Does the Structure of Clinical Questions Affect the Outcome of Curbside Consultations With Specialty Colleagues?

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Background: Clinical questions frequently arise during the practice of medicine, and primary care physicians frequently use curbside consultations with specialty physicians to answer these questions. It is hypothesized that well-formulated clinical questions are more likely to be answered and less likely to receive a recommendation for formal consultation.

Objective: To assess the relationship between the structure of clinical questions asked by family physicians and the response of specialty physicians engaged in curbside consultations.

Design and Participants: A case series of clinical questions asked during informal consultations between 60 primary care and 33 specialty physicians using an e-mail service. Curbside consultation questions were sent, using e-mail, to academic specialty physicians by primary care physicians (faculty, residents, and community practitioners) in eastern Iowa.

Main Outcome Measures: Questions were analyzed to determine the clinical task and to identify 3 compo-

nents: an intervention, a comparison, and an outcome. Consultants' responses were analyzed to identify whether questions were answered and whether consultants recommended formal consultation.

Results: There were 708 questions in this analysis: 278 (39.3%) were diagnosis questions, 334 (47.2%) were management questions, 57 (8.0%) were prognosis questions, and 39 (5.5%) were requests for direction. Clinical questions were less likely to go unanswered or receive a recommendation for formal consultation when the question identified the proposed intervention (odds ratio, 0.54; 95% confidence interval, 0.34-0.86; $P = .006$) and desired outcome (odds ratio, 0.46; 95% confidence interval, 0.29-0.69; $P < .001$). Only 271 (38.3%) of 708 curbside consult questions identified both of these components.

Conclusion: Medical specialists' responses to curbside consultation questions seem to be affected by the structure of these clinical questions.

Arch Fam Med. 2000;9:541-547

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C LINICAL QUESTIONS frequently arise during the practice of medicine.[1] Depending on the methods of researchers, primary care physicians generate between 0.7 and 18.5 questions for every 10 patients cared for in the office setting.[2,3] When unanswered, these questions represent knowledge gaps that potentially impact quality of medical care.[4,5]

Recently, the structure of clinical questions has gained attention, and health professionals are advised to formulate clinical questions using a standardized approach.[6,7] Well-formulated questions are thought to be those identifying an inter-

vention of concern (eg, a treatment or a diagnostic test), the hoped-for outcome of the intervention, and, if applicable, a comparison intervention. Questions containing these components are hypothesized to be more "answerable."

The importance of well-formulated questions has largely been in the context of using the medical literature to fill knowledge gaps.[6-8] However, primary care physicians infrequently use literature searches[9-12] and are more likely to use informal consultations to answer their clinical questions.[3,9,12] Thus, the curbside consult is an important means of answering clinical questions.[3,9-11,13-15]

MATERIALS AND METHODS

The clinical questions used for this study were those asked by primary care physicians using an e-mail–based informal consultation service. The E-mail Consult Service (ECS) links primary care clinicians across Iowa with 33 specialty physicians and other health professionals (including a family therapist, a nutritionist, and a microbiologist) at the University of Iowa, Iowa City. The details of this service have been described previously.[16] The ECS allows primary care physicians to send clinical questions to consultants specifically recruited for this service. Neither the primary care clinicians nor the e-mail consultants were advised on the structure of their e-mail communications. Users of the ECS were aware that their questions and answers were freely available to other primary care physicians using this service, but users were not aware of our specific study or hypotheses. All questions posed by 60 family physicians, practicing within the 1612-km^2 county where the medical school is located, sent via the ECS between May 1996 and May 1999 were analyzed for this project. The physicians were faculty members or residents in a family practice training program or full-time community practitioners.

PROCEDURES

Questions asked during e-mail consultations were identified and analyzed using a taxonomy based on that proposed by Sackett.[7] Each question was parsed to identify the 3 components of the taxonomy: an intervention of interest, a comparison, and a clinical outcome. Questions were also placed into 1 of 8 task categories previously identified by Sackett et al: clinical findings, diagnostic tests, etiology, differential diagnosis, prognosis, treatment, prevention, and self-improvement. Questions about whether a specific patient required a formal consultation or to whom to refer the patient were placed into the category of self-improvement. A ninth task category, request for direction, was also created. Questions in this category contained a description of a clinical situation but did not identify 1 of the 8 clinical tasks. Instead, the primary care practitioner typically asked a general question, such as "What do you think?" "Any ideas?" "What would you suggest?"

Two of us (G.R.B. and C.S.R.) independently analyzed each question using the taxonomy shown in **Table 1**. All discrepancies were reviewed and discussed until consensus was reached. The questions were analyzed before the consultants' answers were reviewed. Responses from the consultants were then analyzed to identify whether a question was answered and whether a consultant recommended formal consultation. The κ value for whether the consultant answered a question was 0.73 and for whether the consultant requested a formal consultation was 0.86. Thus, there was substantial to near-perfect agreement between the reviewers on these end points.[17] Last, we recorded whether the consultant requested additional information in response to a clinical question. The thoroughness and accuracy of the answers or the appropriateness of consultants' requests for formal consultation were not analyzed.

Eighty-nine questions that were not about specific patients were excluded from this study because they could not result in the recommendation that a specific patient be sent for consultation. The 62 questions in the domain of self-improvement were also excluded because almost all pertained to referral. In addition, because we hypothesized that the training status of the physician (board certified vs postgraduate resident) might impact the response of the consultant, we excluded 31 questions that could not be attributed to a specific individual.

END POINTS

Outcomes of interest included whether a question was answered or whether the consultant requested a formal consultation. A priori, we also decided to combine these end points into a single outcome for a third analysis. We reasoned that when consultants had difficulty understanding a question they might not answer the question or might handle the situation by recommending formal consultation. In addition, we concluded, based on interviews with the primary care physicians who used the ECS, that both outcomes were considered "nondefinitive" from the primary care physician's perspective and that these were outcomes they wanted to avoid.

STATISTICAL ANALYSIS

Univariate associations between the individual characteristics of the questions and the end points were analyzed using χ^2 and t tests. Mulivariate analysis to investigate the associations between the components of a question (intervention, comparison, and outcome) and the consultants' responses were undertaken using logistic regression. A logistic model was also created that included the components of the questions, the training status of the questioner, whether the consultant believed there was adequate clinical information (assessed by whether the consultant asked for additional information), and the specialty domain of the consultants. Consultants were categorized into the domains of adult medicine, pediatrics, obstetrics and gynecology, surgery, and other (**Table 2**).

A quality-of-question score was generated based on the components associated with the consultants' responses using logistic regression. Individual components were given scores weighted by their odds ratios (ORs) and summed for each question. The relationship between these question scores and outcomes were further assessed using the Armitage test for trend in proportions. A t test was used to compare the quality-of-question scores of board-certified physicians and trainees. Analyses were performed using statistical software (NSCC 2000; NCSS Statistical Software, Kayesville, Utah).

Table 1. Taxonomy of Medical Questions for the E-mail Consult Service Structure of Questions Project*

Housekeeping

If a consult generates an e-mail discussion between the asker and the consultant, all exchange after the initial consult is not relevant to this study

A single e-mail consult can contain multiple questions

A question that contains 2 phrases linked by *or* usually is 1 question ("Should I use test A or test B?") and the second element is a comparison intervention

A question that contains 2 phrases linked by *and* usually is 2 questions if the 2 are different types of interventions (eg, "In a patient with diabetes mellitus, can I prevent renal failure by maintaining a normal blood sugar level and aggressively treating elevated blood pressure with antihypertensives?"). If the 2 interventions are related, then they count as 1 question (eg, "In a patient with diabetes mellitus, can I prevent renal failure by identifying proteinuria and treating with an angiotensin-converting enzyme inhibitor?" Note that identifying proteinuria and drug prescription come as a package). Questions about whether a treatment is "safe and effective" are counted as a single question.

Elements of the question

1. Specific patient or problem
2. Intervention: can be a treatment, a test, a prognostic factor, a cause of symptoms, an etiology, a referral to another provider, etc
3. Comparison intervention: the question does not contain a comparison unless one is expressly identified in the consult; the absence of the intervention does not count as a comparison unless not using the intervention is expressly mentioned (eg, "Should I use or not use drug X?")
4. Outcome: is a statement of what needs to be accomplished, the disease that needs to be treated, or the condition that needs to be attained

Outcomes can be general, eg, improvement in a specific condition, diagnosis of a specified disease, the association between 2 conditions, or maximizing quality of life. General outcomes such as "How do I diagnose this patient?" or "How do I treat this patient?" without mention of a specific disease or intervention do not count as outcomes.

Outcomes can also be specific, eg, reduce mortality, accuracy of a test, or diagnosis of disease X. The question contains an outcome if an outcome linked to the intervention is found anywhere in the consult. An outcome can be the cost of an evaluation ("What is the most cost-effective method of using these tests?") or the safety of a treatment ("How can I reduce the risk of adverse effects using medication X?"). Alternatively, outcomes might not always be related to the specific patient that is used to frame the question, eg, an outcome can be a matter of the precision or accuracy of a test. Asking for help understanding a situation or learning the standard of care in a situation does not count as an outcome unless the question is how best to achieve this outcome (ie, is a "self-improvement" question).

Categories of clinical tasks involved in questions

1. **Clinical findings**
   How to gather findings from the history or physical examination
   How to interpret findings from the history or physical examination
   When to perform a clinical maneuver during the history or physical examination
2. **Etiology**
   Questions about the single cause or the origin of a disease
   Disease is usually defined by 2 of the following 3: recognized etiologic agent, identified group of signs or symptoms, or consistent anatomical alteration
   Differential diagnosis will look at multiple causes
3. **Differential diagnosis**
   How to rank the possible causes of a patient's clinical problem by
      a. Likelihood
      b. Seriousness
      c. Treatability
   When to consider a possible cause for a disease
4. **Diagnostic test**
   How to select a diagnostic test
   When to use a specific diagnostic test
   How to prepare a patient for a diagnostic test
   How to prioritize tests within a series

How to interpret a diagnostic test result
   When to use testing for case finding (note: case finding differs from screening because case finding is based on increased clinical suspicion because of risk factors)
   Any question related to the precision, acceptability, expense, or safety of a test

5. **Prognosis**
   How to estimate the patient's likely clinical course over time
   How to predict the likely complications of a disease
   How to communicate the prognosis to a patient
6. **Therapy**
   How to select a treatment that offers a patient more good than harm
   How to dose a treatment
   When to start a treatment
   How to select treatments that are worth the cost or effort
   How to prevent or minimize the complications of a treatment
   How to identify a possible complication of a treatment
7. **Prevention†**
   How to reduce the risk of disease by identifying and modifying risk factors
   How to identify disease early by screening
   How to interpret the results of a screening test
   How to respond to the result of a screening test, eg, selection of treatment or an additional test
   When to start screening an asymptotic population
   Questions about risks associated with preventative intervention belong here
8. **Self-improvement**
   How to keep up-to-date
   How to improve clinical skills
   How to run a more efficient clinical practice
   How to make better use of specialty consultants
   How to find a consultant with specific skills
   Finding whether a specific treatment or test is available
9. **Request for direction**
   Any question that contains specific patient information but does not offer any indication as to what information the asker needs. This question can sometimes be identified by containing the following phrases: any ideas, any suggestion, what would you recommend, any thoughts. If the questioner formulates a specific question but still asks for direction, then the request for direction is not present.

Outcomes of curbside consult request

Answer

The quality, relevance, or applicability of the answer is not pertinent to this analysis. However, to qualify as an answer, the information must be judged to relate to the question.

A consultant might answer 1 question in a consult and not a second question.

If no response to an entire e-mail consult can be identified, then the result is removed from the analysis. In this situation, it cannot be known if the lack of response is because of transmission problems or consultant inaction.

Consultation

The consultant recommends, requests, demands, or suggests a consult in their reply to the question. A consult is present if the consultant suggests a procedure that requires patient referral to another physician. Recommending an imaging study does not count as a consult.

A formal consult recommendation is *not* present if the consultant gives an answer and states that if the problem does not resolve the patient should be sent for a formal consult.

A consult request is *not* present if the consultant only states that he or she would "be happy to see the patient."

Needs more information

Restating the information in the consult does not qualify as a request for more information.

Stating assumptions used to formulate the answer does not qualify as a request for more information.

Stating 2 possible courses of action depending on a factor unknown to the consultant does not qualify as a request for more information.

*Adapted from Sackett et al.[7]

†There can be confusion between prevention and treatment. Questions about interventions for identified disease to prevent further complications belong in therapy. Questions about interventions to prevent progression in disease states belong in prevention. For example, use of the loop electrosurgical excision procedure for cervical intraepithelial neoplasia II is a question about prevention. There is often confusion between screening and diagnosis because the same tests can be used for both purposes. Whereas screening occurs in individuals who are asymptomatic, or not suspected of having the disease in question, diagnosis is used to confirm whether someone actually has a disease. For example, a blood glucose test in someone who is healthy would be a screening test. The same test in someone with symptoms of diabetes would be diagnostic.

Table 2. Frequency Table of the Questions Posed Using the E-mail Consult Service by Specialty Domains and Consultants' Responses

Specialty Domain	Consultants, No.	Represented Specialties	Questions, No. (%) (N = 708)
Adult medicine	12	Cardiology, infectious diseases, neurology, nephrology, gastroenterology, oncology, hematology, lipids, endocrinology, rheumatology, occupational medicine, pulmonary	371 (52.4)
Surgery	6	Ear-nose-throat, orthopedics, ophthalmology, general surgery, urology, vascular	154 (21.8)
Obstetrics and gynecology	4	General gynecology, cervical cytology/disease, geriatric gynecology, obstetrics	97 (13.7)
Pediatrics	3	General pediatrics, infectious diseases, neonatology	23 (3.2)
Other	8	Laboratory medicine, travel medicine, behavioral medicine, alternative medicine, emergency medicine, dermatology, nutrition, pharmacology	63 (8.9)

We thought it possible that the structure of a clinical question would affect the response of a specialty physician involved in a curbside consultation. We hypothesized that well-formulated clinical questions would be more likely to obtain definite answers. By better understanding the relationship between the structure of clinical questions and the responses of specialty colleagues engaged in curbside consults, it might be possible for primary care physicians to make better use of this information resource.

RESULTS

There were 708 questions in this analysis: 278 (39.3%) in the area of diagnosis, 334 (47.2%) in the area of management, and 57 (8.0%) in the area of prognosis; 39 questions (5.5%) were categorized as requests for direction because they did not identify the clinical area or task of concern and forced the consultant to formulate the question that needed to be answered. Three hundred eighty-one questions (53.8%) were posed by board-certified family physicians, and the remaining 327 (46.2%) were posed by postgraduate physician trainees.

Five hundred nine questions (71.9%) identified an intervention, 200 (28.2%) contained a comparison intervention, and 343 (48.4%) identified the sought after outcome. One hundred twenty-two questions (17.2%) specified none of these elements, 224 (31.6%) specified one, 258 (36.4%) specified 2, and 104 (14.7%) specified all 3.

The consultants answered all but 48 (6.8%) of the curbside consult questions and recommended formal consultation in response to 86 of the questions (12.1%). In total, 121 questions (17.1%) posed by primary care practitioners resulted in a nondefinitive outcome, meaning that the question went unanswered or received a recommendation for formal consultation. Board-certified physicians were more likely to receive answers to their questions than were trainees (95.8% vs 90.2%; $P<.01$), but consultants recommended formal consultations at a similar rate (12.3% vs 11.9%; $P=.87$) for these 2 groups. Both groups of primary care physicians also received a simi-

lar percentage of nondefinitive responses (15.5% vs 19.0%; $P=.22$). Consultants asked for additional information in response to 72 questions (10.2%) and were more likely to ask a trainee for additional information than a board-certified family physician (14.1% vs 7.1% of questions; $P=.002$).

Questions in which primary care providers identified the desired outcome were less likely to go unanswered than were those not identifying the desired outcome (OR, 0.51; 95% confidence interval [CI], 0.27-0.94; $P=.03$). The presence or absence of a proposed intervention or comparison intervention was not related to having the question answered by the consultant ($P=.42$ and $P=.25$, respectively). Questions were less likely to result in a recommendation for formal consultation when the question identified the proposed intervention (OR, 0.54; 95% CI, 0.34-0.86; $P=.006$) and desired outcome (OR, 0.46; 95% CI, 0.29-0.72; $P=.004$). The presence or absence of a comparison intervention was not related to this outcome ($P=.12$).

A curbside consult question was less likely to go unanswered or to receive a recommendation for a formal consultation when the question identified the proposed intervention (OR, 0.54; 95% CI, 0.34-0.86; $P=.006$) and desired outcome (OR, 0.46; 95% CI, 0.29-0.69; $P<.001$). The presence of a comparison intervention was not related to this outcome ($P=.48$). The areas of the clinical task, the training status of the physician asking the question, and whether the consultant requested additional information were not related to a nondefinitive outcome ($P>.05$ for all factors). The specialty domain of the consultant was not associated with nondefinitive outcomes except for surgical consultants. Compared with specialists in adult medicine, surgeons were more likely to respond with nondefinitive answers (OR, 3.0; 95% CI, 1.8-5.2; $P<.001$). Surgeons were similar to other specialties in their frequency of not answering questions ($P=.85$) but were much more likely to recommend a formal consultation ($P<.001$).

Further analysis helped detail the association between specifying an intervention or an outcome in a ques-

Table 3. Examples of Clinical Questions Asked by Family Physicians and Their Associated Quality Scores*

Quality Score	Curbside Questions With Neither an Intervention Nor an Outcome
0	I have a 32-year-old patient who had chest pain in November 1997 and was found to have bicuspid aortic valve with a gradient of 16. She is now pregnant with her third child. Is there any need to do anything else?
0	I have a young male who came to my office for an upper respiratory tract infection complaint. He also has a history of depression and had felt more irritable of late . . . thyroid function tests were ordered. His TSH is very depressed, but free T_4 and T_3 are normal. Any ideas?
0	50-Year-old nullipara with focal duct ectasia on ultrasound. Was taking Premarin (conjugated estrogens), which I changed to Ogen (estropipate) to decrease the estrogen effect of her hormone replacement therapy on her breasts. Is there anything else I should do for her clinical problem?
0	30-Year-old presented with headache, malaise, and fever for 2 wk. No recent travel or significant alcohol use. He is homosexual and has had unprotected intercourse. Laboratory test results include elevated AST (338) and AST (175). He is Hep B Ab + (patient had received Hep B vaccine). All other Hep B laboratory test results are negative, as are Hep A results and Hep C Ab and virus PCR. Where do I go from here?

	With an Intervention *or* an Outcome
1	49-Year-old lady with amenorrhea for 13 y following motor vehicle accident when she sustained multiple injuries including facial and head injuries. Laboratory test results to this point: prolactin, 13 µg/mL; TSH normal at 3.5, with free T_4 slightly low at 0.6; follicle-stimulating hormone, 0.7; luteinizing hormone, <0.2. I think she may have pituitary hypofunction secondary to her accident. Is there anything else you would do to work her up?
1	I have a patient who is a 47-year-old postmenopausal smoker with a positive family history of coronary disease. She has a history of pain with stress, rest, and indigestion, but not usually with exertion. She has had 2 treadmill tests, 1995 and 1997, both normal. Would you recommend catheterization now?
1	A 43-year-old man with hyperlipidemia asked if he should have his homocysteine levels checked. If elevated, should he receive folate supplements?
1	I have a 61-year-old female with evidence of esophagitis on upper endoscopy. She previously was taking H_2 blockers and was having intermittent burning chest pain. On switching to Prilosec (omeprazole), she has felt great for the last 5 wk. How long should this medication be continued?

	With an Intervention *and* an Outcome
2	I have a 50-year-old married white female patient with hypopituitarism secondary to a multi-injury motor vehicle accident 14 y ago. She has consistently low free T_4 with inappropriately low TSH. I have been gradually increasing the Synthroid (levothyroxine sodium) dose. Since we are not absolutely sure that she has sufficient corticotropin, if I keep going up on the dose of Synthroid am I in danger of pushing her into an adrenal crisis?
2	I have a 43-year-old male with a strong family history of coronary artery disease who had some atypical chest pain a few weeks ago during a time of stress, not exertion. He had no recurrence. Exercise treadmill testing showed about 2 mm of ST depression in V_5 and V_6 late in stage 3 that resolved 5 min after testing and was asymptomatic. He did reach 85% maximum heart rate. Perfusion scanning showed 2 fixed defects (anterioseptal and inferior walls). Can you tell from this the likelihood of 2- or 3-vessel disease?
2	I have a 44-year-old male who was recently diagnosed with Hep C. Enzyme-linked immunosorbent assay II and recombinant immunoblot assay results were positive. Liver biopsy shows inflammation confined to the portal areas and no fibrosis. A Hep C virus RNA quantification is pending. What result would you expect on the PCR for you to recommend interferon use?

*Examples have been lightly edited for style. TSH indicates thyrotropin; T_4, thyroxine; T_3, triiodothyronine; AST, aspartate aminotransferase; Hep, hepatitis; Ab, antibody; and PCR, polymerase chain reaction.

tion and the response of the consultants. Because the ORs for these components and obtaining a nondefinitive outcome were similar, both of these question components were given a value of 1. Thus, questions were given a score of 0 if neither an intervention nor an outcome was specified, a score of 1 if either was specified, and a score of 2 if both were specified. Examples of questions taken from curbside consults, and their associated scores, are shown in **Table 3**. The presence of a comparison intervention was not included in this model because this component was not significantly associated with any of the end points.

There was a strong association between the total quality score of a question and whether there was no answer or a recommendation for formal consultation (Armitage test for trend, $P<.001$). When neither question component was present, 29.4% of the questions went unanswered or received a recommendation for a formal consultation. When both components were present in a question, only 10.0% of the questions resulted in a nondefinitive outcome (**Table 4**). Questions with a score of 0 and categorized as a request for direction were more likely to result in a nondefinitive outcome than were questions with a score of 0 that identified the clinical task of concern (39.5% vs 25.0%). However, this difference did not achieve statistical significance ($P=.10$).

Questions posed to consultants in the 5 specialty domains all had similar quality scores ($P=.24$). Trainees tended to ask questions with a slightly lower quality score compared with board-certified practitioners (mean score, 1.15 vs 1.25; $P=.047$). Both groups were equally as likely to state an intervention in their questions ($P=.74$), but board-certified physicians were more likely to state the desired outcome ($P=.002$). Trainees and board-certified providers were equally likely to ask a request

Table 4. Association Between the Presence of an Identifiable Intervention or Outcome in a Clinical Question and the Consultant's Response

Intervention or Outcome	Quality Score	Questions, No. (N = 708)	Unanswered Questions, No. (%)*	Recommedations for a Formal Consultation, No. (%)*	Nondefinitive Outcomes, No. (%)†
Neither	0	126	12 (9.5)	28 (22.2)	37 (29.4)
Only one	1	311	25 (8.0)	40 (12.9)	57 (18.3)
Both	2	271	11 (4.1)	18 (6.6)	27 (10.0)

*Armitage test for trend, P<.05.
†Nondefinitive outcome indicates that the question went unanswered or the consultant recommended a formal consultation or referral. Armitage test for trend, P<.001.

for direction question (4.3% vs 6.1% of their questions, respectively; *P*=.23).

COMMENT

Consultants' responses to informal or curbside consultation questions from primary care physicians were strongly associated with the structure of the clinical questions. Primary care physicians were more likely to obtain an answer and less likely to get a recommendation for a formal consultation when their questions clearly identified a proposed intervention and the desired outcome. An example of such a question is "Will the addition of a β-blocker lengthen the life of a 58-year-old woman with moderate congestive heart failure who is already taking an angiotensin-converting enzyme inhibitor?" This question can be compared with a less well-formulated one such as "What should I do for a 58-year-old woman with moderate congestive heart failure who is already taking an angiotensin-converting enzyme inhibitor?" Nearly 30% of the questions that did not clearly identify an intervention and desired outcome went unanswered or received a recommendation for a formal consult. In contrast, when both were specified, only 10% of clinical questions resulted in this outcome.

The association between the structure of questions and consultants' responses was independent of the training status of the asking physician and uniform over most consulting domains. Although our findings suggest that primary care physicians can affect the consultants' answers by how they structure their clinical questions, we also found that primary care clinicians did not routinely ask well-formulated clinical questions. Overall, about 40% of the curbside consult questions clearly identified an intervention and desired outcome, and there was little difference in how experienced clinicians and physicians still in training structured their questions. This finding suggests that how questions are structured might not be related to general medical knowledge and that even experienced physicians may benefit from training in structuring their clinical questions. (A tutorial on formulating clinical questions is available on the Internet at http://fpinfo.medicine.uiowa.edu/tutorial/intro_questions.htm.)

The demonstrated associations are consistent with the literature on problem solving. It has long been held that formulating an answerable question is a fundamental problem-solving skill because well-structured problems are more solvable than are ill-structured ones.[18-20] Well-formulated clinical questions might require less effort on the consultant's part to answer and thus are more likely to be answered. The association between the structure of a question and the recommendation for a formal consultation might be linked to perception of expertise. An attribute of expertise, including medicine expertise, is the ability to formulate well-defined expressions of ill-defined problems.[21,22] Consultants might interpret a primary care physician's ability to structure a well-defined question about a clinical problem as evidence that he has sufficient expertise to manage the problem. This explanation deserves further study.

Limitations of our research need to be noted. The first is that clinical questions studied for this analysis are those posed using an e-mail–based service. It is possible that consultants respond differently to e-mail questions than they do in-person or on the telephone.[23] When a clinical question is posed using e-mail, consultants have less immediate access to additional clinical information but more time to ponder the question and compose an answer. Whether the structure of clinical questions affects the responses of consultants engaged in face-to-face exchanges with primary care physicians deserves study.

Second, this is an observational study. Although we documented an association between the structure of a question and a consultant's response, we cannot determine whether the association is one of cause and effect. However, the association between the quality of question and the responses of consultants is strong and hierarchical in nature. In addition, the association between the quality of question and consultants' responses is independent of the training status of the questioner or the clinical task.

Third, we did not assess the satisfaction of the consultants with how individual questions were formulated by family physicians or whether their answers satisfied individual questioners. We also do not have information on whether the consultant's recommendations were followed and, therefore, cannot assess the association between the structure of clinical questions and clinical outcomes of patients.

In conclusion, the structure of questions asked during curbside consultations was associated with whether consultants answered a question or requested a formal consultation. Only 38% of questions contained the 2 key components of well-structured questions. Although experienced family physicians asked slightly higher-quality questions than did trainees, our findings suggest that many physicians might benefit from additional training on how to ask clinical questions.

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Clinical Pearl

Do Beta-Blockers Lead to Diabetes?

In a study following the development of atherosclerotic risk factors, diabetes developed within the next 6 years at a higher rate in patients with hypertension treated with beta-blockers than those treated with thiazide diuretics, angiotensin-converting-enzyme inhibitors, or calcium-channel blockers, or compared to patients without hypertension. The patients on beta-blockers had a 28% higher rate of the development of diabetes (relative hazard, 1.28; 95% confidence interval, 1.04-1.57). (*N Engl J Med.* 2000;342:905-912).