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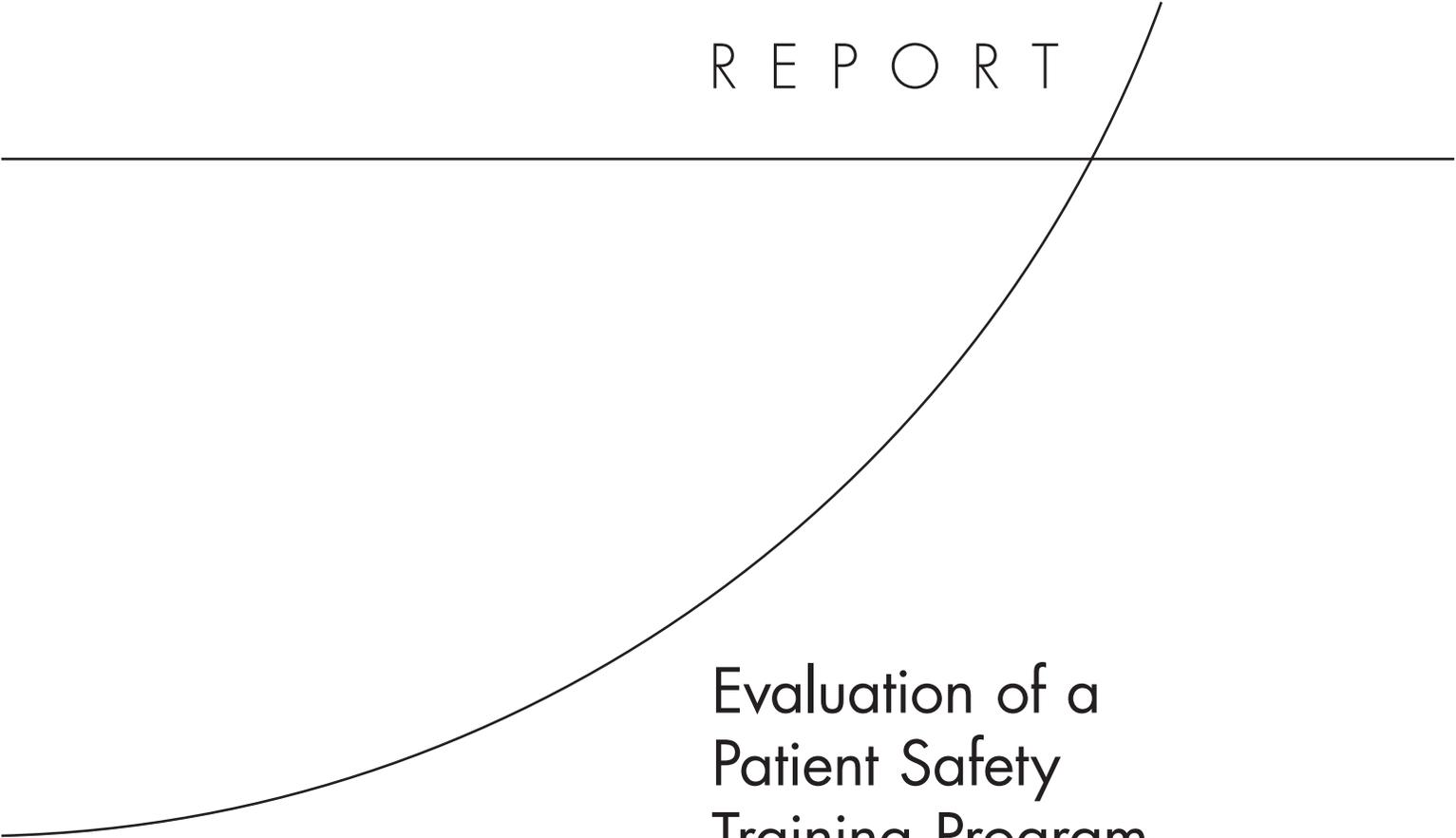
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R E P O R T



Evaluation of a Patient Safety Training Program

Christopher Nelson

Prepared for the Jewish Healthcare Foundation

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1776 Main Street, P.O. Box 2138, Santa Monica, CA 90407-2138
1200 South Hayes Street, Arlington, VA 22202-5050
201 North Craig Street, Suite 202, Pittsburgh, PA 15213-1516
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Summary

Medical errors account for somewhere between 44,000 and 98,000 preventable deaths annually in the United States (Institute of Medicine [IOM], 2000), with some estimates as high as 195,000 preventable deaths a year (Health Grades, 2004). Thus, more people die each year from medical errors in the United States than from motor vehicle accidents (IOM, 2000). Along with the obvious human costs, medical errors generate the need for otherwise unnecessary hospital admissions, lengthened hospital stays, and additional treatments to correct the initial error (IOM, 2001). Total national costs associated with medical errors are estimated at between \$17 billion and \$29 billion annually (IOM, 2000), including lost income, lost household production, disability and healthcare costs.¹ Other less tangible costs include a loss of patient trust and diminished job satisfaction among healthcare providers.

One widely discussed approach to addressing the problem of medical error is improved professional training on safety science concepts for healthcare professionals (IOM, 2000: 12). The Jewish Healthcare Foundation (JHF) a Pittsburgh-based philanthropy dedicated to furthering the provision of high-quality healthcare—recently developed such a training curriculum. An initial pilot version of the curriculum was offered during the summer of 2004 under the auspices of the JHF/Coro Health Sciences Fellowship, a four-year-old program offered in partnership with the Coro Center for Civic Leadership.

In order to gain preliminary feedback on the effectiveness of this training curriculum, JHF contracted with the RAND Corporation to provide an in-process evaluation of the summer 2004 pilot, which, unlike earlier iterations of the Fellowship, included a primary focus on medical error and patient safety.² The purpose of the evaluation was to assess the prospective merit of the new version of the Fellowship as a mechanism for training students in the healthcare professions in the principles and practices of safety science.

Evaluation Questions and Methods

The Fellowship's ultimate goal is to engender in participants the capacity to make system-improving changes in the healthcare settings in which they eventually work. Consequently, its impacts will become evident, if they become evident at all, long after the completion of this evaluation. Thus, the evaluation is not able to provide a rigorous estimate of the Fellowship's efficacy in achieving its *ultimate* goal. Instead, the report seeks to provide formative feedback on *intermediate* goals that might inform improvement, redesign, and decisions about scale-up of the summer 2004 Fellowship.

The evaluation questions that guide this report reflect the need for in-process feedback and fall into three categories:

- *Design and context.* What were the key elements of the Fellowship's design? What were the key characteristics of the program's Fellows?
- *Implementation.* How effective was the delivery of the curriculum during the summer 2004 pilot?
- *Training outcomes.* Is there evidence of program impacts on the Fellows' (a) knowledge of safety science concepts and skills, (b) willingness and ability to apply safety science concepts, and (c) commitment to error reduction and patient safety?

Data collection methods included document review, a participant survey, participant focus groups, observations, and an examination of work samples.

¹ Studies suggest that medication errors alone increase hospital stays by an average of 1.9 to 4.6 days, at an annual cost of \$2,262 to \$4,700 per admission (Bates, Spell, Cullen, et al., 1997; Classen, Pestotnik, Evans, et al., 1997).

² Hereafter, we use the term "Fellowship" to refer to the summer 2004 pilot version.

Fellowship Design and Participant Characteristics

Safety science concepts included in the Fellowship are derived primarily from the Toyota Production System (TPS) and a locally developed curriculum developed by a nonprofit alliance, the Pittsburgh Regional Healthcare Initiative (PRHI). The curriculum—Perfecting Patient Care—involves both *core principles* and a set of *methods of investigation*. The core principles include the following:

- Most medical errors involve systemic root causes.
- Process improvement is usually best undertaken by those working on the “front lines” of care and in real time.
- For front line workers to successfully address systemic root causes of medical errors, the support and leadership of management is required.

The method of investigation, in turn, includes:

- Identification of a patient need
- Careful observation of current work practices
- Identification of a problem with current work processes
- Investigation of the root causes of such problems
- Devising and testing a change in work processes
- Measuring results of the change.

The first three activities often involve selection of a “model line”—a productive process in the hospital or other clinical setting that might serve as an example for the rest of the organization—and a careful assessment of the “current condition” of that process. Root cause analysis, in turn, is described in the Fellowship as the process of asking “The 5 Whys.” Here, the analyst begins with an unsatisfactory condition (e.g., a high rate of central line infections) and then asks why the condition exists. Having identified a proximate cause through an answer to the first “why” question (e.g., use of equipment that has not been properly sterilized), the analyst continues to ask why each of the causes themselves exists. Having done this, the next step is to devise and implement a fix to the problem. TPS provides “four rules in use” that provide guidance for system redesign. The rules urge users to ensure that steps in the care chain (1) are related to outcomes, (2) are clear, (3) are highly specified, and (4) provide ongoing signals about system performance.

Along with the core safety science curriculum content, Fellows also received training in critical thinking and teamwork skills. The emphasis on critical thinking can be viewed as a complement to TPS’s emphasis on careful observation and the use of the scientific method to evaluate the impact of changes in healthcare processes.

Training on leadership and teamwork skills focused largely on a tool called OARRS, which stands for Outcomes, Agendas, Roles, and Rules. Fellows used the OARRS tool to structure and execute group activities. *Outcomes* refer to the intended goals of a group activity, while *agendas* refer to the sequence of events by which the activity is to proceed. Similarly, *roles* refer to the functions that each team member plays, while *rules* refer to the guidelines that govern interactions among team members. For, instance, participants used the tool to plan for sessions in which they interviewed guest speakers from local healthcare facilities. The Fellowship also sought to develop leadership and teamwork skills by including representatives from a wide range of healthcare disciplines.

Instruction was almost entirely built around a series of site visits to local clinical settings engaged in effective patient safety practices. This served to embed the content described above into real-world clinical contexts.

The summer 2004 Fellowship was offered in two tracks, “Getting to Zero” (GTZ) and “Getting to Excellence” (GTE), in an effort to experiment with minor variations in instructional techniques and content foci. While the focus of both tracks was on patient safety, the GTE track also included units on palliative care and public health. Similarly, while both tracks involved site visits, Fellows in the GTZ track also participated in hands-on exercises that typically involved interviewing practitioners, diagramming processes, and suggesting process and system redesigns.

Implementation

Having explicated the design of the Fellowship, the evaluation by RAND sought to assess the implementation of that design during the summer 2004 pilot. For the most part, respondents’ reactions to the execution of the course were positive. Most found that the material presented was new to them. However, there were mixed opinions about whether the Fellowship attempted to cover too much material. Many respondents noted that topics often were rushed. But few, if any, could identify material they thought might be dropped in the interest of time.

Some respondents also raised concerns about the overall coherence of the Fellowship, suggesting that sessions should be more focused around overarching themes and concepts. In a similar vein, many respondents noted that it was not always clear how course readings related to broader instructional goals. Respondents’ opinions were also mixed on the Coro skills (e.g., leadership, critical thinking, and group operations). While some respondents found presentation of the Coro skills to be too simplistic, others found them to be new and important, noting that they seldom receive such training in the course of their other studies.

Opportunities for hands-on experience and the use of concrete examples during the Fellowship were given high ratings by respondents. However, there was some concern that participants were not given enough time to prepare for presentations, and that project groups were not given enough time to complete their tasks and develop strong working relationships. Some respondents also pointed out that presentations by Fellows often came at the end of the session, with little or no opportunity for discussion. This, according to the respondents, diminished the presentations’ utility as learning tools.

Instructors and guest speakers generally received high marks. However, respondents generally wanted more opportunities to interact with guest speakers and with each other.

Training Outputs

As noted earlier, a key challenge lies in the fact that most of the Fellowship’s ultimate goals will happen—if they happen at all—long after the evaluation is over. The logic model discussed above identified the following goals: (1) enhanced *awareness* of patient safety issues, (2) increased prevalence of *attitudes* about safety that are congruent with current “systems” thinking on safety, and (3) the development of *knowledge and skills* that can be used to diagnose and respond to systemic causes of medical error as intermediate outputs that might be used to evaluate the Fellowship’s efficacy in the short term.

Data from the survey and focus groups suggest that the Fellowship largely succeeded in achieving each of these goals. First, respondents reported discernible increases in the extent to which they perceived patient safety as a significant problem. For instance, respondents were asked to rate their level of agreement with the statement “Medical error is a significant problem” on a five-point scale, with 1 representing “Strongly disagree” and 5 representing “Strongly agree.” Respondents were asked to rate their agreement with the statement both before the Fellowship and on the day they took the survey,³ with self-reported awareness levels increasing during the course of the Fellowship. Indeed, the average participant gained 1.1 points

³ Respondents took the survey near the end of the Fellowship. The logic of this “retrospective pre/post” design is discussed in Chapter 3.

on the five-point scale, a statistically discernible increase in their agreement with the statements presented to them.⁴

Second, respondents reported becoming more likely to hold attitudes about error causation that are congruent with current thinking in safety science. For instance, one item asked respondents to indicate the extent to which they agreed with the statement “Medical errors are primarily caused by individual carelessness” on a five-point scale, where 1 represented “Strongly disagree” and 5 represented “Strongly agree.” Given the Fellowship’s emphasis on the systemic causes of medical errors and the importance of blame-free organizational cultures, Fellowship developers clearly hoped that participation in the Fellowship would reduce the level of agreement with this statement. Indeed, the average respondent rating declined from 3.3 to 2.2, a statistically discernible decline of 1.1 points. Similarly, there were discernible increases in respondents’ self-reported knowledge of core safety science concepts and techniques. However, respondents were less certain of their readiness to apply these skills in real-world clinical settings.

Respondents also reported a willingness to act on their newly developed knowledge and skills. This included reading materials related to patient safety, and speaking to colleagues and supervisors about safety problems observed in the workplace.

Recommendations

While limitations in the design (e.g., the inability to observe Fellows applying their skills in actual clinical settings) prevented us from assessing the Fellowship’s success in meeting its ultimate goals, the evidence considered here suggests that, at the very least, the Fellowship succeeded in reaching its more immediate training goals. Nevertheless, the report identified a number of remaining issues that Fellowship developers would do well to address as they continue to refine the design. These include:

- The tradeoff between breadth and depth in the range of material covered
- The extent to which the Fellowship is well-organized around a set of clear and coherent instructional themes and goals
- The extent to which course readings and hands-on exercises are integrated into a larger instructional vision
- The appropriateness and use of training in critical thinking
- Concern about the ability to apply skills in practice
- Time for hands-on activities.

To address these and other issues, we offer a number of recommendations, some involving suggestions for further design and planning, others for increasing the program’s evaluability.

Recommendation 1: Use a logic modeling exercise to strengthen coherence of design. Fellows’ concerns about the program’s coherence suggest the need to reconsider the match between the Fellowship’s goals and elements of its design. Accordingly, JHF might consider a logic modeling exercise (one more elaborate and participatory than the logic model presented in this report) to ensure that the Fellowship’s specific elements are all well aligned with instructional goals. This exercise might include the following steps:

- Developing a list of typical use contexts and scenarios in which Fellows might eventually work
- Identifying capabilities that cut across the use contexts and scenarios

⁴ See Chapter 3 for a discussion of “statistical discernibility,” as the term is used in this report.

- Mapping training activities against Fellows’ capabilities
- Evaluating the whole design for completeness and coherence.

Recommendation 2: Reconsider the use of readings and exercises. The Fellowship has a strong orientation toward case-based learning—especially in the GTZ track. This orientation is appropriate given the complexity and variability in the skills it seeks to teach. Given the concerns raised in this report about tradeoffs between depth and breadth of coverage, it makes sense to review each of the exercises to ensure that they are sufficiently imbued with core concepts and skills, and that they are rich enough to provide Fellows with the experience of tackling complex problems without overwhelming them. Indeed, respondents to survey and focus-group questions often noted that they had too little time to learn from the exercises. Thus, Fellowship developers might look for opportunities to reduce the number of exercises, allowing more time for exercises that Fellows found most valuable.

Fellowship developers might also consider developing rich documentation for cases and exercises that might provide “scaffolding” for future instructors to support effective presentation of the cases. This will be particularly important should JHF consider scale-up of the Fellowship to other sites and locations.

It is important to emphasize that the findings presented here should be regarded as suggestive, but not conclusive. This caution stems from the fact that (1) we were unable to observe alumni as they seek to function in real-world healthcare settings; (2) practical considerations forced us to rely mainly on self-reported accounts of changes in awareness, attitudes, and skills related to patient safety; and (3) the fact that the evaluation design could not employ a no-treatment comparison group. Thus, the remaining recommendations we present provide suggestions to ensure that future implementations of the Fellowship are capable of yielding stronger evaluative inferences.

Recommendation 3: Track alumni over time and do follow-up surveys. First, JHF should consider developing a formal and rigorous system for tracking and surveying Fellowship alumni over time. Such a survey might include questions on the following:

- Career paths, including information about the institutional environments in which alumni work
- The extent to which alumni have been involved in activities to improve patient safety
- The extent to which the skills and concepts taught in the Fellowship have been adequate given the institutional contexts in which they work
- Which concepts and skills alumni have retained over time.

Tracking alumni can be challenging, especially in healthcare where significant numbers might move to other communities. For this reason, it would be useful for the tracking system to include names of family members and professional colleagues who might be able to assist JHF in locating alumni who have moved.

Recommendation 4: Develop more structured ways to evaluate hands-on exercises. The reliance on self-reported outcomes in this evaluation could be addressed in future evaluations if JHF were to develop more rigorous ways of evaluating participant projects and other work. Participants worked on a number of hands-on projects, culminating in a group project presented to other participants and members of the local healthcare community. These exercises would be more useful for evaluation purposes if they had been graded against a well-specified rating rubric. Ideally, such a process would be applied both to a work completed at the beginning *and* the end of the Fellowship. This would provide a clear baseline against which to assess growth over time.

Recommendation 5: Consider more careful structuring of differences between tracks. Finally, the existence of two Fellowship tracks provides an opportunity to determine how variations in content and

pedagogy affect outcomes. Such knowledge, in turn, can be useful in guiding improvements to the Fellowship. However, the fact that the GTE and GTZ tracks varied both in content *and* pedagogy made it difficult to assess the independent impact of either on implementation and outcomes. In the future, it would be desirable to plan such variations in a way that allows for clearer inferences.

Conclusions

The JHF-Coro Fellowship represents an early attempt to develop and implement a training curriculum in medical safety science for healthcare professionals in training. The results reported here suggest that the approach used by the Fellowship holds promise and is worthy of further effort. However, conclusions about its ultimate effect on patient outcomes await more sustained implementation and further evaluation research.