The Problem-based Medical Audit Program: Influence on Family Practice Residents' Knowledge and Skills

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Background and Objectives: *Family physicians need to possess the skills to conduct audits in their own clinical settings to ensure that their patients receive exemplary clinical care. Residency offers an important opportunity for physicians to develop these auditing skills. This study describes the introduction of a problem-based medical audit program at three teaching units in the Department of Family Medicine at McMaster University and the program's effect on learner knowledge, skills, and attitudes toward the practice audit.* Methods: *A survey designed to assess residents' self-rated knowledge, skills, and attitudes toward practice audits was distributed before and after residents participated in the audit program.* Results: *Forty-three residents were surveyed; 33 (76.7%) completed the initial questionnaire and follow-up questionnaire. Residents reported significant improvements in their understanding of the relevance of audits, ability to develop a practice audit question, skills in designing methodology, and skills needed to conduct an audit independently. Residents also reported a moderate increase in their knowledge of statistics needed to complete an audit.* Conclusions: *The practice audit program at McMaster University uses a problem-based model to introduce learners to the concept of the clinical audit. The practice audit program successfully improved the residents' self-reported ability to conduct an audit and heightened their understanding of the importance and relevance of the audit process.*

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Medical audits are an important tool for providing clinicians with feedback about their clinical care. The National Health System (NHS) in the United Kingdom, which has actively supported and promoted the use of medical audits since 1990,[1] has defined the medical or practice audit as "the systematic critical analysis of the quality of medical care, including procedures used for diagnosis and treatment, the use of resources and the resulting outcome, and quality of life for the patient."[2] Using an iterative loop known as an audit cycle, clinicians decide on an ideal level of care, measure their current performance, and develop strategies to attain to the standard of care and then reevaluate the effectiveness of these strategies.[1,3-7]

Practice audits coupled with directed feedback are an effective tool for improving clinical outcomes[8-10] and for continuing medical education.[11] Audits provide clinicians with direct information about their practice patterns and permit clinicians to improve the care they offer to their patients. Increasingly, North American family practice programs are recognizing the need for future clinicians to be skilled in the audit process. In their guidelines for residency programs, the College of Family Physicians of Canada (CFPC) has recommended that all family practice residency programs in Canada incorporate a practice audit curriculum into their programs.[12]

A variety of curricula have been used for teaching the medical audit process to learners.[13] In July 1996, the McMaster University Family Medicine Residency Program (FMRP) began implementing a problem-based medical audit program at three family medicine teaching units. As part of the implementation of this program, a survey was designed to assess the influence of the practice audit program on resident self-reported knowledge, attitudes, and skills in practice audits. This paper describes the problem-based practice audit program at McMaster University and reports the findings of this survey before and after residents participated in the program.

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Methods

Program Description

The practice audit program of McMaster University FMRP uses a problem-based approach to allow learners to develop the skills required to design, conduct, interpret, and implement needed clinical changes from a practice audit. Family practice residents (postgraduate trainees) based at the three clinical teaching units are required to participate in at least one chart audit cycle per full-time (4-month) family medicine block.

Residents at each teaching unit meet weekly with a faculty tutor for 2 hours to plan, develop, and conduct the chart audit. The faculty member acts primarily as a facilitator and resource and provides occasional critical input when needed, but residents direct the learning process of the audit. Groups usually consist of 5–10 family practice residents. The residents select a clinical issue that has arisen during their practice experience at the unit and develop the question to be explored with the chart audit. They examine the literature and establish the current ideal standard of practice for the clinical issue. Following selection of the clinical standards, residents develop a worksheet, which identifies the variables to be assessed during the chart audit. Charts are then selected for review; depending on the number of patients with the clinical condition, either all charts are reviewed or an appropriate sample size is generated. Charts are randomly selected and examined for the needed clinical information.

Each teaching unit has an on-site computer with access to basic statistical programs and programs to search the medical literature. Faculty members with audit skills and experienced biostatisticians are available for residents for consultation, and they actively contribute to both resident and colleague development in this sometimes intimidating field. Topics reviewed include sample size calculations and use of basic statistical tests such as *t* tests, chi-squares, and confidence intervals.

Analysis of the data gathered on the audit worksheets is completed using a statistical software package, such as SPSS for Windows® or Epi-Info.® Statistical analysis of worksheet data included frequency tables, calculation of means and medians, *t* tests, and chi-squares and confidence intervals.

Results of the audit are presented to the clinical staff at each unit at the end of each full-time family medicine block. Following the presentation, the residents make recommendations for improving clinical care at each center and assist in developing clinical tools, flow-sheets, or programs that would assist in achieving optimum care (Table 1).

Table 1

Sample Chart Audit Process:
Clinical Care of Type II Diabetic Patients

STEP 1. SELECTING TOPIC FOR REVIEW (1–2 WEEKS)
Two residents saw patients with Type II diabetes during the week prior to the chart audit tutorial. The residents were unclear about what clinical interventions they should offer these patients routinely and if these interventions were being done in a regular and timely fashion.

Question for chart audit: Are we providing all our diabetic patients with all the recommended health interventions?

STEP 2. SET TARGET STANDARDS (1 WEEK)
Residents conducted a literature search and obtained current Canadian guidelines for diabetic care[20] and additional relevant literature.[21]

STEP 3. DEVELOP WORKSHEET (2 WEEKS)
Standards of care were developed for patients with diabetes, and a chart audit worksheet was developed. Criteria for evaluation in the audit included documented weight, fasting glucose and glycosylated hemoglobin, renal function, urine analysis for microalbuminuria, opthamologic and neurologic evaluation, and assessment of cardiovascular status, including serum cholesterol and EKG.

STEP 4. OBSERVE PRACTICE (3–4 WEEKS)
All charts or medical records of patients with diabetes were reviewed.

STEP 5. COMPARE PERFORMANCE WITH TARGET STANDARDS (4 WEEKS)
Data were entered into the Epi-Info 6® and analyzed for frequencies. Chi-square comparisons were made between age groups, gender, number of years with disease, and physicians.

STEP 6. IMPLEMENT CHANGE (1–2 WEEKS)
Results were presented to weekly teaching unit rounds, and all clinical staff were invited to provide suggestions for improving diabetic patient care. Residents took the suggestions and developed a diabetic flow chart for all diabetic patients' charts.

STEP 7. REPEAT CYCLE
One year later, diabetic charts will be reviewed and clinical care will be compared with previous results.

Table 2

Survey Questions

Q1. I understand how practice audits are relevant to everyday clinical practice.
Q2. I can develop a useful practice audit question.
Q3. I have the skills needed to design the methodology for a practice audit.
Q4. I have enough knowledge of statistics to generate sample sizes and analyze the results from a practice audit project.
Q5. I possess the skills needed to conduct a practice audit project in my practice.

Program Evaluation

All 43 family practice residents based at the McMaster University family medicine teaching units (North Hamilton CHC, Stonechurch Family Medical Center, and McMaster Family Practice Unit) received an initial evaluation survey in July 1996, prior to participating in the practice audit program. Follow-up surveys, identical to the initial survey, were completed in June 1997 at the end of the academic year, at which point residents had had the opportunity to participate in at least one practice audit.

The anonymous survey assessed self-rated knowledge, skills, and attitudes to practice audit before and after program implementation (Table 2). Responses were graded on a 5-point Likert scale (1=strongly disagree and 5=strongly agree). Data analysis was completed on Epi-Info 6® and SPSS for Windows.®

Results

Forty-three first- and second-year residents received copies of the initial and follow-up surveys. Thirty-three residents completed the initial survey, and 33 completed the follow-up survey, providing a response rate of 76.7% for both surveys.

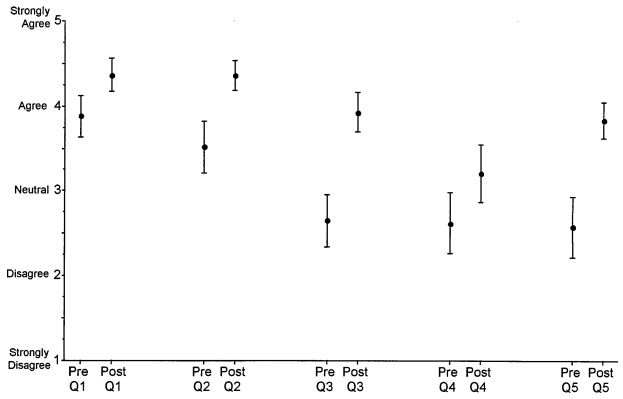
Self-rated knowledge of the relevance of practice audits to everyday clinical practice increased significantly from a mean of 3.88 (95% CI=3.63–4.126) to 4.36 (95% CI=4.17–4.56) after participating in the practice audit program. Resident self-rated skill in developing a useful practice audit question increased significantly between the initial and the follow-up survey, from 3.52 (95% CI=3.21–3.82) to 4.36 (95% Cl= 4.19–4.54). Residents reported that they had more of the skills needed to design the methodology for a practice audit after being involved with the practice audit program (from 2.65 [95% CI=2.34–2.96) to 3.92 [95% CI=3.70–4.15]). Residents reported an improvement in the statistical skills required to conduct a practice audit, but the CIs for this improvement did overlap (from 2.62 [95% CI=2.26–2.93] to 3.21 [95% CI= 2.87–3.55]). Finally, residents felt overall that they were better equipped to conduct an audit of their clinical care independently in their own practice after 1 year of participating in the practice audit program (from 2.58 [95% CI=2.22–2.93] to 3.8 [95% CI=3.62–4.04]).

Discussion

The medical audit program at McMaster University was developed to increase future physicians' knowledge and comfort with the audit process. Our evaluation of the program demonstrates that it has significantly increased family practice residents' self-reported skills in all of the areas needed for the successful implementation of an audit in a clinical practice (Figure 1). Residents report they are better able to develop a useful question, design the methodology, and conduct a medical audit in their practice after being involved with the program for 1 year.

Figure 1

Residents' Responses to Practice Audit Survey Before and After Program Implementation
(Means With 95% CIs)



Q1. I understand how practice audits are relevant to everyday clinical practice.
Q2. I can develop a useful practice audit question.
Q3. I have the skills needed to design the methodology for a practice audit.
Q4. I have enough knowledge of statistics to generate sample sizes and analyze the results from a practice audit project.
Q5. I possess the skills needed to conduct a practice audit project in my practice.

Program Strengths

We believe that the positive changes reported by the residents may be due to several key issues. Using a problem-based model, learners identify audit topics, which are derived from their clinical experience, and learning objectives, which will enable them to complete the audit. The topics are usually chosen from a clinical dilemma or question the residents faced while providing daily patient care. Previous studies of audit programs confirm that physicians who choose their own audit topics are more likely to complete the audit than those who did not[14] and are more likely to change their behavior in response to the feedback received.[10] Programs that requested that learners scrutinize the clinical care of other physicians met with criticism, since learners felt the relevance of the audit was lost for them.[13] Ensuring that residents direct the audit process will lead to the acquisition of the skills needed to conduct an audit and increase the likelihood that learners will complete the audit cycle.

In the UK experience on audits, limited time was reported as a common reason for not participating,[13-16] and lack of protected time has been named as a significant concern and barrier to attaining skills for practice audits for learners.[17] In our program, residents received protected time during the week to complete fundamental audit tasks, such as literature searches, worksheet development, chart reviews, statistical

analysis, and preparation for presentation. By designating specific time to work on audit tasks, residents may have a more positive experience with the audit, which may increase the likelihood that they will participate in future audits.[15]

Program Challenges

The audit program also has areas that require development and improvement. Residents reported an improvement in their statistical skills required to conduct a chart audit, but the difference was not statistically significant (Figure 1). The residents' knowledge of statistics is still rated only as neutral even after participating in the audit cycle. Teaching statistical skills is not a strength of the current program, and absence of these skills could potentially be a future barrier to conducting practice audits independently.

Another challenge is due to the structure of our program, which is similar to the structure of other residency programs. Family practice residents at McMaster are placed at either teaching units or are paired with a community physician for their family medicine blocks. The practice audit program has been difficult to integrate into the community-based residency training unit, due to the variability in practices, the difficulty coordinating additional educational events, and the distances that residents must travel for educational time. In addition, without a central filing system for all community practices, the work of the audit would fall to one resident per practice, which would be a tremendous amount of work, significantly more than for residents based at the teaching units. Possible solutions to this weakness include joining the clinical teaching units for their established practice audit sessions, selecting a single community practice for the practice audit for community-based residents, providing an extended period of time to complete the audit, or choosing a single topic and streamlining the number of charts evaluated.

Evaluation Limitations

Although residents have self-reported on the program's influence on their knowledge and skills pertaining to medical audits, we have little objective information on the residents' experience. Specifically, we have no objective measures of their knowledge and skills or their ability to conduct the audit independently. In addition, we have no information about whether residents change their practice behavior after an audit or if they incorporate audits into their practices after graduation from residency. However, the medical audit program at McMaster University uses educational methods that have been established as effective in teaching new skills and shaping physician behaviors in other learning situations, and it used the small-group model that is effective in influencing physician knowledge[18] and behavior[19] in other situations. Future evaluation of graduates' clinical behaviors will establish whether their participation in this educational program developed physicians able to complete an effective audit cycle and encouraged them to use audits in their future clinical practices.

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