The Use of Clinical Decision-Support Tools to Facilitate Geriatric Education

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Innovative methods are needed to incorporate effective geriatric education into internal medicine residency programs. The purpose of this report is to describe the development and use of clinical decision-support (CDS) tools to facilitate geriatric education and improve the care delivered to older adults in an academic internal medicine residency ambulatory care clinic. Starting in 2009, CDS tools were implemented as a major strategy of an initiative to improve resident physician clinical competencies in geriatrics and improve the quality of care and quality of life of older adults. These tools, designed to improve resident assessment and action for each of three educational modules (falls, vision, and dementia) were embedded within the ambulatory electronic medical record (EMR) and provided a method of point-of-care training to residents caring for older adults. One hundred internal medicine residents supervised by 17 general internal medicine faculty members participated. Data regarding CDS use and associated outcomes were recorded and extracted from the ambulatory clinic EMR. Residents screened between 67% and 88% of eligible patients using CDS algorithms; rates of additional assessment and referral or further examination reflected the prevalence of the condition in the patient population. Although further development may be necessary, CDS tools are a promising modality to supplement geriatric postgraduate education while simultaneously improving patient care. **J Am Geriatr Soc 60:1145–1149, 2012.**

Key words: ambulatory care; clinical decision support; electronic health records; geriatrics; medical education

Despite a rapidly growing population of older adults confronted by a shortage of physicians trained to care for them,[1] geriatric education remains a low priority for graduate medical education.[2] Traditional methods of medical education, such as didactic lectures, lead to gaps in training medical residents on how to care for older adults who often have complex illnesses with multiple comorbid conditions.[3] Accordingly, older adults frequently receive inadequate care, particularly for geriatric problems.[4] Novel methods are needed to incorporate effective geriatric education into residency programs already stressed by time constraints for a myriad of training activities.[5]

Clinical decision-support (CDS) tools that provide physicians with patient-specific assessments or recommendations to assist with clinical decision-making, such as those embedded in a multifunctional electronic medical record (EMR), have specifically been promoted as a means to improve clinician performance.[6,7] A few studies have suggested that providing trainees with CDS tools at the point of care may augment learning, in addition to guiding patient care.[8,9] Although there is much variability in implementation of CDS and resulting efficacy,[10] computer-based tools that automatically provide decision support at the time and location of decision-making, along with recommendations that can be implemented, tend to improve clinical practice.[11] These tools may also play a valuable role in housestaff education.

The purpose of this article is to describe the development and use of CDS tools to provide supplemental geriatric training to internal medicine residents, facilitating the integration of geriatric principles into routine processes of care for older adults.

METHODS

Setting and Participants

The *Aging Q³—Quality Education, Quality Care and Quality of Life* program was initiated in 2009 at the Medical University of South Carolina (MUSC) to improve resident physician clinical competencies in geriatrics and improve the quality of care and quality of life of older

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DOI: 10.1111/j.1532-5415.2012.03960.x

0002-8614/12/$15.00

adults. This 4-year program, funded by the Donald W. Reynolds Foundation, emphasizes the need for multiple teaching strategies and a supportive practice environment. The outpatient portion of this program is occurring within the university internal medicine (UIM) ambulatory care clinic. This clinic is the setting for all MUSC internal medicine residents' weekly continuity clinics and for the residency program's ambulatory block rotation. The UIM ambulatory care clinic uses the McKesson Practice Partner (PP) (San Francisco, CA) EMR system. All residents receive EMR training before beginning their clinical duties.

During the interventions described in this article, between June 2009 and March 2010, 100 internal medicine residents (Postgraduate Years 1 to 3) participated in Aging Q^3 educational activities in the UIM clinic. Seventeen general internal medicine faculty members served as preceptors supervising residents during this period and participated in Aging Q^3 orientations for each condition. The institutional review board at the MUSC reviewed the project and approved it as exempt.

The Aging Q^3 Program

Quality indicators derived from the Assessing Care of Vulnerable Elders (ACOVE) paradigm guide the geriatric content of Aging Q^3.[4,12] Based on a baseline survey of residents' confidence in treating numerous diagnoses and conditions in elderly adults, 16 ACOVE conditions and concerns that residents reported low confidence in managing were selected to be the focus of the 4-year program. A primary goal of the Aging Q^3 project has been to enable residents to identify, evaluate, and treat or refer elderly adults with these conditions. During the first year of the Aging Q^3 project, intensive 3-month education and quality improvement modules were devised for each of three selected ACOVE conditions and concerns that residents had reported low confidence in managing: vision, falls, and dementia. For the vision module, residents were reminded about the detrimental effects of vision loss on the quality of life of older adults and taught to recognize the common causes of vision loss in older adults. Prompt referral to an ophthalmologist was emphasized for patients found to report vision problems. For the falls module, residents were educated about the importance of screening older adults for a history of falls, doing a proper falls assessment to determine potential reasons for falling, and providing appropriate interventions such as physical therapy referrals to adults at risk for future falls. For the dementia module, residents were taught to screen patients for dementia using the Mini-Cog[13] screening tool. Although these interventions also included didactic lectures and academic detailing by faculty, a crucial educational strategy of the Aging Q^3 interventions was design of CDS tools incorporated into the EMR to provide recommendations for actions that residents could incorporate while caring for older adults. Data extracted from the EMR were also used to monitor the effect of the modules.

Design of CDS Tools

PP includes the ability to modify progress note templates and to extract relevant data fields from the EMR. The CDS tools described in this article were developed as customized progress note templates within PP to be used at the point of care to guide residents through specific processes of care.

Existing features of the EMR were used to create these tools, and no additional programming by the vendor was required. Several internal medicine faculty members with informatics experience worked with a clinical analyst from the university information systems department to develop the tools. Throughout Year 1 of the Aging Q^3 project, during each 3-month module dedicated to a specific ACOVE concern (vision, falls, dementia), the general progress note template used by residents was specifically customized to provide decision support for residents when seeing patients aged 65 and older. Brief screening questions were embedded into the progress note for each module. Positive answers to the screening questions prompted additional questions and guided residents on how to proceed with screening, diagnosis, and referral. These progress note templates were also modified to facilitate collection of data to measure the success of each module.

As shown in Figure 1, during the vision module, all progress note templates that residents opened for patients aged 65 and older reminded them to ask, "Has the patient seen an eye doctor in the past year?" "Does patient have any new eye symptoms?" and "Does vision interfere with completing activities of daily living?" Residents were then prompted to perform a funduscopic examination and consider a referral to ophthalmology for patients reporting vision symptoms. Figure 2 illustrates the CDS tool for the falls module. A reminder was included in the progress note template of all elderly patients to prompt residents to take a fall history. If the answer to the initial screening question, "Was a fall reported in the past year?" was "yes," the system prompted residents to perform and record the results of a Timed Up and Go Test,[14] check orthostatic vital signs, perform medication review, and if appropriate make a referral to physical therapy. The dementia progress note template prompted residents to ask the patient about memory or thinking problems and, based on the responses, guided residents through an algorithm to perform an additional assessment including the steps of the Mini-Cog[13] if necessary. Figure 3 illustrates the template for the dementia module. Figure 3A indicates the screening question, drop-down prompts, and responses for facilitating adherence. Figure 3B illustrates the dementia screening algorithm. The responses to many of the questions prompted by each CDS were automatically recorded into a database that was later extracted from the EMR and queried.

Integration of CDS Tools within the Residency Practice

Like most academic centers and community practices,[1] there are few geriatricians providing care to this elderly population at MUSC. Thus, during faculty meetings devoted to each module, general internal medicine faculty members precepting residents in the internal medicine residency clinic were oriented to CDS use, as well as the details of the specific geriatric concern. In turn, faculty members were expected to provide academic detailing to the residents during the residency clinic. This detailing included additional hands-on training on CDS use. At the

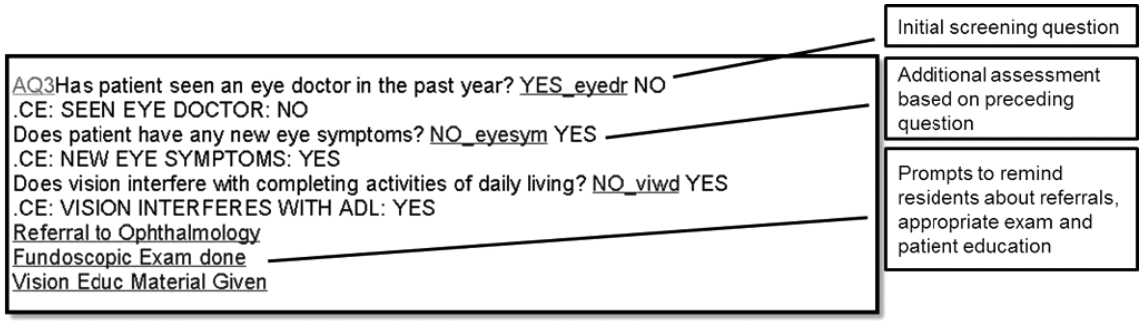

Figure 1. Vision clinical decision support example.

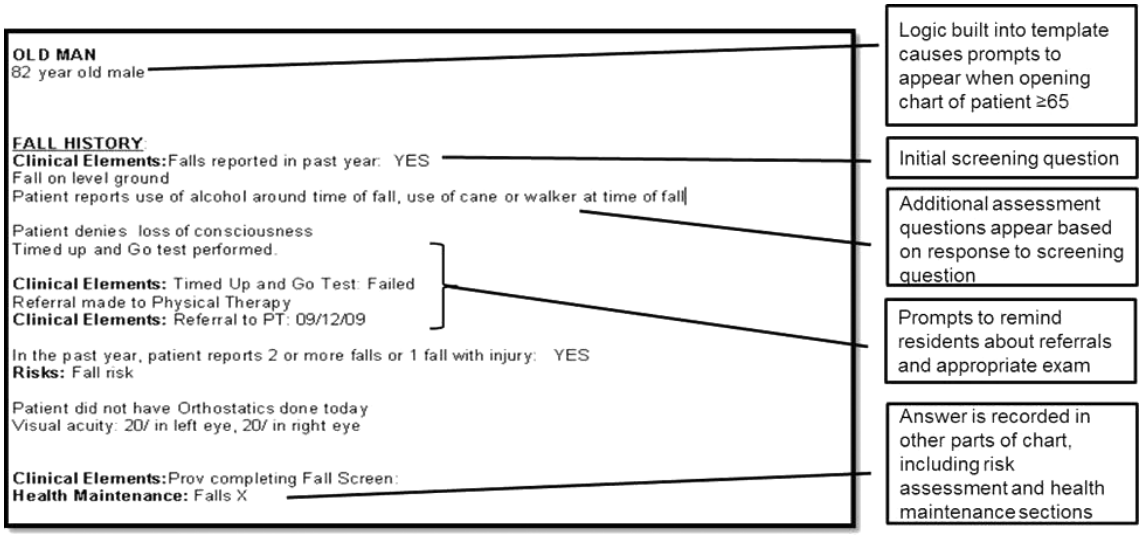

Figure 2. Falls progress note example.

start of each module, residents were also given a lecture on the topic that included explanation of the related CDS.

Program Evaluation

To measure resident use of the CDS and actions emanating from the CDS strategy, specific coded data fields were embedded into each customized progress note. A PP extract program was periodically run to obtain de-identified patient data, including the Aging Q^3 specific data fields. The data were then aggregated and converted to SAS (SAS Institute, Inc., Cary, NC) data sets for further analysis. Other data sources for Aging Q^3 monitoring and evaluation included faculty surveys; resident pre–posttests; on-line surveys; patient surveys; and management logs that tracked activity implementation, faculty member participation, and selected impact objectives related to residents' self-efficacy, knowledge, attitudes, and behavior.[15,16]

RESULTS

Table 1 shows resident action based on CDS use for each of the three modules. Residents initiated use of the CDS for the majority of older adults during each 3-month intervention. Using the algorithm specific to each module's CDS, residents were able to identify patients reporting new vision symptoms or a fall in the past year or patients with perceived memory problems. Further action then included performance of a funduscopic examination for patients reporting vision problems, a Timed Up and Go Test for patients reporting a recent fall, and a Mini-Cog dementia screen for patients reporting memory problems. Appropriate referrals or additional tests were then initiated for some patients, if applicable, based upon the responses to prompts included in the CDS. Throughout the three modules, 80% of UIM faculty preceptors provided academic detailing to residents.

An assessment of faculty preceptors' perception of the effectiveness of the CDS tools was also included in a faculty survey conducted in January 2010. Faculty preceptors were asked to rate the effectiveness of the CDS tools in improving resident geriatric training and knowledge on a scale of 1 to 5, with 1 being not at all effective and five being extremely effective. Of the 16 faculty preceptors responding to this survey question, the median response rate was 4, or very effective. One faculty member rated the CDS tools to be not at all effective. At each annual retreat, faculty were given the opportunity to criticize and suggest improvements in the various components of the Aging Q^3 program. The CDS component was consistently reported as highly valuable in achieving the impact objectives.

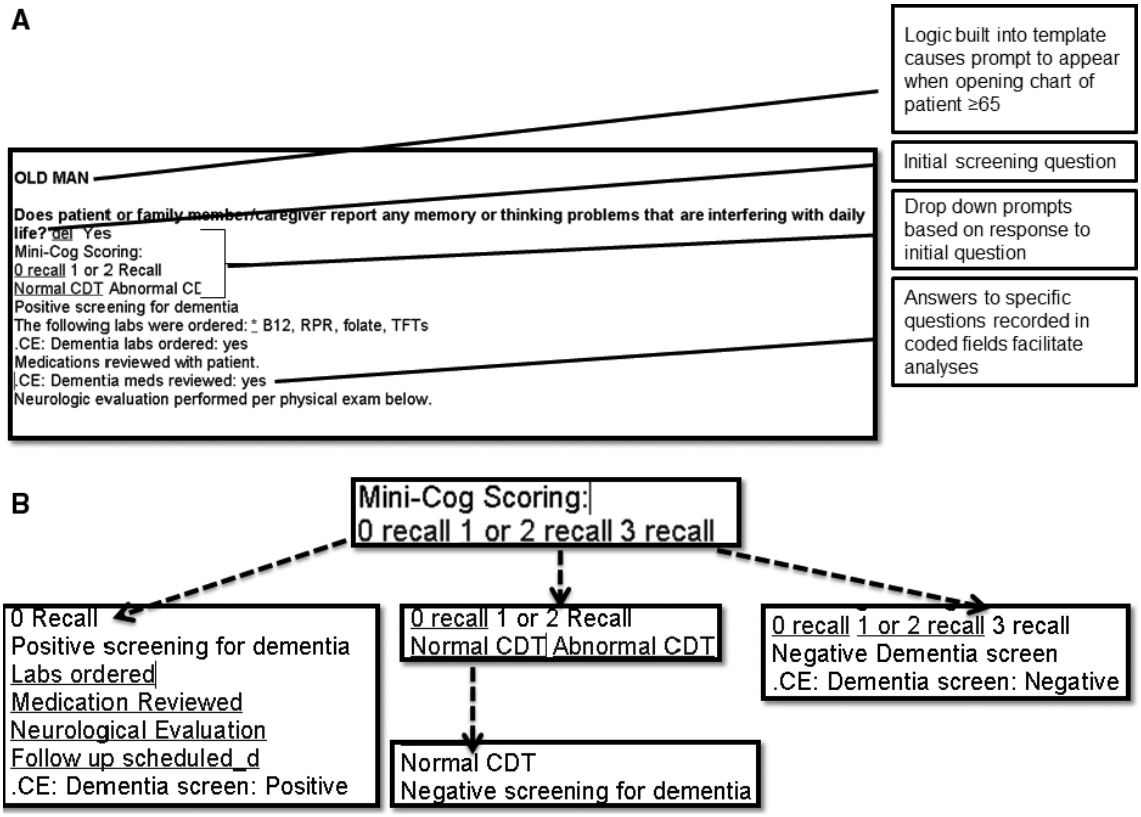

Figure 3. Dementia progress note example. (A) Dementia module clinical decision support (CDS) embedded into progress note. (B) Algorithm based on Mini-Cog Dementia screening results appearing in progress note. CDT = Clock Drawing Test. CE = Clinical Element (coded data field).

Table 1. Resident Performance on Assessing Care of Vulnerable Elders (ACOVE) Modules Using Clinical Decision Support (CDS)

	ACOVE Topic		
	Vision	Falls	Dementia
Resident Process	*N* (%)		
Performed initial screening	717 (88)	940 (86)	961 (67)
Performed additional skill or examination	57 (45.6) (funduscopic examination)	119 (46.2) (Timed Up and Go Test)	57 (94.7) (Mini-Cog)
Referral or further examination	277 (40.8) (referral to ophthalmology)	11 (37.9) (referral to physical therapy)	19 (73.7) (additional dementia examination)

Use of CDS was measured for each module over a 3-month period.
N = number of patients aged ≥ 65 eligible for each resident action based on CDS algorithms.

DISCUSSION

Through the use of CDS, internal medicine residents were guided through the identification, diagnosis, and treatment of several important geriatric conditions. Using this hands-on approach, residents learned to effectively and efficiently integrate geriatric processes of care into the routine office visit, which often resulted in further examination or referral of symptomatic patients. This may be an important strategy for geriatric education as we move forward in an environment with few geriatricians and a rapidly growing aged population.

There are several limitations to using CDS to enhance postgraduate geriatric education. First, the CDS tools developed for this project included only brief prompts and guidance for each module; lectures and additional academic detailing were used to supplement the information provided in the CDS. Second, the CDS tools each focused on a single geriatric concern and were available to residents for only a 3-month period. It was decided to limit each intervention to 3 months to avoid overwhelming residents with educational interventions about multiple concerns at the same time. Furthermore, combining the CDS tools for several conditions into one progress note could

have resulted in alert fatigue and subsequent user dissatisfaction.[17] Finding methods to sustain each educational intervention beyond a 3-month period remains a challenge. These items could be added as a comprehensive tool in the health maintenance feature of the EMR to remind providers about all of the potential conditions that should be screened for or assessed in older adults, which the provider could then prioritize to minimize alert fatigue. Third, the prevalence of older adults with some conditions, such as dementia, was low in the clinic population, which limited the number of residents receiving hands-on training during each 3-month period. Finally, the assessment of process-of-care measures was subjective, based on resident report as documented in the EMR. Faculty members were encouraged to observe residents performing assessments, including physical examination maneuvers if applicable, but it was not possible to measure the frequency of direct faculty observation.

Although the effect of the use of EMRs and CDS on medical education has not been well studied, some limited studies suggest that these types of information technology may improve patient outcomes while also serving as potential educational tools that provide context-specific learning.[18,19] Residents often report feeling unfamiliar with general principles of geriatric care.[3] Additional development of these types of CDS, integrating multiple aspects of care into a single tool, could considerably help residents more aptly and confidently manage many geriatric concerns. Furthermore, because Stage 1 of the Medicare and Medicaid EHR Incentive Programs' Meaningful Use process[20] requires that eligible providers implement at least one CDS rule, use of CDS by primary care physicians will probably become increasingly common. It is likely that these tools, which were created without additional programming by the vendor, could be replicated in other EMRs for use by physicians caring for geriatric patients in nonacademic settings as well.

CDS tools have been a vital component of the Aging Q^3 project. Use of these tools provides hands-on training to residents while leading to appropriate screening and management of important medical conditions that may affect older adults. Although further development is necessary, these tools appear to be a promising new modality to supplement geriatric postgraduate education and complement the growing policy and professional call[21] for appropriate use of information technology to improve quality.

ACKNOWLEDGMENTS

Conflicts of Interest: None of the authors have any conflicts of interest to declare.

This study was funded by the Donald W. Reynolds Foundation Aging and Quality of Life program.

Author Contributions: All authors contributed to the conception and design of the study, acquisition of data, analysis of data, and interpretation of findings. All authors revised the article critically for important intellectual content and provided final approval of the version for publication.

Sponsor's Role: The funding agency had no role in the study design; in collection, analysis, or interpretation of data; in writing of the report; or in the decision to submit the paper for publication.

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