International Journal of Community Medicine and Public Health
Abdullah MY et al. Int J Community Med Public Health. 2022 Feb;9(2):1000-1004
http://www.ijcmph.com
pISSN 2394-6032 | eISSN 2394-6040

DOI: https://dx.doi.org/10.18203/2394-6040.ijcmph20220005

Review Article

Types of screening tools used to identify potential inappropriate medication in the geriatric

Marwah Y. Abdullah[1]*, Majed M. Alomari[2], Ali N. AlNihab[3], Maha S. Alshaikh[4], Maryam A. Alzahrani[5], Ali H. Al-Shehab[3], Munthir H. Alghafli[6], Ayat E. Shaban[7], Majed A. Bajaba[7], Samia S. Al Yateem[8], Ahmad A. Alseraihi[9]

[1]Department of Family Medicine, East Jeddah Hospital, Jeddah, Saudi Arabia
[2]Primary Health Care, Ministry of Health, Mecca, Saudi Arabia
[3]Department of Emergency Medicine, Anak General Hospital, Dammam, Saudi Arabia
[4]College of Medicine, Ibn Sina National College, Jeddah, Saudi Arabia
[5]Primary Health Care, Ministry of Health, Albaha, Saudi Arabia
[6]College of Medicine, King Faisal University, Hofuf, Saudi Arabia
[7]Al Nahda Primary Healthcare, Ministry of Health, Jeddah, Saudi Arabia
[8]College of Medicine, Imam Abdulrahman Bin Faisal University, Dammam, Saudi Arabia
[9]Department of Cardiology, King Salman Medical City, Medina, Saudi Arabia

Received: 25 December 2021
Accepted: 29 December 2021

***Correspondence:**
Dr. Marwah Y. Abdullah,
E-mail: Marwayq@gmail.com

ABSTRACT

Inappropriate intake of medications can increase the risk of many morbidities and mortality among the geriatric population. Therefore, assessment of drug underuse, overuse, and inappropriate use has been an area of interest across the different investigations, and according to which, different screening tools were developed to identify these problems and enhance the quality of care to these patients. In the present study, we aim comprehensively discuss the different types of currently reported screening tools that can identify potentially inappropriate medication in the geriatric population. Studies show that assess, review, minimize, optimize, reassess (ARMOR), and medication appropriateness index (MAI) tools are the most commonly reported for this purpose to appropriately evaluate drug administration practices. However, they are time-consuming and need adequately trained personnel, which might not be available within the different settings. Accordingly, we suggest that more than one tool should be used, as we have reviewed all the advantages and disadvantages of the modality within the current study, to adequately facilitate and make the process of evaluation easy and enhance the quality of care for the geriatric population.

Keywords: Geriatrics, Polypharmacy, Desprescription, Medication, Screening tools, Misbehavior

INTRODUCTION

Treatment of medical conditions in the geriatric population is usually done through means of medication administration.[1,2] Estimates show that the prevalence of different medical conditions that need adequate management is high among this population.[3-5] However, it should be noted that inappropriate intake of medications can increase the risk of many morbidities and mortality among them. Therefore, assessment of drug underuse, overuse, and inappropriate use has been an area of interest across the different investigations,[4] and according to which, different screening tools were developed to identify these problems and enhance the quality of care to these patients.

These tools should be used within the clinical practice to help physicians establish a valid structure to appropriately screen and detect the different practices related to medication use in the geriatric population. All of the proposed screening tools are mainly direct to make the process of screening against inappropriate medication systematic and to facilitate the process of inappropriate medication deprescription among physicians that deal with geriatric patients. Interactive online tools are usually used by the majority of busy clinicians as a result of the current trends that are directed at using online resources, in addition to the increasing practices of using online medical records and health digitalization.[6,7] In the present study, we aim to comprehensively discuss the different types of currently reported screening tools that can identify potential inappropriate medication in the geriatric population.

METHODS

This literature review is based on an extensive literature search in Medline, Cochrane, and EMBASE databases which was performed on 27 November 2021 using the medical subject headings (MeSH) or a combination of all possible related terms, according to the database. To avoid missing potential studies, a further manual search for papers was done through Google Scholar while the reference lists of the initially included papers. Papers discussing types of screening tools used to identify potential inappropriate medication in the geriatric were screened for useful information. No limitations were posed on date, language, age of participants, or publication type.

DISCUSSION

Many questionnaires were reported to assess medication use in the geriatric population, and determine the inappropriate behavior related to these practices. Nevertheless, it should be noted that some investigations were not adequately validated and still need to be furtherly assessed for their efficacy in this field. For instance, MedStopper is a previously validated online tool that has been widely used in this context and was mainly designed for older patients that are frail in mind to facilitate the process of deprescription of inappropriate medication use. However, it should be noted that the modality does not assess the underuse of medications, and only aims to assess potentially inappropriate medication use and overuse.[8]

The main purpose for which the screening medications in the older drug user (SMOG) was developed is the assessment of the frequency of the different drug-related problems prescription for geriatric patients by community and outpatient pharmacists using six different medications. Three main categories were reported for the drug-related problems that were assessed by the modality, including drug, patient, and provider-related concepts. Each of these domains is adequately defined and explained, and the instrument has been widely validated across the different investigations in the literature.[9] Previous investigations reported that using the instrument as an intervention for medication use among pharmacists in the geriatric care settings was significantly associated with enhanced rates of drug-related problems in these settings compared to the outcomes obtained with the usual care.[9,10] Many advantages were reported for the modality, including the easy accessibility and use by community pharmacists, and adequately defining the different parameters and domains of drug-related problems. However, the modality has not been associated with a predictive value for predicting these problems, has various limitations regarding validation and development description, and mainly relies on the tertiary literature to identify the different drug-related problems. Accordingly, further investigations are still required for further assess this screening tool, especially within the inpatient settings.[11,12]

The tool to improve medications in the elderly via review (TIMER) is another validated tool in the literature and assesses four different domains regarding potential inappropriate medication use among the geriatric population. These domains include management of complications, therapeutic goals, safety, adherence, and costs. Many advantages were reported for the TIMER tool, including being easy to use and having a structured format that helps care providers to enhance the quality of care related to medication use.[13] Nonetheless, it should be noted that the modality was not adequately validated within sufficient clinical investigations, and therefore, it should not be used in clinical settings until further studies were conducted. In this context, a previous randomized controlled trial reported that using TIMER was significantly associated with increased frequency of identification of drug-related problems in the elderly population by pharmacy students and practicing pharmacists.[13] However, it should be noted that the sensitivity of the modality in detecting drug-related problems is not remarkably high as compared to other assessment tools. Accordingly, it has been demonstrated that the modality can be used by pharmacists only in outpatient settings aiming at providing medication therapy management practice strategies.

Developing the assess, review, minimize, optimize, reassess (ARMOR) screening tool was first reported by Haque et al that aimed to reduce the drug-related problems among the geriatric population by enhancing the functional status through a systematic evaluation of medication use.[14] The tool can effectively help the user to identify and be aware of the monitoring, interactions, dosing, functional impact, efficacy, and safety of the administered drugs. Different medications were involved in the tool evaluating system, including vitamins and supplements, analgesics, antipsychotics, antidepressants, and beta-blockers. Evidence shows that the associated medication review of the included medications by the tool is adequately comprehensive. Moreover, it has been demonstrated that the tool is able to reduce or inhibit the administration of drugs that can potentially adversely impact the body functions, with more risks of developing complications

less than benefits, and medications that are not prescribed or indicated, in addition to reviewing subclinical drug-related problems, and the different drug interactions and their potential impact on the functional status of the geriatric population. The tool can also help patients adjust the doses of their medications based on their liver and renal functions and their health status. It has been shown to furtherly assess the vital signs, cognitive and functional status, adherence, and clinical status.[15,16] However, the use of this modality might be limited because of the usual unavailability of specific data related to the patient's health to the community pharmacist. It has also been reported that evidence regarding the validity of this tool furtherly lacks the indications and evaluation of the safety of the application. Therefore, further studies are also needed to adequately assess and validate the efficacy and safety of this screening tool.

Another tool that has been described in the literature is the assessing care of vulnerable elders-3 (ACOVE-3). This tool has been described to be composed of 392 quality indicators that evaluate 14 care processes and 26 conditions. Studies show that the tool was mainly designed to enhance the quality of care for vulnerable geriatric patients that are likely to become severely disabled within two years or are expected to pass away.[17,18] Among the different sections that were involved in this tool, the main section was specified for the assessment of appropriate medication use among geriatrics. Assessment of medication use in the geriatrics by this tool mainly addresses the concepts of general medication use and does not contain recommendations against avoiding harmful practices or avoiding certain medications. Evidence shows that the instrument only assesses 13 medications, of which nine are related to avoidance of administration of these medications. It is widely used because it can easily assess the intended outcomes during inpatient settings, at primary care, managed care, and at home.[19] Furthermore, many other advantages were reported for the modality, including data provision (supporting recommendation), easily used, and applicability across the different care settings. However, different parameters were not included in this tool (for instance, the different indicators of medication use). Accordingly, it has been demonstrated that this tool should only be used for severely disabled patients and who are expected to die, while assessment of potentially inappropriate medication use should be conducted by other assessment tools.[20,21]

Among patients with noncurable diseases, evidence shows that the good palliative–geriatric practice algorithm (GPGPA) has been used to reduce the administration of non-essential medications. The tool is mainly composed of six domains that can cumulatively enhance practices related to medication use among the geriatric population, whether by discontinuing the drug, reducing the dose, increasing the dose, or using another alternative drug. The functional status, therapeutic goals, drug-related adverse events, dosing, dosage system, efficacy, and indications are all included parameters within the tool that can effectively enhance the care of potential inappropriate medication administration. A previous investigation indicated the efficacy of the modality in achieving these outcomes when used in clinical settings. The authors reported that the rate of hospital refers and mortality events were significantly lower in the study group, where the GPGPA tool was applied, compared to the control group.[22] It should be noted that many advantages were reported for the tool, including patient-specific adaptability, being easy to use, and reduced adverse withdrawal events. However, it should be noted that some limitations were also reported for the tool.[23,24] This is mainly the inability of the screening tool to evaluate the costs, allergies, duration of therapy, duplication, contraindications, and interactions. No validated interrater reliability was also reported for the modality, which might also limit the clinical efficacy of using it in the different settings.[25] Overall, the GPGPA tool should be used on a long-term basis by pharmacists working in the outpatient clinics to evaluate inappropriate medication use among the geriatric population that is at increased risk of death.

Another tool that was also reported in the literature is the assessment of underutilization (AOU) tool which was developed and validated by the same creators of the medication appropriateness index (MAI). Nevertheless, it was reported for a different purpose. It has been reported that the AOU tool is mainly developed to evaluate medications that should have been prescribed for the geriatric population in the clinical settings and others that should not.[26,27] However, it should be noted that the use of the tool might be limited within the different or poor-resources community settings because its application requires the availability of the medication lists and medical history of the patient. Based on this tool, the different conditions are listed in a questionnaire and are being evaluated accordingly on admission by the attending caregiver. Previous investigations have demonstrated that the modality is effective and valid and data from these relevant studies show that two-thirds of the geriatric population that were recruited, especially those with cardiovascular events, reported underuse of medications for 1-2 conditions.[26,27] Since the MAI tool was first reported,[28] it has been adequately validated with favorable reliability and outcomes in the different settings.[29,30] The tool is based on a scoring system, and high scores recommend that the dose should be amended or another alternative should be used. A previous study reported that the risk of developing drug-related problems was significantly associated with the AMI score, and each score was associated with a 13% increase in the risk of developing drug-related problems in the geriatric population.[31] It should be noted that different investigations aimed to assess the reliability of the modality and hugely variable findings were reported for these investigations, which has been attributed to many factors, including the availability of medical data, training, and judgment variations.[32-34] Although many advantages were reported for this tool, it was also reported that it is

time-consuming and does not assess allergy in its included domains.

CONCLUSION

Studies show that the ARMOR and MAI tools are the most commonly reported for this purpose to appropriately evaluate drug administration practices. However, they are time-consuming and need adequately trained personnel, which might not be available within the different settings. Accordingly, we suggest that more than one tool should be used, as we have reviewed all the advantages and disadvantages of the modality within the current study, to adequately facilitate and make the process of evaluation easy and enhance the quality of care for the geriatric population.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: Not required

REFERENCES

1. Ferrucci L, Giallauria F, Guralnik JM. Epidemiology of aging. Radiol Clinics North Am. 2008;46(4):643-52.
2. Newman AB, Murabito JM. The epidemiology of longevity and exceptional survival. Epidemiol Rev. 2013;35(1):181-97.
3. Dipiro JT, Talbert RL, Yee GC, Matzke GR, Wells BG, Posey LM. Pharmacotherapy: a pathophysiologic approach, ed. McGraw-Hill Medical, New York. 2014.
4. DiPiro JT, Talbert RL, Yee GC, Matzke GR, Wells BG, Posey L. Pharmacotherapy A Pathophysiologic Approach, 10e. Pharmacotherapy: A Pathophysiologic Approach 10e New York: McGraw-Hill Education. 2017;255-8.
5. Guiding principles for the care of older adults with multimorbidity: an approach for clinicians: American Geriatrics Society Expert Panel on the Care of Older Adults with Multimorbidity. J Am Geriatr Soc. 2012;60(10):1-25.
6. Zullo AR, Gray SL, Holmes HM, Marcum ZA. Screening for Medication Appropriateness in Older Adults. Clin Geriatr Med. 2018;34(1):39-54.
7. Bulloch MN, Olin JL. Instruments for evaluating medication use and prescribing in older adults. J Am Pharmacists Assoc. 2014;54(5):530-7.
8. Cassels A. 'Can I stop even one of these pills?' The development of a tool to make deprescribing easier. Eur J Hospital Pharm. 2017;24(1):3-4.
9. Vinks TH, Egberts TC, de Lange TM, de Koning FH. Pharmacist-based medication review reduces potential drug-related problems in the elderly: the SMOG controlled trial. Drugs Aging. 2009;26(2):123-33.
10. Vinks TH, de Koning FH, de Lange TM, Egberts TC. Identification of potential drug-related problems in the elderly: the role of the community pharmacist. Pharm World Sci. 2006;28(1):33-8.
11. Van Cuong L, Giang HTN, Linh LK. The first Vietnamese case of COVID-19 acquired from China. Lancet Infect Dis. 2020;20(4):408-9.
12. Dibas M, Doheim MF, Ghozy S, Ros MH, El-Helw GO, Reda A. Incidence and survival rates and trends of skull Base chondrosarcoma: A Population-Based study. Clin Neurol Neurosurg. 2020;198:106153.
13. Lee SS, Schwemm AK, Reist J. Pharmacists' and pharmacy students' ability to identify drug-related problems using TIMER (Tool to Improve Medications in the Elderly via Review). Am J Pharm Educ. 2009;73(3):52.
14. Haque RU. ARMOR: A Tool to Evaluate Polypharmacy in Elderly Persons. Ann Long-Term Care. 2009;17:26-30.
15. Thieu H, Bach Dat B, Nam NH. Antibiotic resistance of Helicobacter pylori infection in a children's hospital in Vietnam: prevalence and associated factors. Minerva Medica. 2020;111(5):498-501.
16. El-Qushayri AE, Ghozy S, Reda A, Kamel AMA, Abbas AS, Dmytriw AA. The impact of Parkinson's disease on manifestations and outcomes of Covid-19 patients: A systematic review and meta-analysis. Rev Med Virol. 2021;e2278.
17. Shrank WH, Polinski JM, Avorn J. Quality indicators for medication use in vulnerable elders. J Am Geriatr Soc. 2007;55(2):373-82.
18. Wenger NS, Roth CP, Shekelle P. Introduction to the assessing care of vulnerable elders-3 quality indicator measurement set. J Am Geriatr Soc. 2007;55(2):247-52.
19. Askari M, Wierenga PC, Eslami S, Medlock S, de Rooij SE, Abu-Hanna A. Assessing quality of care of elderly patients using the ACOVE quality indicator set: a systematic review. PloS One. 2011;6(12):e28631.
20. Son PT, Reda A, Viet DC, Quynh NXT, Hung DT, Tung TH, Huy NT. Exchange transfusion in the management of critical pertussis in young infants: a case series. Vox Sang. 2021;116(9):976-82.
21. Nguyen TM, Huan VT, Reda A. Clinical features and outcomes of neonatal dengue at the Children's Hospital 1, Ho Chi Minh, Vietnam. J Clin Virol. 2021;138:104758.
22. Garfinkel D, Zur-Gil S, Ben-Israel J. The war against polypharmacy: a new cost-effective geriatric-palliative approach for improving drug therapy in disabled elderly people. The Israel Med Assoc J. 2007;9(6):430-4.
23. El-Qushayri AE, Dahy A, Reda A. A closer look at the high burden of psychiatric disorders among healthcare workers in Egypt during the COVID-19 pandemic. Epidemiol Health. 2021;43(0):e2021045.
24. Pham TS, Reda A, Ngan Nguyen TT, Ng SJ, Huan VT, Viet DC, Huy NT. Blood exchange transfusion in viral hepatitis in a small infant: a case report. Transfus Apher Sci. 2020;59(6):102907.

25. Garfinkel D, Mangin D. Feasibility study of a systematic approach for discontinuation of multiple medications in older adults: addressing polypharmacy. Arch Int Med. 2010;170(18):1648-54.
26. Wright RM, Sloane R, Pieper CF. Underuse of indicated medications among physically frail older US veterans at the time of hospital discharge: results of a cross-sectional analysis of data from the Geriatric Evaluation and Management Drug Study. Am J Geriatr Pharmacother. 2009;7(5):271-80.
27. Steinman MA, Landefeld CS, Rosenthal GE, Berthenthal D, Sen S, Kaboli PJ. Polypharmacy and prescribing quality in older people. J Am Geriatr Soc. 2006;54(10):1516-23.
28. Hanlon JT, Schmader KE, Samsa GP. A method for assessing drug therapy appropriateness. J Clin Epidemiol. 1992;45(10):1045-51.
29. Kassam R, Martin LG, Farris KB. Reliability of a modified medication appropriateness index in community pharmacies. Ann Pharmacother. 2003;37(1):40-6.
30. Samsa GP, Hanlon JT, Schmader KE, Weinberger M, Clipp EC, Uttech KM, Lewis IK, Landsman PB, Cohen HJ. A summated score for the medication appropriateness index: development and assessment of clinimetric properties including content validity. J Clin Epidemiol. 1994;47(8):891-6.
31. Lund BC, Carnahan RM, Egge JA, Chrischilles EA, Kaboli PJ. Inappropriate prescribing predicts adverse drug events in older adults. Ann Pharmacother. 2010;44(6):957-63.
32. Fitzgerald LS, Hanlon JT, Shelton PS. Reliability of a modified medication appropriateness index in ambulatory older persons. Ann Pharmacother. 1997;31(5):543-8.
33. Somers A, Mallet L, van der Cammen T, Robays H, Petrovic M. Applicability of an adapted medication appropriateness index for detection of drug-related problems in geriatric inpatients. Am J Geriatr Pharmacother. 2012;10(2):101-9.
34. Hanlon JT, Weinberger M, Samsa GP. A randomized, controlled trial of a clinical pharmacist intervention to improve inappropriate prescribing in elderly outpatients with polypharmacy. Am J Med. 1996;100(4):428-37.

Cite this article as: Abdullah MY, Alomari MM, AlNihab AN, Alshaikh MS, Alzahrani MA, Al-Shehab AH, et al. Types of screening tools used to identify potential inappropriate medication in the geriatric. Int J Community Med Public Health 2022;9:1000-4.