

Problem Formulation in Evidence-based Practice and Systematic Reviews

Ralf W. Schlosser
 Therese M. O'Neil-Pirozzi
 Northeastern University, Boston, MA

Good questions outrank easy answers.

—Paul A. Samuelson

Evidence-based practice (EBP) is being recognized as a preferred approach to practice in communication disorders and sciences in general (Reilly, Douglas, & Oates, 2003) and fluency

ABSTRACT: Problem formulation, or the asking of well-built questions, is the first step in the evidence-based practice (EBP) process. Often it is the first stumbling block for clinicians as the success of subsequent steps hinges on how well the problem is formulated. Templates for asking well-built questions can assist clinicians in this process. In this article, we will introduce the PESICO template—person, environments, stakeholders, intervention, comparison, outcomes (Schlosser, Koul, & Costello, 2006)—apply it to the field of fluency disorders, and illustrate it with several well-built questions. Problem formulation is also relevant in the development of systematic reviews, which provide the clinician with timesaving access to prefiltered evidence. The second aim of this article is to offer practitioners considerations in formulating problems in their own review efforts and to discuss the impact of this problem formulation on the use of systematic reviews for informing practice. This is accomplished by reflecting on the problem formulation done by C. Herder, C. Howard, C. Nye, and M. Vanryckeghem (2006), this volume, in their systematic review of behavioral stuttering interventions.

KEY WORDS: evidence-based practice, fluency disorders, knowledge and skills, problem formulation, systematic reviews, well-built questions

disorders in particular (e.g., Bernstein Ratner, 2005; Costello Ingham, 2003). EBP has been defined in many ways. In order for the reader to determine an appropriate definition for oneself, the following criteria for a viable definition are proposed: First, the definition has to make clear that EBP is an integration of three constructs (best and current research evidence, clinical expertise, and relevant stakeholder perspectives); second, it should be evident that the decision to be made will affect the clinical services rendered for an individual client rather than a group or population of clients.

One definition that meets both of these criteria has been proposed by Schlosser and Raghavendra (2004), who defined EBP as “the integration of best and current research evidence with clinical/educational expertise and relevant stakeholder perspectives, in order to facilitate decisions about assessment and intervention that are deemed effective and efficient for a given direct stakeholder” (p. 3). To accomplish this integration, several workers across health care have recommended a process involving the following steps: (a) Ask a well-built question, (b) select evidence sources, (c) implement the search, (d) synthesize the evidence, (e) apply the evidence, (f) evaluate the evidence application, and (g) disseminate the findings (Costello Ingham, 2003; Craig, & Smyth, 2002; Reilly et al., 2004; Sackett, Straus, Richardson, Rosenberg, & Hayes, 2000; Schlosser, 2003). Each of these steps represents an important part of the chain of evidence-based decision making. Arguably, however, the first step is the most

important one of all because it is the question that drives all subsequent steps. The question is reflective of how well a problem has been formulated and translated into actionable steps. If the question is not focused well, the consequences may be rather severe. To be exact, three such consequences are particularly frustrating and often result in the clinician abandoning EBP efforts.

A question that is insufficiently focused may lead the clinician to a very time-consuming search, which involves sorting out many irrelevant references. Schlosser, Wendt, Angermeier, and Shetty (2005) illustrated how the components of a well-built question can be used to devise a methodical search strategy. Second, if the question is not focused, it will be difficult or time-consuming to select the best evidence available. A focused question will help the clinician determine what kinds of study designs are required to best answer a question. This, in turn, will result in a more rapid filtering of retrieved evidence or, even better, a more focused search that eliminates evidence lacking the required study designs. Third, a focused question provides sufficient information about the client and his or her environment in order to facilitate the retrieval of studies that are relevant to the specific client with whom a clinician is concerned. It is for these reasons that this first step is also often the first stumbling block for many clinicians who are interested in evidence-based decision making. Thus, the first aim of this article is to describe what makes a question “well-built” and show how clinicians can construct such questions. Examples will be provided from the field of fluency disorders.

Problem formulation is not only relevant in EBP, but also in the development of systematic reviews. For several reasons, systematic reviews play a critical role for EBP (Schlosser et al., 2005). For the practitioner, they constitute a timesaving measure in that they allow the practitioner to make use of already synthesized information. The more time-consuming alternative is for clinicians to search for individual studies themselves and subsequently engage in their own synthesis. Systematic reviews also offer access to already prefiltered evidence because the appraisal of quality is part and parcel of many systematic review efforts. Finally, systematic reviews have the potential to afford more sound conclusions concerning the effectiveness of treatments compared to any one individual study. Not unlike the development of a research question for an original study (e.g., Higginbotham, 2003), problem formulation is a crucial first step in implementing a systematic review. Similar to the role of well-built questions for EBP, the manner in which the problem is formulated in a systematic review has major ramifications for the remaining review process. In a situation where the problem in a systematic review is ill defined, it is unlikely that the criteria for inclusion and exclusion of studies will be well defined. This, in turn, will lead to questions about the completeness of the search for studies and will ultimately lead to credibility issues relative to the conclusions drawn from the review.

The second aim of this article is to offer readers some considerations that should be useful in formulating problems for their own systematic review efforts or that will

facilitate an appraisal of problem formulation of already completed systematic reviews. But, first, let us turn our attention to the asking of well-built questions in EBP.

PROBLEM FORMULATION IN EBP: A FRAMEWORK FOR ASKING WELL-BUILT QUESTIONS

The availability of a viable framework or template would be helpful to guide clinicians through the process of constructing well-built questions. Recently, Schlosser, Koul, and Costello (2005) evaluated an existing template that was originally proposed in medicine—the PICO template (Richardson, Wilson, Nishikawa, & Hayward, 1995)—in terms of its suitability for application to the field of augmentative and alternative communication (AAC). PICO stands for *patient*, *intervention*, *comparison*, and *outcome* as the components that make up a well-built question. Specifically, PICO was evaluated in terms of the representativeness of these components for AAC purposes as well as the appropriateness of its subcomponents and terminology. On the basis of this analysis, Schlosser et al. proposed the PESICO template, which stands for *person*, *environments*, *stakeholders*, *intervention*, *comparison*, and *outcomes*. For an explicit rationale for this modified template, the reader is kindly referred to the original source.

Is the PESICO template appropriate for fluency disorders as well? The answer to this question can be found by examining similarities between AAC and fluency disorders. First of all, both are subfields of speech-language pathology. Second, the communication partner plays a vital role in both fields in that a partner’s behaviors and attitudes can impact the communicative success of the individual using AAC as well as that of the individual with a fluency disorder. For example, Guitar (2006) speaks to the role of a parent in assisting a young child with a fluency disorder. Finally, the environment in which the client is functioning might also affect the performance of individuals with fluency disorders as it affects individuals using AAC. On the basis of these similarities, many of the rationales for proposing PESICO for AAC should hold up to fluency disorders as well.

The PESICO Template

Person (and problem). This *P* component includes the person’s characteristics such as membership in a population, chronological age, mental age, gender, ethnic group, risk profile, and diagnosis. Specific to stuttering, other features include the severity and characteristics of an individual’s dysfluencies, time and experience with stuttering, coexisting disorders (e.g., phonologic problems), and previous therapy (Conture, 2001; Zebrowski & Conture, 1998). Additionally, the problem that one aims to solve through the EBP process should be made explicit.

Environments. The *E* component is important to specify in building a well-built question in fluency disorders because dysfluencies can vary significantly from situation

to situation, and from moment to moment, depending on many different factors that characterize these situations and moments (Yaruss & Quesal, 2001). For instance, an individual who stutters may experience more fluency in the therapy room than in the classroom. Similarly, the individual may have no problems making a special dinner request at home, but, when it comes to ordering a meal in a restaurant, the individual might experience extreme difficulty. Therefore, it becomes important to delineate the settings for which the clinician is seeking an answer. This will enhance the likelihood of finding the right kind of evidence and will facilitate the determination of relevancy once the evidence has been located.

In addition to the setting, the *E* component also includes the role of the communication partners of individuals who stutter. The relation of the communication partner to the individual who stutters might impact on the person's fluency. For example, it might be easier to communicate with a spouse than it is to communicate with a supervisor at work. In addition, the behaviors of communication partners might differentially affect an individual's fluency. Some treatment strategies call for communication partners to talk more slowly or to stop interrupting the individual who stutters. It is not uncommon to find suggestions for those who communicate with individuals who stutter regarding how they might modify their behaviors (e.g., see <http://www.asha.org/public/speech/disorders/stuttering.htm>). Thus, it is critical to include information about communication partners as part of a well-built question. Only then will the clinician be able to search more effectively for evidence and determine the relevance of otherwise applicable evidence regarding clinical approaches/services for the specific individual at hand.

Stakeholders. The *S* component refers to the perspectives of stakeholders, including those of the direct stakeholder, who is the person who stutters. The child's, adolescent's, or adult's perspective may be thought of as the person's viewpoints, preferences, attitudes (e.g., toward speaking and stuttering), sensitivity (toward stuttering), concerns, and expectations relative to the problem. Because the person will be involved in any decision making ensuing from the EBP process, this is an important aspect to include in some well-built questions.

Communication partners may be drawn from various types of other stakeholder types, including (a) indirect, (b) immediate community, and (c) extended community. Although the *E* component provides a space to describe the behaviors, knowledge, and skills of communication partners, the *S* component designates a space to describe their perspectives and attitudes. These stakeholder types may hold perspectives that influence the feasibility of efforts toward evaluation, prognosis, and intervention. Indirect stakeholders are family members or the spouse of an individual who stutters. Because they often constitute the familiar partners with whom the person communicates, they may be indirectly affected by the actions ensuing from well-built questions. Therefore, it is paramount to elicit their perspectives during the problem formulation process. Similarly, the perspectives of immediate community stakeholders may be relevant if they interact with the

person who stutters on a regular basis either professionally or socially. For example, the waitress at the local diner that the individual frequently visits might have perspectives that inform the use of communication strategies when episodes of dysfluencies do not allow her to understand the individual's lunch order. Finally, extended community stakeholders may have relevant perspectives even though they do not know the individual who stutters on a personal level. The perspectives of laypersons may come into play when one is posing questions relative to outcomes of interventions such as improved communicative success as perceived by unfamiliar partners. For instance, a clerk in a bookstore might have perspectives that are relevant when the individual who stutters attempts to locate a specific book with the help of the clerk.

Intervention. This component, abbreviated *I*, is actually a misnomer in that it includes more than what are considered interventions or treatments (Richardson et al., 1995). Craig and Smyth (2002) offered a tip to clinicians to help them think about this component: "Describe what it is you are considering doing or what it is that has happened to the patient" (p. 30). In this spirit then, an intervention is defined as "a superordinate concept for the different intentional steps taken to change [*the behaviors or attitudes of, added by Schlosser et al., 2006*] persons, interaction, [*procedures, added by these authors*], events or environments in a desired direction" (Granlund & Björck-Åkesson, 2005). Schlosser et al. (2006) argued that this definition allows the clinician to include actions pertaining to a multitude of decision-making areas beyond therapy or treatment, as indicated by its name. These actions may relate to diagnostic evaluation, intervention development, and intervention itself. In terms of diagnostic evaluation, for example, this component may include techniques for eliciting a child's reactions to stuttering and his feelings about his speaking abilities in general or a set of procedures for analyzing the frequency and types of dysfluencies produced before treatment. Interventions or treatments in fluency disorders are manifold and include (a) desensitization/cognitive therapy, (b) airflow and regulated breathing, (c) response contingent time-out, (d) prolonged/smooth speech, (e) parental change, (f) self-recording, and many more (see Cordes, 1998). Well-built questions may relate to the effectiveness of a treatment.

Comparison. The *C* component involves the alternative to which the intervention is being compared. As such, it may involve an alternative diagnostic procedure or another type of treatment. Related to diagnosis, for example, a clinician may be interested in exploring a new set of procedures for analyzing the frequency and types of dysfluencies that are produced by a child relative to an already existing procedure such as systematic disfluency analysis (Campbell & Hill, 1987).

Outcome. In the words of Craig and Smyth (2002), this is where the clinician defines "what it is you are hoping to achieve or avoid" (p. 30). Related to diagnosis, for instance, the desired outcome may be a more sensitive diagnostic procedure or a procedure that requires less time and is less costly. Related to treatment, the desired outcome might be a reduction in the frequency of dysfluencies or a

reduction in the severity of dysfluencies or secondary outcomes such as improved self-esteem or self-efficacy in interactions.

Illustrating the PESICO Template

To make this template more concrete to the reader, Table 1 offers several examples of well-built questions in each of the major decision-making areas, including evaluation, prognosis, intervention development, and intervention. Although some of these question are presented without regard to the availability of research to help answer them, several questions were deliberately developed so that they may be answered by consulting the systematic review presented in this volume by Herder, Howard, Nye, & Vanryckeghem (2006). These questions are marked with an asterisk for easy identification. This allows the reader to follow the EBP process from asking a well-built question to searching for research evidence (Dennis & Abbott, 2006), to appraising the evidence (Law & Plunkett, 2006), to synthesizing the evidence (Turner & Bernard, 2006), to interpreting the evidence (Nye & Harvey, 2006), to the completed systematic review (Herder et al., 2006).

Problem Formulation in Systematic Reviews

Problem formulation is also of importance in the planning of systematic reviews. Analogous to asking well-built

questions in the EBP process, problem formulation is the first step among several steps. To be exact, there are a total of five stages in the planning and implementation of systematic reviews: (a) problem formulation, (b) data collection, (c) data evaluation, (d) analysis and interpretation, and (e) public presentation (Cooper & Hedges, 1994). Problem formulation impacts all subsequent stages and as such is perhaps the most crucial stage in planning a systematic review. This is analogous to the role of well-built questions in EBP.

During the problem formulation stage, synthesists delimit the topic and determine the criteria for the inclusion and exclusion of studies. In order to delimit a topic well, it helps if the synthesist has a sound knowledge base related to the topic at hand. Herder et al. (2006), in this volume, problematized their topic in terms of the following decision areas: (a) type of participants, (b) types of research designs, (c) types of interventions, and (d) types of outcomes.

In terms of participants, decisions had to made concerning the participants' age, gender, stuttering severity, and diagnosis. Should the systematic review focus only on children and adolescents (i.e., school-age), or would there be some merit for including adults as well? If stuttering interventions with adults differed conceptually or practically (e.g., in terms of the issues that adults who stutter face) from those provided to children, then it might have been plausible to delimit the participants to school-age children

Table 1. Illustrative examples of well-built questions using the person, environments, stakeholders, intervention, comparison, outcome (PESICO) template.

<i>Practice</i>	<i>Person/Problem (P)</i>	<i>Environments (E)</i>	<i>Stakeholders (S)</i>	<i>Intervention (I)</i>	<i>Comparison (C)</i>	<i>Outcomes (O)</i>
Evaluation	For a 14-yr-old male who stutters who has referred himself	to the school SLP for a stuttering evaluation	because of his concerns regarding his fluency,	is it useful to evaluate his peers' perceptions of his fluency		to help identify therapy focuses?
Prognosis	Does a 16-yr-old who stutters who refers himself			for speech therapy	in comparison to peers who stutter who are referred for speech therapy by others	have a better therapy prognosis?
Intervention development*	For a 4-year-old child with 4% syllables stuttered	in home and school environments over the past year	with family and teachers,	should therapy be recommended		to improve fluency?
Intervention*	With an 8-yr-old child who stutters across communication partners and	across environments		would the gradual increase in length and complexity of utterance (GILCU) program	or a prolonged speech treatment approach	be a better choice to reduce his number of stuttered words per minute?
	Of a 5-yr-old child	in home and preschool environments with communication partners		receiving Lidcombe therapy,		how many weeks of therapy should be provided before the stuttering severity should start to decrease?

Note. The questions with an asterisk might be answerable by consulting the systematic review by Herder et al. (2006) in this volume.

and adolescents or to suggest that a separate synthesis be conducted on adults. In this case, a decision was made to be inclusive and include participants regardless of age. In terms of gender, there was no reason to focus on only one gender to the exclusion of the other. Related to diagnosis and severity, participants who were labeled as stuttering or stammering were included (regardless of severity), whereas participants who were diagnosed as “clutterers” were excluded. Although not stated specifically in Herder et al. (2006), readers will understand that the treatments used for cluttering are sufficiently dissimilar from those used for stuttering so that it would be inappropriate to pool treatments for both conditions.

In terms of research design, the synthesist has to problematize the pros and cons of including only randomized controlled trials (RCTs) versus being more inclusive by considering also nonrandomized quasi-experimental designs and single-subject experimental designs. To a large extent, this decision will be informed by the current status of research related to the research question at hand. The field of fluency disorders has had a long history; thus, it is plausible to assume that there will be a sufficient number of RCTs available for a meaningful pooling of data. That is why Herder et al. (2006) chose to include only RCTs—RCTs being considered the strongest intervention design. In some situations, there may be certain treatments that may not have been investigated with RCTs but there is evidence generated with other kinds of designs such as nonrandomized group designs or single-subject experimental designs. In these situations, the synthesist might consider including non-RCTs.

Problem formulation also involves decision making relative to the kinds of interventions that are being considered in the review. In the Herder et al. (2006) synthesis, a decision was made to focus exclusively on behavioral interventions aimed at improving speech behaviors. The interventions that end up being included in the synthesis obviously bear relevance to the breadth of the implications of the findings. In this volume, Herder et al. made a decision to exclude psychopharmacological interventions, and thus the results generated only speak to the effectiveness of behavioral interventions and cannot be extended to other types of interventions. In some subfields of speech-language pathology or some review questions, it is important to contemplate whether or not to consider combined treatments. For example, Herder et al. needed to decide whether to include combined treatments that have behavioral as well as psychopharmacological components. Although this is not made explicit, the statement that only behavioral interventions be considered implies that such combined treatments did not qualify. No other restrictions (e.g., length of treatment, number of sessions) were imposed on otherwise qualifying interventions.

Last but not least, the synthesist has to problematize what kinds of outcomes should qualify for inclusion. Herder et al. (2006) decided to focus exclusively on measures related to speech production. This was an important decision because it not only impacts internal validity of the review but also determines the range and applicability of the findings in fluency disorders. By

explicitly excluding measures that pertain to potential psychological or emotional benefits of behavioral interventions, the authors deliberately kept a very narrow focus. This permitted the authors to choose a very homogeneous set of studies and relevant quality indicators tied to these specific measures. Because the measures associated with speech production are typically objective, quantifiable, and direct, following the same principles of measurement, this seemed like a sensible solution. The measurement of psychological effects would have introduced very different and more indirect measures (e.g., rating scales) with their unique factors contributing to their internal validity and reliability. The synthesists would have to accommodate and reconcile these differences. At the same time, however, by restricting the review to measures of speech production, the application of the findings to practice are also limited in that they do not speak to well-built questions that require evidence related to the effects of behavioral interventions on variables such as the self-esteem or self-efficacy of individuals who stutter.

In sum, problem formulation related to systematic reviews has implications for all subsequent stages of the planning and implementation of systematic reviews. For the practitioner who consults systematic reviews to inform his or her practice, it is the problem formulation in a review that offers profound insights regarding how solid the generated evidence is in terms of internal validity as well as its relevance and transferability to the conditions specified in a well-built question.

CONCLUSION

Problem formulation plays a critical role in EBP as well as in the production of systematic reviews and their utilization in clinical practice. For EBP, we have argued that problem formulation, or the asking of well-built questions, affects all subsequent steps of the EBP process, and, as such, it is perhaps the most important step of all. In order to facilitate the asking of questions that are indeed well built, we have introduced the reader to the PESICO template and illustrated its use with examples from fluency disorders. The answers to some of the questions can be informed by the systematic review by Herder et al. (2006) in this volume. Future research should determine the validity of this template in furthering well-built questions, and whether the use of this template might result in greater success in finding relevant evidence. Problem formulation in producing systematic reviews, analogous to the asking of well-built questions in EBP, affects all subsequent phases in the development of a review. In order to keep this as concrete as possible, we have contemplated the problem formulation efforts by Herder et al. in this volume. The case has been made that problem formulation has profound implications not only for the synthesist who strives to develop a sound review, but also for those clinicians who seek to use already completed systematic reviews to inform their clinical practice. In the words of Paul A Samuelson, “good questions outrank easy answers.” We hope that the reader

has gained an increased appreciation of the importance of good questions and that the considerations offered are helpful toward the asking of better questions.

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Contact author: Ralf W. Schlosser, PhD, Professor, Department of Speech-Language Pathology and Audiology, Northeastern University, 151C Forsyth, Boston, MA 02115. E-mail: R.Schlosser@neu.edu