

You and your EMR: the research perspective

Part 3. Answering practice-level questions

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Dr Park and her team have had their electronic medical record (EMR) for almost 2 years. Throughout this time, they have been recording questions they hope their EMR might help them answer. These questions have arisen from practice-management concerns, proposed quality-improvement initiatives, and old-fashioned clinical curiosity. They are wondering how to begin using the EMR to provide some answers.

Electronic medical records can be used to answer many practice-level questions. Regardless of your motivation for querying your EMR, several matters must be considered.

What is your question?

A clear answer can only arise from a focused question. A broad area of interest (eg, blood pressure measurement) will need to be narrowed to a specific research question that meets the FINER (feasible, interesting, novel, ethical, and relevant) criteria.¹ Quantitative research questions* fall into 2 broad categories: descriptive and analytic. Descriptive questions portray important characteristics of a phenomenon, group, or process of interest (eg, What proportion of office visits has a blood pressure measurement recorded in the patient's record?). Analytic questions compare 2 or more groups or conditions (eg, Did changing office procedures affect the proportion of office visits at which a patient's blood pressure reading is documented?). The mnemonic PICOT² (population, intervention, comparator, outcome, time frame) can help in formulating a good analytic research question.

Is the information you need to answer your question present and accessible in the EMR?

To answer any question from your EMR, you must be able to define a numerator and a denominator for the phenomenon, group, or process of interest, and you must be able to reliably identify these based on information present in the EMR. Experienced EMR researchers will tell you that fulfilling these criteria is more complicated than it might initially seem. For example, in one study investigating 6 different potential ways of identifying patients with diabetes in a primary care EMR database, the prevalence of diabetes ranged more than

2-fold (from 5.0% to 12.0%) depending on which definition was used.³

In EMRs, key information might be recorded in a variety of different places or might be missing altogether. For example, a patient's height might appear in a note, on a periodic health examination template, in a structured height-and-weight field, or in a customized field created by an individual clinician. For many patients, height might not have yet been documented anywhere in the EMR. The research query must take into account and search for the variety of ways that information will be recorded in the EMR.

How will you translate patient information into a numerator and a denominator?

Imagine you are interested in determining the proportion of your patients with renal failure who have been referred to a nephrologist. In order to answer your question, relevant data from individual patient records will need to be translated into numbers that can be counted by the computer. If the EMR contained a tick box for "renal failure present," then your denominator could be readily distinguished. Because EMRs are not designed this way, you will need to translate (recode) the data that do exist (eg, text in the cumulative patient profile) into a form that can be recognized and counted by the computer. This entails identifying all possible variations on "renal failure" that might be present in the cumulative patient profile ("renal failure," "nephropathy," "CRF" [chronic renal failure], "microalbuminuria," etc) and translating them into a new variable: renal failure present or absent. Consistency in data entry⁴ (eg, ensuring all users reliably record renal failure in an identical fashion) will reduce the burden of recoding.

How will you extract and analyze the information?


Depending on the specific EMR used, many descriptive, practice-level questions of clinical interest in family physicians' offices (eg, What proportion of women older than age 50 had a mammogram in the past 2 years?) can be answered by the EMR software using customizable queries or a structured query language interface. For analytic questions (eg, Are obese and nonobese women equally likely to have undergone a screening mammogram in the past 2 years?), it will likely be necessary to export the data into a separate software

*The potential of EMRs for qualitative research is, at present, underexplored.

package (eg, Excel, SPSS) for analysis. Statistical capabilities, available technical support, and ease of exporting data vary among EMR products and should be considered at the outset of the research process.⁵⁻⁷

Do you need special permission to analyze and report the data?

Formal approval from an institutional (hospital or university) research ethics board might not be required for chart audit research or queries that remain entirely internal to the practice (eg, quality improvement). If it is hoped that any portion of the study will be shared outside the practice, then clearance from the local research ethics board might be necessary, particularly if the study involves combining data from multiple providers or exporting data from the EMR into a separate database. For physicians in clinics associated with hospitals, additional procedures might be necessary to obtain approval from hospital data custodians.⁸ Investigating applicable local standards should be an early step in the research-planning process.

Today's EMRs make it possible for individual physicians to ask and answer important questions about their own practices; however, doing so requires attention to several issues and processes that are best considered well before they hope to analyze data. A little foresight goes a long way in practice-level EMR research. 

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Competing interests

Dr Cejic is Chair of the Nightingale Advisory Board at Nightingale Informatix (the vendor of the electronic medical record that **Dr Cejic** uses). None of the other authors has any competing interests to declare.

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