

Clinical questions of learners: Can they be anticipated according to a developmental model?

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Abstract

Purpose

The accumulation of medical literature has made it difficult for providers to retrieve precise answers to clinical questions. Profiling physicians and their questions may enable instructors and information brokers to better anticipate information needs. The purpose of this study was to provide empirical data exploring the relationship between the clinical questions of health professionals and their level of experience.

Method

A sample of thirty internal medicine physicians was recruited at the Portland VA Medical Center. Subjects were given written clinical scenarios and asked to record questions as they worked through each case. Subjects were classified according to their training level and questions were coded according to a typology adopted from the literature. Subjects were asked to furnish standardized exam scores so that knowledge within an expertise domain could be estimated.

Results

Trainees reported less clinical experience than graduates (resident mean 4.43 years, graduate mean 8.86 years) and had lower test scores after correcting for outliers (residents 73%, graduates 81.7%; $p=0.095$). Although both groups asked more background than foreground questions, the frequency of foreground and background questions appeared to vary as a function of subject class. Trainees asked a higher proportion of background questions than graduates (background: residents 44%, graduates 35%; $p=0.004$).

Conclusion

Our results indicate that graduates are more likely than residents to ask a foreground question given the same clinical situation. This supports the hypothesis that the experiential level of a provider may predict the types of questions asked and the information required to support clinical care.

Word Count: 250

Index Terms: medical education, information services, needs assessment, internship and residency, knowledge

Background – The Information Gap

It has been virtually axiomatic in medical education and medical informatics that patient care can be improved by improving clinicians' access to medical knowledge (1, 2). According to a recently published "roadmap" for clinical decision support, "making scientific evidence and clinical best practices more useful and accessible to clinicians and patients is one of the key strategies for crossing the quality chasm and transforming the health system" (3).

Yet this goal has been elusive. Over the last quarter century, explosive growth in the volume of published medical information(4) has continued unabated. Now accompanied by a growing body of pre-appraised literature and other forms of publication, this growth of available information has made it paradoxically more difficult for the clinician to keep abreast of new developments (5-9). To help remedy this problem, publishers and system developers are continuously seeking improved approaches to timely delivery of information that is appropriate to the needs of the individual user in a specific clinical context.

These efforts have resulted in substantial progress in the availability and performance of computerized information tools for healthcare, yet questions remain about whether present resources are sufficiently usable at the bedside or in the clinic (10, 11). Published reports indicate that clinicians are routinely frustrated by electronic tools that retrieve too much information or the wrong kind of information (8, 9, 12-16). Hence, the challenge remains to develop retrieval tools that can tailor information to user expectations and needs (17).

Meeting Information Needs

The content of clinical questions has been used as the basis for understanding and responding to clinician information needs, using questions gathered in the course of patient care (18-20). The simplest approach is to match terms in the question to relevant knowledge or literature: a question about ‘atrial fibrillation’ retrieves resources containing that term, most of them relevant, but many not useful or applicable to the task at hand. A useful refinement is to classify questions as “background” or “foreground” questions and then classify foreground questions according to purpose, such as therapy, diagnosis, or prognosis (21), then matching them to literature specific to that purpose, as in PubMed’s Clinical Queries feature(22). A query about atrial fibrillation ‘therapy’ retrieves information about treatment but filters out references focused on etiology, diagnosis, or prognosis. Ely, et al. classified questions even more finely, defining a taxonomy of standard question types that could not only improve retrieval of information for users, but ideally could also be used by publishers to develop medical knowledge resources that specifically address the needs of practitioners(23).

Responding to information needs, however, requires understanding not only of the question being asked but also of the individual who is asking it. Good teachers know they must first assess the learner. On multidisciplinary teaching rounds, a question about atrial fibrillation requires a different response depending on whether it comes from a third year medical student, a third year medical resident, a nursing student, or a pharmacy intern. Gorman, et al. examined the clinical questions of primary care clinicians and found that compared to physicians, the questions of nurse practitioners and physician assistants were more often concerned with background information such as etiology or clinical manifestations of disease (24). Ramos (25) and Green (26) compared the information behaviors of residents and faculty and reported that residents asked more questions than faculty and were more likely to pursue answers.

Studies of questions asked by residents generate intriguing pedagogical questions and have potentially important implications for both medical education and medical

information systems. Are information needs for a given clinical encounter consistently different according to the level of training of the person asking, and can they be predicted? Although there are no studies examining the impact of user knowledge on searching behavior (27), it is assumed that experience in a given content domain affects the way new information is processed (28). Moreover, students, residents, and faculty naturally gravitate towards certain knowledge resources according to their experiential background and current information needs (29, 30). These findings suggest that consistent differences do exist in the information needs and knowledge resource preferences of users according to their level of training. If these differences can be reliably inferred from the questions asked by learners, it would be possible to improve the performance of information systems by tailoring the information delivery to the training level or developmental stage of the learner.

In this study we examined the clinical questions of physicians in an internal medicine training program to determine whether the type of question being asked by a physician could be predicted from the level of training or knowledge of that physician.

Methods

Overview

We hypothesized that the domain knowledge and the amount of experience of a clinician would predict the type of clinical questions they would articulate. We expected that residents and faculty with less knowledge or experience in a given domain would ask more background questions and their colleagues with greater knowledge or experience in that domain would ask more foreground questions. To test our hypothesis we provided clinical scenarios in a single domain to residents and faculty in an internal medicine

program, collected the questions that arose from these scenarios, categorized these questions according to a classification scheme derived from the literature (31, 32) and examined the relationship between question types and physicians' domain knowledge and level of training.

Subjects

We recruited thirty volunteers, fifteen residents ('trainees') and fifteen faculty ('graduates') from the Internal Medicine (IM) residency program at the Portland Veterans Affairs Medical Center (PVAMC). Because of documented decay in the knowledge base of internists(33), we excluded faculty more than 10 years past graduation to ensure that exam scores (see Measurements, below) reflected current knowledge. To reduce variation due to specialty differences in knowledge we recruited subjects from a single specialty, Internal Medicine. Subjects were recruited in person or by email by one of the authors (BL). The study protocol was approved by the Institutional Review Board of the PVAMC.

Measurements

Clinical Experience

We assessed two components of clinical experience: general and domain specific. General clinical experience, which would influence an individual's overall development and judgment as a physician, was represented in two ways: the subject's training level using simple categories: intern, resident, fellow, or faculty; and the integer number of years engaged in clinical activity. Domain specific experience (as opposed to domain specific knowledge, discussed below), which would influence an individual's expertise and familiarity within that domain, and might vary for physicians at the same level of training or practice, was assessed by measuring the self-perceived comfort level within that domain, [using a five point Likert scale].

Medical Knowledge

A single IM subspecialty domain, gastroenterology (GI), was arbitrarily chosen for this study. Subjects' medical knowledge of GI was estimated using resident in-service exam scores or faculty board certification exam scores. We selected exam scores because they are an objective external measure of content knowledge.

Question Types

Subjects were presented with a series of vignettes concerned with GI conditions and asked to record three clinical questions they would consider looking up [was it stated 'consider looking up' or 'would look up?'] at the point-of-care. Vignettes are a well validated tool for the evaluation of clinical practice behaviors (34) and for studying information needs and preferences (35, 36). Vignettes were used in this study to hold situational variables constant between respondents. The vignettes (Appendix 2) were short 1-3 paragraph clinical scenarios derived from previously published instruments (34, 37) and were designed to challenge the respondents within a single specialty domain.

Each respondent received an information sheet, a sample vignette, three actual vignettes, a list of normal lab values, and written instructions for the clinical scenarios. They were given approximately 5 minutes to read a scenario, then asked to indicate their relative familiarity with the clinical situation using a 5 point Likert scale, and to record three questions that, if answered, would help most in management of the patient. Unique identifiers were then stripped from the questions and data were tracked using randomly assigned identification numbers.

Questions recorded by the subjects were assigned by the authors to categories in a hybrid typology derived from published taxonomies of clinical questions (26, 31, 32, 38). The categories included Foreground, Background, Logistic Information, Social Influences, and Patient Data. Explicit category definitions with examples were refined by the authors over successive rounds of independent coding and subsequent discussion. Coders were blinded to the subject data and coding was performed with questions sorted

in random order to limit bias, halo, or order effects. Each investigator coded the questions independently, then discrepancies were adjudicated through rater consensus, and inter-rater reliability was calculated using the non-weighted kappa statistic.

Analysis

Descriptive statistics were used to summarize the distribution of subjects' clinical experience and medical knowledge. The exam scores were also used as an internal validation of subject classification by calculating the correlation between knowledge scores and experience level. Spearman's rho was used to assess the relationships among non-parametric variables including test scores, provider experience, and self-reported comfort. Pearson contingency table analysis and the chi square statistic were used to assess the association between question type and provider type. Based on similar studies of relationship between user type and clinical questions (26), it was expected that the proportion of foreground questions would range from 50-90% and background questions would range from 10-50% depending upon the relative experience of the user. Hence, assuming a 25% difference in the proportions of question type, the sample size was set at 15 respondents per group for a power of 80%. Statistics were calculated using JMP, SPSS, and Excel software.

Results

Thirty subjects were enrolled in the study. One graduate did not complete the study due to a scheduling conflict and was excluded from the analysis.

GI exam scores, self-reported comfort level, and experience levels for each subject group are shown in Table 1. As expected, trainees reported less clinical experience than graduates (trainee 4.43 years, graduates 8.86 years) and a lower comfort level in GI with each clinical scenario than graduates (mean trainee score 2.43 points, mean graduate score 3.43 points). The mean level of clinical experience reported by

trainees was somewhat higher than expected; this may represent inclusion of experience prior to residency such as medical school clerkships. For the single subject domain tested (GI), mean test scores were quite similar between trainees and graduates (trainees 73.0%, graduates 73.3%). When corrected for a single outlier score (one graduate subject), the difference in mean values is greater, though not statistically significant (trainees 73.0%, graduates 81.7%; $p = 0.095$). Passage of time since taking the exam (up to ten years for graduates), and within-training level variation may have attenuated any true between-group differences in domain knowledge.

GI exam scores were available for only 12 subjects: 7 trainees had not taken an in-service exam at the time of the study, and 10 subjects did not submit scores. Scores are plotted as a function of clinical experience, training level, and self-reported comfort level in Figures 1-3. Too few data are present to draw conclusions about a relationship between training level or years of experience and exam scores (Table 2). There appeared to be a modest albeit not statistically significant association between exam scores and self-reported confidence level (Table 3).

The relative frequency of question types is summarized in Table 4. The study protocol required all subjects to record three questions for each vignette, so the numbers of questions recorded were similar for the two groups. However, trainees recorded significantly more Background questions (trainees 113 (43%), graduates 88 (34%)), while graduates recorded nearly twice as many Foreground questions (trainees 18 (7%), graduates 35 (13%)). This difference in the frequency of question types was statistically significant ($X^2 = 8.32$, $p = 0.004$), and the difference persisted when the analysis was repeated using four discrete subject levels: intern, resident, fellow, and faculty ($X^2 = 12.18$, $p = 0.007$) (Table 5). Logistic questions (concerned with how to get things done), Social Influence questions (concerned with what other physicians might do), and Patient Data questions (information specific to a given patients) were few in number and roughly equally distributed between the two groups. A mosaic plot of the data (Figure 4)

illustrates this apparent “dose-response” relationship between training level and the proportion of Foreground questions asked.

Discussion

We examined the clinical questions of residents and faculty in an Internal Medicine training program to find out whether the types of questions they ask are associated with their level of training or amount of clinical experience. We found that when given a clinical vignette, all providers ask more background questions (32) than any other question type, but as predicted, residents asked a greater proportion of background questions while faculty asked almost twice as many foreground questions. However, our data did not show an association between training level and clinical knowledge. This may be due to the limitations of our study (small sample size, narrow disciplinary focus, single content domain, and incomplete performance data) which was not designed to examine this association.

Several key points can be inferred from the results presented here. First, novices appear to have larger gaps in background knowledge and, therefore, more background questions. Although this seems to make intuitive sense, this has never been quantitatively demonstrated in a prospective manner. Without this data, we might just as easily have expected faculty to have more background questions given their time out of training, or residents to have more foreground questions given the practical demands of their workday. Second, even “experts” appear to frequently have general information requirements and typically ask more background than foreground questions. The high proportion of background questions suggests that there may be a need for more pre-appraised information to help providers with the synthetic process required to develop

expertise. Hence, publications and programs should consider supplementing recent research with more general reviews of disease manifestations and management. Third, it may be possible to profile a learner using existent classification schemes when it is crucial to capitalize upon 'teaching moments'. Many research groups have sought to quantify and characterize clinician information needs (18-20, 38-41) demonstrating that in virtually all cases, most point-of-care questions generated go unanswered (19, 20, 28, 31, 41). And yet, in many circumstances, answers to these questions exist and could impact clinical outcomes (1, 26, 42-44). Hence, the prospect of narrowing an information gap through provider profiling becomes an enticing objective. We hope that the results presented here help validate a practical profiling typology. Finally, the data don't support a positive correlation between experience and knowledge. If learning occurs during residency, one expects scores to rise with training level. Ramsey and colleagues have shown, however, that knowledge appears to decay over time after residency(33). How this relates to comfort level within a practice domain would be complex since other variables such as familiarity and confidence might increase independent of knowledge. Indeed, one would postulate based on data presented here that expertise is likely not only a function of knowledge, but also the storage, retrieval, and application of information.

To our knowledge, this is the first study of its kind to examine the information needs of individuals according to the level of clinician development. Few studies have explored the intersection between information retrieval and educational theory (45, 46). Moreover, biomedical informatics research has only begun to examine how user profiles could enhance retrieval(47, 48). The goal of this study was to provide empiric data

exploring the relationship between clinical questions of health professionals and their stage of learning or experience. This addresses an important potential limitation of previous studies of this type that have neglected to quantitatively distinguish differences between trainees and graduates or validate the typology used to classify questions. Overall, our results suggest that learner characteristics such as level of experience may be used to anticipate the types of clinical questions that will arise and the types of information that may be needed to support patient care. These learner characteristics arise out of a classification scheme (i.e. training level) that is both practical and relatively ubiquitous. Our findings are consistent with the expectation that cognitive differences exist between experts and novices, and that these differences have a significant bearing upon clinician or learner information needs.

Limitations

Aside from the methodological limitations alluded to earlier, including small sample size and purposeful sampling, we have identified several construct limitations that may have affected our results. First, the number and types of clinical questions collected may depend upon the collection technique. Studies using ethnographic non-participant observation tend to result in a higher number of clinical questions than those using interviews or surveys (20, 31, 41). The laboratory setting may have produced a measurement bias by stimulating physicians to ask more evidence-based or well-formed questions in lieu of logistic or social influence questions. We sought to limit this tendency by adopting standardized terminology culled from and validated by prior experiments (15). Second, our decision to compare mid-level residents with faculty may

have increased the probability of a type II error. The rate of knowledge accumulation may be steeper early in the education process and then plateau as the clinician matures, limiting our ability to detect subtle differences between senior residents and generalist faculty. A broader sampling of training and experience levels from early medical students to seasoned clinicians and subspecialists might have demonstrated a more robust “dose-response” curve across developmental stages. Third, it is possible that our classification of study participants was too coarse to detect the nuanced cognitive progression of clinicians. Although we selected respondent categories that have practical applicability (i.e. academic training level), there is probably a high degree of heterogeneity within each group. Fourth, we narrowed our study to a single resident type (internist) within a single knowledge domain (gastroenterology). We elected to use this approach to limit confounders as much as possible. However, it is plausible that the differences between trainees and graduates are more obvious when information needs and retrieval behaviors are aggregated across clinical domains. Fifth, we used a question classification ontology that might be artificially coarse and ill equipped to capture the nuanced variations in information needs. We chose Richardson’s(49) classification scheme mainly because it is well established amongst evidence-based practitioners and espoused by academics as a means to cultivate information retrieval heuristics. Nevertheless, there may be better ways to correlate information needs with user profiles.

Conclusion

We hypothesized that the degree of medical knowledge and clinical experience would be associated with the types of clinical questions arising in the course of patient

care. Specifically, we expected more experienced providers to ask a higher proportion of foreground questions while trainees would ask more background questions. The results showed that staff providers and fellows were more likely than resident physicians to ask a foreground question when presented with the identical clinical scenario. These findings lend support to the idea that the experiential and educational development of a clinician may be used to predict the types of questions that will be asked and the type of information required to support clinical care.

The results of this study might have implications for medical education theory and practice. Clinician educators are encouraged to “diagnose the learner” when introducing new concepts. It appears from the preliminary data presented here that an important distinguishing characteristic between the novice and expert is not just the possession of information but also the way it is processed. Klein has published compelling evidence indicating that experts process information with remarkable efficiency using what appear to be intuitive or subconscious faculties(50). Indeed, the capacity to instantaneously contextualize data and identify relevant patterns is axiomatic of expert decision making (51, 52). If the issue, then, is not *what* we know but rather *how* we know, we may be able to improve teaching efficiency by organizing content in a different manner.

Our work here may also inform improvements in information retrieval and presentation. In a world that can produce one quintillion bytes of content in one year (53), information consumers need precision, not capaciousness(54). Few medical professionals are facile with the controlled vocabularies commonly used by healthcare databases. Is it, therefore, not surprising that referrals to electronic journals from Google far exceed those from PubMed(53, 55)? The stakes for retrieval are particularly high in

healthcare, where technology design and performance can impact patient outcomes as well as health care costs. We believe leveraging technology to profile the knowledge and experience of the user may offer the key to better design and more precise searches.



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Legends for Figures

Figure 1. Standardized exam score for subject domain of gastroenterology plotted as a function of the subject's training level.

Figure 2. Standardized exam score for the subject domain of gastroenterology plotted as a function of self-reported years of clinical experience.

Figure 3. Self reported comfort level within subject domain of gastroenterology plotted as a function of standardized exam score for GI.

Figure 4. Mosaic plot for the proportion of question types asked by subjects stratified by training level.

Table 1. Knowledge and experience of respondents

	Trainee	Graduate	p value
n	15	14	
Mean level of experience	4.43 yrs +/- 1.72 yrs	8.86 yrs +/- 2.93 yrs	< .001
Mean comfort level	2.43 +/- 0.76	3.43 +/- 0.85	.007
Mean test score	73.00 +/- 9.14	73.28 +/- 27.03	.87
Mean score excepting outliers	73.00 +/- 9.14	81.67 +/- 16.93	.095

Table 2. Years of Experience vs. Exam Score

		Exam Score	Corrected Score *
Years of Experience	Spearman's rho	-.162	.094
	Sig. (2-tailed)	.597	.771
	N	13	12

* Outlier removed

Table 3. Self-Reported Comfort vs. Exam Score

		Exam Score	Corrected Score *
Comfort Level	Spearman's rho	.478	.315
	Sig. (2-tailed)	.116	.345
	N	12	11

* Outlier removed

Table 4. Question type totals for each respondent group

	Background	Foreground	Logistic	Social	Patient	Total
Residents	113 (43%)	18 (7%)	1 (0%)	2 (1%)	1 (0%)	135 (52%)
Graduates	88 (34%)	35 (13%)	3 (1%)	0 (0%)	0 (0%)	126 (48%)
Total	201 (77%)	53 (20%)	4 (2%)	2 (1%)	1 (0%)	261 (100%)

Table 5. Comparison of the proportion of question types asked by subjects

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square for trainees vs. graduates	8.32	1	.004
Pearson Chi-Square for all provider categories	12.18	3	.007

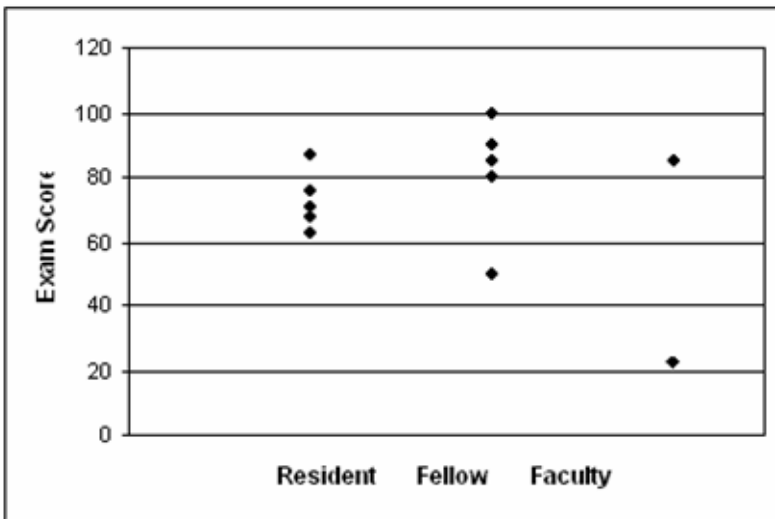


Figure 1.

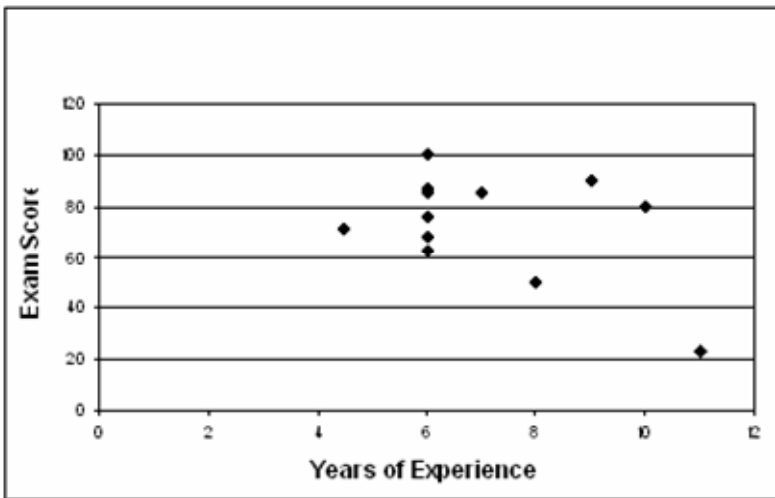


Figure 2.

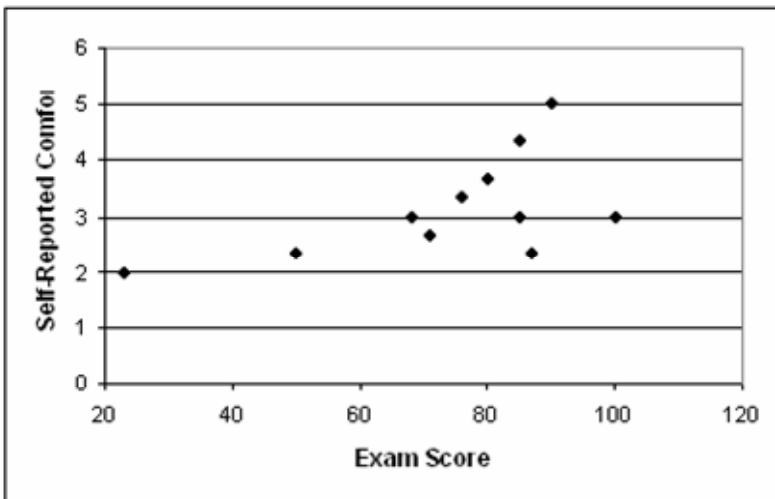


Figure 3.

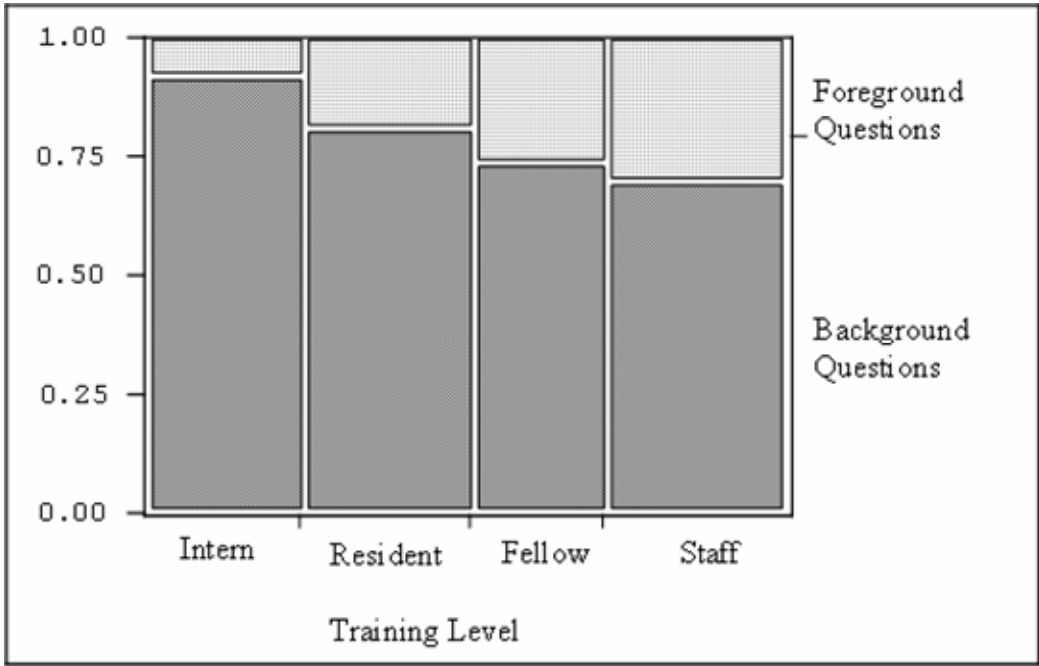


Figure 4.

Appendix 1: Question Typology:

Background question – These questions involve general background knowledge of a disease. They have two essential components: a question root involving the who, what, when, where, or why about a disease, disease process, or therapy with a verb and a disorder or an aspect of a disorder. In other words, they are simple two-part questions about the basic facts of a disease or a therapy. A lack of prior knowledge or experience of a particular condition or situation characterizes background questions. General epidemiologic questions also may be classified as background so long as they are not specific to a particular regional context. Answers are typically found in regularly updated electronic or printed texts(56-58). Examples of background information resources include Harrison’s Principles of Internal Medicine textbook, Up To Date electronic reference, and MD consult. Review articles can also be used to answer a background question. Review articles typically offer an overview of a topic and are written by a single author. They do not generally represent an evidence-based resource. **CODE 1**

Ex 1 (etiology and pathophysiology): What causes migraines?

Ex 2 (overview of therapy): What are the standard treatments for depression?

Ex 3 (prognosis): What is the known life expectancy for a patient with an ejection fraction less than 30%?

Ex 4 (diagnostics): How is iron deficiency routinely diagnosed?

Ex 5 (history and exam): What are the physical findings in bronchiolitis?

Ex 6 (epidemiologic): What is the prevalence of aspergillus infection in asthmatics?

Foreground question – These questions are generally more complex than background questions and typically require a focused response. They ask for specific knowledge about managing patients with a disease and have 3 or 4 essential components. The first component is the patient or problem. The subject may be represented by a patient type, patient characteristic, disease, primary problem, or a co-existing condition. Occasionally the subject or population can be inferred from the context of the question. The second part is the intervention, prognostic factor, or exposure. The third part is the comparison or main alternative to the primary intervention. The foreground question may not have a specific comparison. The fourth part is the outcome and entails what the user hopes to accomplish measure, improve, or affect. A precise outcome should be stated and may not be inferred. Moreover, vague references to an outcome cannot suffice. Phrases such as “improved outcomes”, “clinical evidence”, “correlate”, “correspond”, and “do better than” are abstract concepts and do not facilitate a search strategy. Thus, such comments do not constitute an explicit outcome. By their nature, foreground questions require up-to-date answers. Examples of foreground questions include clinical evidence for the therapeutic efficacy of a new or existing treatment, the diagnostic accuracy of a test for a disease, or the best treatment strategy for a particular patient type. Answers are typically found in the primary literature, online clinical research bibliographic databases (such as Ovid or PubMed), or study syntheses (meta-analyses, methodologically sound guidelines)(56-58). **CODE 2**

Ex 1 (comparative therapies): In young children with acute otitis media, is short-term antibiotic therapy as effective as long term antibiotic therapy?

Ex 2 (relative efficacy): How do tricyclic antidepressants compare with selective serotonin reuptake inhibitors in terms of costs and benefits for patients experiencing depression in a primary care context?

Ex 3 (evidence of therapeutic efficacy): In patients with history of alcohol abuse, what is the therapeutic efficacy of clonidine to mitigate withdrawal symptoms?

Ex 4 (diagnostic accuracy): In adults with suspected iron deficiency anemia, what is the diagnostic accuracy of a serum ferritin level?

Ex 5 (prognosis): In patients with sickle cell anemia, what is the prognostic significance of frequent episodes of acute chest syndrome on probability of 10 year survival?

Logistical question – These are questions do not involve the ‘what’ but rather the ‘how’ of a task or intervention. That is to say that these are questions about how to get things done or who to contact to facilitate a process. For example, respondents may inquire as to what is the necessary form or formulary equivalent of a therapeutic agent(31). Alternatively, respondents may inquire as to who is the preferred local consultant for a clinical problem. Also, questions may relate to the mechanism of therapy administration. To be logistic in nature, the question must suggest the demand for regional, institutional, or

provincial information. Questions that easily translate across settings or are context independent are not logistic. Answers are typically found in local publications or policy and procedure manuals. **CODE 4**

Ex 1 (regional process and policy): What DMV forms are required when a patient is evaluated for dementia?

Ex 2 (institutional process and policy): Can tirofiban be administered outside of the ICU?

Ex 3 (resource availability and access): Which calcium channel blockers are on the local formulary?

Ex 4 (medication administration): What diluent does this pharmacy use for vancomycin?

Epidemiologic question – These questions relate to aggregated patient statistics, which may guide regional practice, for example recent patterns of illness or public health data. The question must have a provincial focus or relate to the provider's catchment area. Answers may be found in institutional literature or local public health department bulletins. **CODE 5**

Ex 1 (regional disease epidemiology): What is the prevalence of syphilis in the northwest US?

Ex 2 (regional disease epidemiology): What is the prevalence of MRSA colonization among homeless patients in the Portland metropolitan area?

Ex 2 (regional response patterns): What is the resistance rate of urinary bacterial pathogens to sulfa drugs in this hospital?

Social question – These questions frequently contend with how local or familiar colleagues get the job done. For example, providers may inquire about local practice patterns. There must be an explicit contextual comment to distinguish the question from those seeking background knowledge. Answers are typically found with local colleagues. **CODE 6**

Ex 1 (domain expert practice patterns): What is Dr. C's NSAID of choice for chronic osteoarthritis?

Ex 2 (domain expert practice patterns): Do our cardiologists combine aspirin and warfarin in patients with atrial fibrillation and known ischemic disease?

Ex 3 (regional or institutional practice patterns): Do University hematologists prefer checking MMA and homocysteine to evaluate nutritional anemias?

Patient data question – These questions relate to the acquisition of patient data in order to augment the history and exam. For example, providers may ask about the patient's family history, prior medication use, or lung exam findings. Answers are typically found in the chart, outside medical records, or at the bedside. **CODE 7**

Ex 1 (patient history): When did the patient complete his course of antibiotics?

Ex 2 (patient data): What is the patient's creatinine clearance?

Ex 3 (exam findings): Does the patient have clubbing?

Appendix 2 – Sample Vignette

Vignette 1

A 40-year-old woman contracted chronic hepatitis C virus (HCV) infection from a blood transfusion more than 20 years ago. Her physical examination reveals no signs of advanced liver disease, and the only abnormalities on her complete blood count and liver chemistry panel are an elevated aspartate aminotransferase (AST) level (75 U/L) and alanine aminotransferase (ALT) level (110 U/L). A liver biopsy performed 1 year ago demonstrated moderately active interface hepatitis and focal bridging fibrosis. She is interested in therapy after reading about it on the Internet.

Aside from additional patient data, what information would you like to know?

Appendix 3 – Sample Questions

- 1 Are there guidelines for when to initiate interferon therapy?
 - 2 What is the appropriate dose of interferon and ribavirin for this patient?
 - 3 What medical therapies have been proven to reduce mortality for acute variceal hemorrhage?
 - 4 How accurate do transaminase levels predict fibrosis score and are they directly proportional?
 - 5 What is the quality of evidence for the use of ribavirin and interferon in the treatment of patients with hepatitis C?
 - 6 Is EGD banding superior to sclerotherapy in patients with bleeding esophageal varices?
 - 7 What pathologic findings on liver biopsy predict a response to interferon/ribavirin treatment?
 - 8 At what point is therapy indicated in HCV?
 - 9 What are the current recommendations for treating hepatorenal syndrome?
 - 10 Is a SAAG always reliable in a patient who has an extremely low albumin?
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