of the authors.

References

- 1.) McDermott, M. M., Schmitt, B., Wallner, E. Impact of medication nonadherence on coronary heart disease outcomes: A critical review. *Arch Intern Med.* 1997; 157;1921-1929.
- 2.) Swanlund SL, Scherck KA, Metcalfe SA, Jesek-Hale SR. Keys to successful self-management of medications. *Nurs Sci Q.* 2008; 21(3):238-246.

- 3.) Steiner JF, Earnest MA. The language of medication-taking. *Ann Intern Med.* 2000; 132:926-930
- 4.) Brown MT, Bussell JK. Medication adherence: WHO cares? *Mayo Clin Proc.* 2011; 86:304-314.
- 5.) Johnson JA, Bootman JL. Drug-related morbidity and mortality. A cost-of-illness model. *Arch Int Med. (JAMA Int Med.)* 1995; 155:1949-1956. PMID: 7575048
- 6.) Ernst FR, Grizzle AJ. Drug-related morbidity and mortality: updating the cost-of-illness model. *J Am Pharm Assoc.* 2001; 41:192-199. DOI: 10.1016/s1086-5802(16)31229-3
- 7.) Watanabe JH, McInnis T, Hirsch JD. Cost of prescription drug-related morbidity and mortality. *Ann Pharmacother.* 2018; 52:829-837. DOI: 10.1177/1060028018765159
- 8.) Cipolle RJ, Strand LM, Morley PC. *Pharmaceutical Care Practice.* 1998, McGraw Hill: New York.
- 9.) Cranor CW, Bunting BA, Christensen DB. The Asheville Project: long-term clinical and economic outcomes of a community pharmacy diabetes program. *J Am Pharm Assoc.* 2003; 43:173-84. DOI: 10.1331/108658003321480713
- 10.) Isetts, B.J.; Brown, L.M.; Schondelmeyer, S.W.; Lenarz, L.A. Quality assessment of a collaborative approach for decreasing drug-related morbidity and achieving therapeutic goals. *Arch Intern Med. (JAMA Intern Med.)* 2003; 163:1813–1820.
- 11.) Isetts BJ, Schondelmeyer SE, Heaton AH, Wadd WA, Hardie NA, Artz MB. Effects of collaborative drug therapy management on patients' perceptions of care and health-related quality of life. *RSAP.* 2006; 2:129-142. doi:10.1016/j.sapharm.2005.12.002
- 12.) Isetts, B.J.; Schondelmeyer, S.W.; Artz, M.B.; Lenarz, L.A.; Heaton, A.H.; Wadd, W.B.; Brown, L.B.; Cipolle, R.J. Clinical and economic outcomes of medication therapy management services: The Minnesota experience. *J Am Pharm Assoc.* 2008; 48:203–211.
- 13.) Isetts, B.J.; Brummel, A.R.; Ramalho de Oliveira, D.; Moen, D.W. Managing drug-related morbidity and mortality in a patient-centered medical home. *Med Care.* 2012; 50:997–1001.
- 14.) McFarland MS, Finks SW, Smith L, Buck ML, Ourth H, Brummel A. Medication optimization: Integration of comprehensive medication management into practice. *Am Health Drug Benefits.* 2021; 14:111-114. PMID: PMC8845520
- 15.) Funk KA, Pestka DL, McClurg MT, Caroll JK, Sorensen TD. Primary care providers believe that comprehensive medication management improves their work-life. *J Am Board Fam Med.* 2019; 32:462-473.
- 16.) Minnesota Northstar Geriatrics Workforce Enhancement Program. *Effective Medication Self-Management.* Available at: <https://mngwep.nexusipe.org/toolkits/effective-medication>
- 17.) Orem DE. *Nursing: Concepts of Practice (6th ed.)*, 2001, Mosby: St. Louis, MO.
- 18.) Bandara A. *Self-Efficacy Beliefs of Adolescents.* 2006, Information Age Publishing: Charlotte, NC.
- 19.) Isetts BJ, Talley KM, Brearley AM. Assessing feasibility of a novel approach to effective medication self-management for older persons. *Geriatr Nurs.* 2023; 53:295-300. <https://doi.org/10.1016/j.gerinurse.2023.08.006>
- 20.) Moon J, Kolar C, Brummel AR, et al. Development and validation of a patient satisfaction survey for comprehensive medication management. *J Manag Care Spec Pharm.* 2016; 22:81-86.
- 21.) Tavakol M, Dennick R. Making sense of Cronbach's alpha. *Int J Med Educ.* 2011; 2:53-55. doi: 10.5116/ijme.4dfb.8dfd
- 22.) Isetts BJ, Buffington DE. CPT code-change proposal: National data on pharmacists' medication therapy management services. *J Am Pharm Assoc.* 2007; 47:491-495. doi: 10.1331/JAPhA.2007.07013
- 23.) American Medical Association. *CPT® Changes 2006: An Insider's View - Medication Therapy Management Services.* Chicago: American Medical Association; 2005:309–12.
- 24.) American Medical Association. *Current Procedural Terminology: CPT® 2007.* Professional ed. Chicago: American Medical Association; 2007: Medicine - Medication Therapy Management Services CPT codes 99605 – 99607.
- 25.) Streiner D. Starting at the beginning: an introduction to coefficient alpha and internal consistency. *J Pers Assess.* 2003; 80:99-103. DOI:10.1207/S15327752JPA8001_18
- 26.) The Canadian Medication Appropriateness and Deprescribing Network. *Medication appropriateness.* Available at: <https://www.deprescribingnetwork.ca/canadian-deprescribing-network>
- 27.) By the American Geriatrics Society Beers Criteria® Update Expert Panel. American Geriatrics Society 2023 updated AGS Beers Criteria® for potentially inappropriate medication use in older adults. *J Am Geriatr Soc.* 2023; 71(7):2052-2081. <https://doi.org/10.1111/jgs.18372>

APPENDIX

(<https://mngwep.s3.us-west-2.amazonaws.com/2022-06/Self-Efficacy%20Checklist.pdf>)

TABLE 1: Internal Consistency of the Minnesota Medication Self-Management Checklist

Item	Cronbach's Alpha	95% Confidence Interval
Overall	0.82	0.79-0.85
Without Q1	0.77	0.72-0.81
Without Q2	0.76	0.71-0.81
Without Q3	0.81	0.76-0.84
Without Q4	0.82	0.78-0.85
Without Q5	0.82	0.78-0.85
Without Q6	0.78	0.73-0.82
Without Q7	0.81	0.77-0.85