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Risk Evaluation in Occupational Safety and Health Research: Results from a Benchmarking Exercise of Federal and Academic IRBs

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Abstract

Objective: Research involving working populations can pose unique ethical and risk evaluation challenges. The purpose of this benchmarking project was to assess how federal agencies and academic institutions approach the interpretation and application of key risk evaluation concepts in research involving workers in their places of employment.

Methods: Key informant interviews were conducted to ascertain current practices related to assessing soundness of research design, determining risk reasonableness and research-relatedness of risks, and evaluating the risk of non-invasive clinical tests in occupational settings.

Results: There were noteworthy commonalities among the approaches described to review and address critical aspects of risk evaluation for OSH research involving human participants.

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Disclaimer: The findings and conclusions in this report are those of the author(s) and do not necessarily represent the official position of the National Institute for Occupational Safety and Health, Centers for Disease Control and Prevention.

Conclusions: The insights gleaned may help guide Institutional Review Boards and Human Research Protection Programs as they consider the ethical issues of human subjects research in occupational settings.

Keywords

Institutional Review Board; Revised Common Rule; human subjects research; occupational safety and health research; research risks

1. Introduction

1.1 Overview of Occupational Safety and Health Research

Occupational safety and health research (OSH research) is concerned with identification, assessment and elimination of work-related hazards and risks. Well known occupational hazards include chemical, physical, and biologic agents, in addition to established psychosocial and organizational hazards.[1] Subjects in this diverse portfolio of OSH observational and interventional research, whether in the workplace or the laboratory, tend to be adults healthy enough to work and not necessarily seeking or in need of medical intervention or treatment. Potential benefits to subjects tend to include satisfaction from contribution to socially valuable research, such as improving the assessment and management of risk in workplaces, education on a topic of interest, and access to overall and individual research results. While this research rarely offers the prospect of direct therapeutic benefit, it can present greater than minimal risks to subjects.

1.2 Ethical Considerations in OSH Research

Some OSH research is conducted with workers who are under the direction and control of their employer, and at times, while they are performing their jobs. Workers can be diminished in their ability to protect their own interests at work, and more susceptible than the general population to harm. Hierarchies and power differentials can create conditions where a worker may feel pressured to or not to participate in research.[2] Ethical considerations include being cognizant of potential study impacts on worker-subjects' employment, career advancement, insurability, and reputation. Privacy loss can result in economic and psychosocial consequences, and even personal legal risk in certain studies.[3] Injuries incurred by workers performing their jobs while participating in interventional research can raise economic implications for themselves, their employer, and the research institution.

1.3 Risks of Harm in OSH Research

Risk of harm in OSH research is generally considered to be an assessment of the likelihood a research subject will be exposed to or experience harm from physical, psychological, social, or other factors. Risk assessment also considers the magnitude of the potential harm.[2] The former is an empirical judgment and the latter a normative evaluation.[4] Risks of harm to subjects recognizable in the workplace research environment include those related to study procedures, (e.g., blood draws and spirometry), and those related to informational privacy from data collection or employer knowledge of participation. Risks may also result

from researchers reporting collateral observations of hazardous workplace conditions that are unrelated to the study, to authorities.[5] Advance planning for potential hazards and appropriate responses can be a major element in safety monitoring and study oversight.[5] Planning might also consider access to emergency egress and medical equipment, as well as protections of researchers themselves in hazardous work environments.

1.4 Challenges in OSH Research Risk Evaluation

The Belmont Report of 1974 established the ethical principles that guide all biomedical and behavioral research involving human subjects, and the ensuing federal regulations protecting human research subjects require Institutional Review Board (IRB) evaluation of risks to subjects that are research related.[6] Reasonable minds can differ on the research-relatedness of certain risks in OSH research with workers in their workplace. Reasonable minds can also differ as to whether the research risks are reasonable in certain cases. Interventional research can pose significant risks without any potential medical benefits, such as studies of heat stress involving exercise. While the federal regulations do not establish an upper limit of risk to which healthy competent adults can consent, various proposals set limits on research risks for healthy volunteers. Some would propose the upper limit of risk of serious harm to be 1%.[7,8] Others support the notion that there is no justification for exposure to some risks, regardless of voluntary and informed consent of subjects and the social or scientific benefit that may be derived from the research.[2] To further complicate the matter, interpretation of concepts generally meant to protect research subjects, such as voluntariness, informed consent, and risk-benefit ratio, can greatly differ from one culture to another.[9] The challenge of interpreting these different and sometimes opposing views of risk and risk-related concepts was a large part of the impetus for the exercise described herein.

Minimal and acceptable risk assessment in OSH research can be challenging when the research is conducted with workers in hazardous occupations.[10] People incur risks of daily life such as home accidents, and risks of routine clinical examinations for their own benefit. Subjects in non-therapeutic research, on the other hand, incur risk for the benefit of others.[4] Absent direct medical benefits, risks must be proportionate to the social value of the study.[11] Risk reasonableness for healthy volunteers in non-therapeutic research has been examined in many phase 1 drug studies, human challenge studies (exposing subjects to pollutants), and, more recently, in controlled human infection studies.[12–14] Those analyses can inform risk evaluation in OSH research. The higher the risks, the higher the social value required to justify non-therapeutic research – and the higher the standard of scrutiny necessary, including consultation with the research population and outside experts.[2,4,7]

1.5 National Institute for Occupational Safety and Health

The National Institute for Occupational Safety and Health (NIOSH) was established by the Occupational Safety and Health Act of 1970 as a research agency dedicated to the study of worker safety and health.[15] NIOSH is part of the U.S. Centers for Disease Control and Prevention (CDC) in the Department of Health and Human Services (HHS). Both CDC and HHS contribute to the research administration requirements NIOSH must adhere to as a federal agency. As such, NIOSH has reporting obligations when conducting research in places of employment that can impact research subjects, including a requirement

to notify the employer, employees, and applicable agencies in the event of imminent danger.[16] Significant medical findings are to be provided immediately to subjects. Findings of individual medical examinations, anthropometric and functional tests are provided to subjects. Reports of the investigation are made available to employers, workers, and the public.[16] NIOSH policy also requires investigators to offer subjects their personal exposure measurements along with available exposure limits. NIOSH research may include collection of biospecimens from individuals to help identify new or existing biomarkers of hazardous exposure, to characterize health effects from exposures or other hazards, or to screen study subjects prior to other tests. NIOSH has a longstanding practice of offering results of value to subjects following a testing and notification plan.[17–19]

1.6 The Revised Common Rule

The Common Rule of 1991 established rules for the ethical treatment of human subjects involved in biomedical and behavioral research, to which all U.S. government-funded research must adhere.[20] In 2017 and 2018, HHS and 15 other Federal Departments and Agencies issued revisions to the Federal Policy for the Protection of Human Subjects.[21] This revision, with a compliance date of January 21, 2019, is officially published as Title 45 in the U.S. Code of Federal Regulations, Part 46 (45 CFR Part 46).[22] Frequently referred to as the revised Common Rule, this policy governs certain aspects of research for the purpose of protecting human subjects and includes the criteria for IRB approval of research. The revised Common Rule changed several key provisions, such as deeming certain public health surveillance activities not to be research, requiring that prospective human subjects "be provided with the information that a reasonable person would want to have in order to make an informed decision about whether to participate" and that key information about the study be provided at the beginning of consent. NIOSH, as a public health authority and learning organization, sought to examine how changes to the Common Rule might affect the IRB review of its protocols. That inquiry caused NIOSH to embark on a comprehensive effort to assess and improve its practices for protecting human subjects.

1.7 Quality Improvement and Assessing Risk to Human Subjects

To explore the Institute's broad interest in improving the operation of its human research protection program, NIOSH conducted a review of recent human subjects research protocols and IRB reviews. This review highlighted an opportunity to assess the interpretation and application of key risk evaluation concepts in the special ethical context of research with workers in their place of employment. To better understand how federal research agencies and academic institutions approached risk assessment in OSH research, NIOSH conducted a benchmarking exercise of peer programs from January 2021 to February 2022 to explore the methods IRBs have adopted under the revised Common Rule to successfully review, evaluate, and approve research protocols relevant to OSH that involve mostly healthy adult subjects.

2. Materials and Methods

The objective of this national benchmark was to describe current practices of IRBs in areas impacted specifically by 45 CFR Part 46.111, (a)(1) and (a)(2), which state that research must adhere to the following requirements to be approved by an IRB:

1. Risks to subjects are minimized: (i) By using procedures that are consistent with sound research design and that do not unnecessarily expose subjects to risk, and (ii) Whenever appropriate, by using procedures already being performed on the subjects for diagnostic or treatment purposes.
2. Risks to subjects are reasonable in relation to anticipated benefits, if any, to subjects, and the importance of the knowledge that may reasonably be expected to result. In evaluating risks and benefits, the IRB should consider only those risks and benefits that may result from the research (as distinguished from risks and benefits of therapies subjects would receive even if not participating in the research). The IRB should not consider possible long-range effects of applying knowledge gained in the research (e.g., the possible effects of the research on public policy) as among those research risks that fall within the purview of its responsibility.[23]

Using these approval criteria as the primary organizing structure, this exercise sought to assess how peer IRBs approach the following issues: (1) assessing soundness of research design, (2) assessing risk reasonableness in anticipation of benefits, (3) determining research-relatedness of risks, (4) determining the probability and magnitude of risks where possible, and (5) assessing research-related risks of non-invasive clinical testing procedures.

A semi-structured one-on-one interview protocol was designed to obtain information on IRB current practices. The interview protocol was reviewed by CDC and was conducted consistent with applicable federal law and CDC policy. The interview protocol was reviewed by CDC and was conducted consistent with applicable law and CDC policy.[22,24,25,26]

2.1. Sample

The benchmark sample included IRB key informants from federal government agencies and academic research institutions conducting research similar to NIOSH. To be considered similar in nature to research conducted at NIOSH, research at the sample institutions was required to meet one or more of the following research criteria: non-therapeutic in nature, involves greater than minimal risk, designed as an intervention, focuses on healthy adult human subjects, offers only de minimis direct benefit to subjects, includes clinical assessments or procedures, considers workers in their place of employment, or studies OSH antecedents or consequences. In addition, sample agencies had to be signatories to the revised Common Rule and/or be registered as conducting occupational health research on www.clinicaltrials.gov. Key informants were identified as either the IRB chair, director, or member with deep and current knowledge of IRB policies and practices.

Sample frames of IRBs from U.S government health research agencies and U.S. academic research institutions were derived from top NIOSH funded research institutions,

workgroup recommendations of institutions engaged in research with NIOSH, academic institutions with whom NIOSH maintains open “reliance out” Institutional Review Board Authorization Agreements (IAAs) under the HHS Single Institutional Review Board Mandate,[27] and academic institutions conducting occupational clinical trials as listed on www.clinicaltrials.gov. To be included in the initial sample, institutions had to be common to at least two of the sample frame sources, which resulted in an initial sample of 25 (10 federal and 15 academic) institutions. For the academic sample, consideration was given to regional representation across the U.S. An initial sample of 12 institutions (6 federal and 6 academic) was drawn, and an internet search was used to identify a key informant for each of the 12 institutions. Eight key informants agreed to be interviewed, representing four academic institutions (67%) and five federal agencies (83%). Three federal agencies were unable to complete the interview due to scheduling or non-response, and one academic institution declined to participate. Prior to the launch of the benchmarking exercise, some federal research agencies in the initial sample consolidated their IRB functions under one umbrella IRB. Thus, one federal key informant was able to speak to the current practices for two of the federal agencies in the final sample.

2.2. Study Design

One-on-one semi-structured interviews with a NIOSH senior staff member were scheduled at a time convenient to the key informant. The conversations were conducted virtually using the secure Zoom for Government (zoomgov.com) platform. To facilitate conversation, the interviewer followed a script containing six questions addressing the topics covered in the study objectives. The interview questions and prompts are provided in Appendix A (see supplemental material).

In total, eight interviews were completed—four with academic key informants and four with federal agency key informants. Each conversation lasted approximately 30 to 45 minutes. The interviews were recorded and transcribed for notetaking purposes only. The transcripts were de-identified and stored in a secure location on a federal data server. Access was restricted to study personnel, and a records retention protocol was established in accordance with federal regulations.[28]

2.3 Data Analysis

Interview transcripts were coded by two independent analysts using NVivo qualitative data analysis software, Version 12 and Release 1.0 for Windows.[29] A two-phase deductive and inductive approach was used to code the interview transcripts. In the deductive coding phase, themes were extracted directly from the structured interview questions and applied to key informants’ responses in order to organize the interview data. These ‘utility’ themes served to retain a link between each response and the interview question to which it was initially offered. In the inductive coding phase, key informants’ responses to the interview questions were examined for content and sentiment. The purpose of this exercise was to identify patterns that could be used to synthesize and make meaning of the large amount of interview data. Because there was no pre-existing coding frame for the data, the analysts followed a prescriptive process for identifying interview themes that capture the important, overarching ideas from qualitative data.[30] This process includes six coding phases: becoming familiar

with the interview transcripts, generating initial codes for data passages, clustering the lower-level codes into higher-order themes based on shared linkages, reviewing themes, defining themes, and reporting the results. The results of the coding effort were reviewed by a senior analyst for accuracy and consistency, with proposed adjustments and final theme descriptions endorsed by all analysts.

3. Results: Interview Themes and IRB Practices

Current practices of key informant IRBs were identified by the higher-order themes developed and applied during the inductive coding process. An overview of IRB practices is provided in Table 1. They are clustered, or organized, by the deductive themes that were derived from the interview questions. A brief description of the practices underlying each theme follows.

Theme 1. Assessing soundness of research design

Respondents reported that scientific review is completed prior to IRB review at their organizations. In most cases, IRBs do not conduct additional review of research protocols for scientific merit, and the results of the scientific review are generally made available to the IRB. Questions about soundness and rigor of research design are shared with the Principal Investigator to request more information or have a dialogue about the project protocol. In some cases, IRBs may contact additional subject matter experts for input if the necessary expertise is not present among the IRB membership. The IRB may disapprove a protocol if questions about soundness of research design are unanswered.

Theme 2. Risk reasonableness in anticipation of benefits

Risk reasonableness is often difficult to quantify, and IRBs approach the assessment of risk reasonableness as a subjective evaluation. Rather than rely on a systematic framework or formula to calculate a risk-to-benefit ratio, IRBs rely on consensus among their panel members. Research risk reasonableness as a social value is also considered in assessing risk reasonableness. IRBs consider the special attributes of study populations when determining if a study exceeds reasonable risk in relation to anticipated benefits and may use checklists to assist with that evaluation. Examples include populations vulnerable to coercion or undue influence, such as children, prisoners, individuals with impaired decision-making capacity; and workers whose work status could be affected by the study procedures (e.g., physical examination or medical testing among a sample of workers with fit-for-duty requirements).

Theme 3. Determining research-relatedness of risk

Determining risk reasonableness considers the additional risks imposed by the proposed research. Respondent IRBs indicated that they *do not* consider baseline risk in particular work settings as a component of research-related risk assessment, recognizing that baseline risks occur whether the research is conducted or not. Some IRBs noted that they make a deliberate effort to identify baseline and research risk to separate consideration of these two types of risk, and their consent documents clearly delineate additional risks being imposed by the research. As with risk reasonableness assessment, IRBs indicated they do not use a formula to explicitly quantify the research related risk.

Theme 4. Determining probability and magnitude of risks

IRBs require evidence to support estimates of the probability and magnitude of potential research-related risks and recognize that some evidence may be speculative in nature when data from human or animal studies are not yet available. IRBs may consider other relevant evidence, such as information on current practices or results from published reports, IRB member expertise, or outside expert opinion. Obtaining as much information as possible from the Principal Investigator or other sources ahead of IRB review is a key element of an efficient panel meeting.

Theme 5. Assessing research-related risk of routine clinical testing

IRBs maintain higher than routine clinical standards when assessing or allowing certain types of risk to be assumed by subjects in research that uses routine physical or psychological examinations or tests. These standards are informed by what is known about the study population and any potential exposures or hazards they may encounter as a result of participating in these types of clinical procedures or tests. Risk imposed on special study populations who may be at increased risk (e.g., pregnant women, people with pre-existing conditions) is considered in making these determinations. If the IRB determines the research subjects may face additional risks beyond those routinely disclosed in a clinical setting, additional safety mechanisms must be in place to provide immediate rescue or referral to outside sources as appropriate.

4. Discussion

Many of the results of this benchmarking exercise shown in Table 1 confirmed NIOSH practices. The effective assessment and management of research related risks to human subjects is shared by many parties including principal investigators, human research protection program managers, institutional officials, IRB members and human subjects. Principal investigators play a key role in proposing studies with scientifically sound research designs and generating socially valuable knowledge. Principal investigators can also provide key insight on the identification and appraisal of research related risks, any special attributes of the study population and informational needs to promote effective consent. Human research protection managers and institutional officials support risk assessments and risk minimization through policies, training, and effective program oversight. Finally, the IRB plays a direct role in the assessing and managing risk according to the review criteria outlined in the revised Common Rule. The obligation of federal research agencies to report collateral observations of work-related risks and hazards that may be outside the control or scope of the research places an additional and unique burden on such agencies conducting OSH research.

NIOSH has conducted a review of the practices within the themes described above and integrated these results into an agency-wide program improvement workplan. This workplan focuses on strengthening the readiness of research for IRB review, including implementing practices for confirming the soundness of the research design and confirming risk estimates are supported by evidence when available.

The specific results from Table 1 that are listed below were identified by NIOSH as areas that warrant further discussion.

Theme 1: Assessing soundness of research design.

- IRB may provide comments for Principal Investigator, but these do not delay IRB review.

Theme 2: Risk reasonableness in anticipation of benefits

- Special attributes of study populations are considered when defining risk reasonableness.

Theme 3: Determining research-relatedness of risks:

- IRB focuses only on research-related risk, not baseline risk associated with work.
- Environmental context is an important consideration when determining minimal risk.

Some IRBs provide scientific review as part of their approval process. NIOSH researchers for example, use a framework for identifying research priorities that include assessment of the burden, need, and potential impact proposed research will address, known by its acronym BNI.[31] Burden provides the evidence of the health, safety and economic burden (or potential burden) of workplace risks and hazards. Need helps identify the knowledge gap the proposed research will fill, the need of interest groups or study populations for the proposed work, and the appropriateness of the research methods to be used. Impact considers how well the research is conceived and likely to address the need, and lead to a reduction in worker injury, illness, disability or death, or enhanced worker well-being.[31] This framework provides criteria for developing an assessment of the soundness of research study design and the likelihood the proposed research will generate the knowledge sought as described in study aims. These same criteria can help inform IRB review particularly in the areas of assessing the soundness of research design. NIOSH research also goes through external peer and tripartite review prior to approval. The parties to the tripartite review are defined as those potentially interested in, or affected by the study, including: (a) government agencies; (b) key companies or trade associations; (c) labor unions or other employee representatives. The NIOSH IRB considers the peer and tripartite reviews to assist in determining the appropriateness of the research design and adequacy of protection of subjects. Examples of additional approaches IRBs use to assess the soundness of research design would be helpful.

Practices related to determining risk reasonableness as it would relate to the special attributes of study populations would also be beneficial. Examples are needed to better understand the context in which these practices occur. Similarly, practices related to determining the research relatedness of risk would benefit from further examples. Case studies on classifying specific risks as research-related or not research-related would be particularly helpful to inform future IRB assessments.

Researchers, institutions, and IRBs conducting and reviewing human subjects research involving workers would benefit from improved clarity on how to assess the research-relatedness of risks, regardless of any one agency’s obligation to report non-research hazards

and risks. Indeed, the results of this exercise generated a list of additional questions that can serve as points of inquiry to develop a more universal approach to assessing the risk of harm that considers the unique challenges to the OSH research environment, especially in particularly hazardous work settings. The protection of human subjects should not vary based on who is conducting research in a worker's place of employment. Different interpretations of the Common Rule and other binding criteria can create a range of approaches to these protections.

Future inquiry might explore the following:

1. Case studies on how the OSH research community (e.g., principal investigators, institutions, and IRBs) appraises and classifies specific risks of harm as research- and not-research related in OSH research.
2. Case studies on how the OSH research community evaluates specific environmental considerations and research subjects with impaired decision-making capacity in risk assessments with an emphasis on OSH research settings.
3. Case studies examining how IRBs assess the potential risks faced by employees who may express negative or critical views of employer or company workplace health and safety policies.
4. How the OSH research community plans for potential hazards in the research environment and appropriate responses- beyond reporting, as a matter of safety monitoring and study oversight.
5. How the OSH research community makes decisions when to offer and how to communicate individual research results to subjects.

While this activity provided useful insights into the current practices of federal and academic IRBs, the semi-structured interview, analytical methods, and relatively small sample size may limit the generalizability of the findings. Only one interview was conducted per respondent, and there was no follow-up on the applicability of new information discovered in subsequent interviews with previous interviewees. Therefore, it is unknown if the perspectives provided by the key informants represent full saturation of current practices from their IRBs. In addition, all key informants interviewed in this benchmarking activity represented IRBs affiliated with organizations conducting research relevant to the field of OSH. Therefore, the nuances of current practices for IRBs reviewing and approving protocols in other research fields may not be represented in the inductive themes identified by this study.

5. Conclusions

Four key takeaways emerged from a synthesis of the interview results and are offered here as potential program improvement actions.

1. Regularly review IRB practices associated with the underlying principles of 45 CFR, Part 46 to ensure optimal alignment with those principles.

2. Ensure IRB panels comply with the required diversity of membership characteristics under 45 CFR, Part 46, including race, ethnicity, gender, cultural background, awareness of community attitudes, and representation of scientific and non-scientific expertise.
3. Provide training in the application of the principles underlying 45 CFR, Part 46 to IRB members to ensure the most up to date practices. Guidance on training requirements and available resources can be found at the HHS Human Research Protection Foundational Training[32] and the CITI Program.[33]
4. Identify approaches to address complex or complicated protocols or novel situations.

This national benchmarking exercise was a useful, efficient, and effective way to access current practices of federal research agency and academic institution IRBs. These methods and materials may offer an approach to benchmarking current practices that can inform future program improvement efforts. This exercise engaged respondents in the type of reflection Human Research Protection Programs and IRBs might benefit from undertaking routinely, but rarely find the time to do so.

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Data Availability:

Not available

Appendix A.: Interview Questions

1. Assessing soundness of research design

This first question relates to how your organization evaluates the soundness of research design as part of their review of human subject research. Could you walk us through how your IRB assesses the soundness of research design?

Interview probes:

- What happens when your IRB has a question related to the soundness and rigor of the research design, including the statistical analysis?
- Who does your IRB look to when considering the soundness and rigor of research design, including the statistical analysis?
- Does your IRB require additional external scientific peer review of proposed research, and if so, how are peer review and IRB review linked in the final IRB determination at your institution?

2. Determining risk reasonableness

The next question relates to approaches to evaluating whether risks to subjects are reasonable in relation to the anticipated benefits. Can you tell us about how your organization assesses the risk-benefit/social value evaluation?

Interview probes:

- Does your organization follow a systematic framework for this evaluation, and if so, can you provide the guidance used to make that assessment?
- How do you assess whether a study exceeds reasonable risk to subjects in relation to **anticipated benefits?**

3. Assessing research-relatedness of risks

This next question relates to how your organization assesses the research-relatedness of risks. In occupational research settings, certain risks of harm may be inherent in the workplace and related to the work environment and job tasks. Workers in those circumstances may have risks above the general population, for example workers in hazardous jobs. Research in these settings may impose additional risks above those that are related to work, such as risks to privacy or job status associated with data collection and risks associated with an intervention which is being evaluated.

Can you tell us if your organization has encountered or considered these types of risks, and if so, does your IRB consider those risks that may result from research as separate from the total risk to workers, which may that include baseline risks associated with their work? In a clinical trial, this would equate to separating the research portion of the study from usual care.

Interview probe:

- Do you have guidance on how to quantify this risk? And if so, are you able to share that with us?

4. Determining probability and magnitude of risks

This next question pertains to the evaluation of the probability and magnitude of risk posed by research. Can you tell us what kinds of evidence your organization expects investigators to provide to support their probability and magnitude determinations of risk?

Interview probes:

- What kinds of evidence do you require investigators to provide?
- What other types of evidence are considered? For example: expert opinion, prior research experience, scientific literature, or authoritative sources.
- In what situations would the IRB ask for additional information?

5. Assessing research-related risk of routine clinical testing

This last question relates to assessing the research-related risk of routine physical or psychological examinations or tests. Can you tell us if your organization encounters these types of risks, and if so, what approaches does your IRB take to assess the risk of these types of clinical testing procedures?

Interview probe:

- In these instances, does your IRB accept the typical risk assessment protocol used in a clinical setting for these procedures, or do you require a higher standard to determine the subject's risk of harm?

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Learning Outcomes

- Describe the implications of the revised Common Rule for research involving workers in their places of employment.
- Evaluate key elements of risk in occupational research involving human participants, including the soundness of research design; risk reasonableness, probability, and magnitude; and the research-relatedness of risk in clinical and nonclinical research procedures.

Table 1.

IRB Current Practices

Organizing Theme	IRB Current Practices Described by Key Informants
Assessing soundness of research design	• IRB relies on results of scientific pre-review • IRB goes back to the Principal Investigator with questions about research design • IRB may provide comments for Principal Investigator, but these do not delay IRB review • On rare occasion, IRB refuses to approve protocol if soundness of design is in serious question
Risk reasonableness in anticipation of benefits	• Assessment of risk reasonableness is subjective • Special attributes of study populations are considered when defining risk reasonableness
Determining research relatedness of risks	• IRB focuses only on research-related risk, not baseline risk associated with work • Research-relatedness of risk is not explicitly quantified • Environmental context is an important consideration when determining minimal risk
Determining the probability and magnitude of risks	• IRB requires evidence on probability and magnitude of risk • IRB looks to Principal Investigator to cite evidence from prior research • IRB solicits expert opinion or conducts own research for evidence • IRB looks for areas where additional information is needed early in the review process to support the goal of approving protocols
Assessing research-related risks of non-invasive clinical testing procedures	• IRB requires higher standard for special situations, populations, or testing • IRB may require additional safety mechanisms for research subjects compared to routine clinical testing considerations