Chapter 5. Future Research

With the exception of selected work processes pertaining to workflow design, most of the evidence on the relationship of working conditions to patient safety is derived from non-experimental studies. Thus, there remain unanswered questions about the magnitude of improvement in patient safety that will be brought by efforts to improve working conditions. There is a need for significant future research that evaluates how specific workplace interventions will be related to changes in patient outcomes. Such research could be conducted as clinical trials or as carefully designed demonstration projects and program evaluation studies.

The available evidence on working conditions also suggests a variety of specific studies that will provide further information on how working conditions affect patient safety. Some examples of the questions to be addressed in future studies are as follows:

- *How does greater nursing experience affect improved patient outcomes?* Is it due to the direct patient care or through advice and other collaborative mechanisms among experienced nurses and less experienced members of inpatient care teams?

- Previous research has found that both the number of registered nurses and the number of total nursing personnel are associated with improved patient safety. *What is the appropriate mix of registered nurses and unlicensed personnel? What are the most effective collaborative models of nursing practice?*

- The evidence suggests that rotating shifts and possibly longer shift lengths are a threat to patient safety. *What scheduling models optimally balance scheduling needs with reduction of medical errors?*

- Previous research on the relationship of stress and patient safety has used weak measures of safety variables. Future research using better measures of patient safety is needed.

- A single study[223] has found that increasing the level of workplace lighting decreased error rates by dispensing pharmacists. Further research conducted in a variety of work settings is needed to evaluate this potential approach to reducing errors that can be implemented widely at relatively modest cost.

- Studies of the relationship of organizational factors to patient safety have used only limited measures of organizational factors. Further research with valid measures of a wide range of organizational factors is needed.

- There is limited evidence that greater experience of health professionals is associated with improved patient safety. Further research to examine this association and potential benefits of enhanced training programs for less experienced providers is needed.

- Further research is needed to quantify the types, frequency, and severity of interruptions and distractions in safety-sensitive areas in health care. Incidents of human error should be carefully analyzed for preventable precursors, such as conflicting task requirements,

distractions, and interruptions.[280] In addition, studies are needed to elucidate further how interruptions and distractions affect medical errors and adverse events. Research is needed to assess the effect of interventions on interruptions and distractions, error rates, adverse events, and patient and physician satisfaction.

- Research is needed to develop and study hospital discharge programs that focus on the root causes of poor outcomes. Further research is needed to determine whether successful programs are transferable to other settings. It would also be useful to study existing or previously implemented hospital discharge programs to understand how they affect medical errors. If existing hospital discharge programs work predominantly through active and not latent error reduction, then risk still remains in the system, especially for patients not eligible for the program.

- Research in interface design supports matching system performance to operator needs in order to improve job performance.[281] The human factors community has argued strongly for further research in this area for some time.[281-284] This community recognizes the need for user-driven design, and displays configured to the user's need to avoid errors.[282] Often, there is more concern with obtaining the most up-to-date technology without concern for how to support operators in their tasks.[284] Others have supported a research effort in interface design in medicine of similar intensity to that seen in other safety sensitive industries, such as aviation and nuclear power.[111]

- There is limited evidence that stress among health professionals has an adverse impact on patient safety, and further research on measuring stress and interventions to mitigate stress in healthcare work environments will help to clarify the importance of this working condition.