

Health Care Human Factors/Ergonomics, Homeward Bound: Practical Considerations for
Fieldwork in Home and Community Settings

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Feature at a glance

Designing innovations aligned with patients' needs and workflow requires human factors and ergonomics (HF/E) fieldwork in home and community settings. Fieldwork in these extra-institutional settings is challenged by a need to balance the occasionally competing priorities of patient and informal caregiver participants, study team members, and the overall project. We offer several strategies that HF/E professionals can use before, during, and after home and community site visits to optimize fieldwork and mitigate challenges in these settings. Strategies include interacting respectfully with participants, documenting the visit, managing the study team-participant relationship, and engaging in dialogue with institutional review boards.

Keywords

Fieldwork, patients, informal caregivers, extra-institutional settings, work systems, health information technology

Word Count: 1764

This is the author's manuscript of the article published in final edited form as:

Valdez, R. S., & Holden, R. J. (2016). Health Care Human Factors/Ergonomics Fieldwork in Home and Community Settings. *Ergonomics in Design*, 24(4), 4–9. <https://doi.org/10.1177/1064804615622111>

Short Feature

Health care HF/E: moving into the home and community

Human factors/ergonomics (HF/E) has contributed to improving health care for over half a century (Chapanis & Safrin, 1960) and is increasingly recognized as a key driver for advances in health care quality and safety (Institute of Medicine, 2011; National Academy of Engineering & Institute Medicine, 2005). Meaningful contributions in the future will be stimulated by two paradigm shifts, which are transforming the targets and settings of health care HF/E practice and research. The first shift concerns the unit of analysis. In HF/E, the focus has extended from physical to cognitive to sociotechnical systems (Holden, Rivera, & Carayon, 2015). In health care, the focus has similarly progressed from biomedical to psychological to systems approaches (Valdez, Holden, Novak, & Veinot, 2015). Consequently, it is increasingly recognized that health care HF/E intervention design, whether technological or programmatic, must account for physical, organizational, and social environments that comprise the larger system context (Waterson, 2009). The second paradigm shift concerns the scope of health care. While HF/E practice within health care originated within institutional settings such as hospitals and clinics (Chapanis & Safrin, 1960), it is increasingly acknowledged as also encompassing home and community settings (e.g., self-regulating blood glucose, managing health information) (Holden, Schubert, & Mickelson, 2015; Moen & Brennan, 2005; Zayas-Caban & Valdez, 2011). This transition is the result of multiple trends, including increased fragmentation of care, insurance based pressures for earlier discharge, proliferation of health information technology, and cultural shifts emphasizing patient engagement and shared decision-making (Brennan, Downs, and Casper, 2010; Carman et al., 2013; Gruman et al., 2010). To be responsive to this shift of scope, HF/E interventions must not only consider professionals (e.g., physicians, nurses, therapists) but also patients, family members, friends, and others in their community. The

intersection of these two paradigm shifts implies that a new frontier for HF/E in health care is a sociotechnical systems approach that considers health care as a system including the home and community (Figure 1). Such an approach is relevant for studying and developing interventions to address a range of phenomena including transitions of care, chronic illness management, care coordination, and health information technology (Carayon et al., 2013).

[Figure 1 about here]

Existing HF/E tools and concepts relevant to a sociotechnical systems approach require adaptation to be effectively applied to home and community settings. In comparison to hospital and clinic environments, patients' homes and communities are highly personal spaces in which health care activities are enmeshed with many other activities of daily living (Corbin & Strauss, 1985) (Figure 2). Moreover, unlike health care professionals, patients and the individuals that support them are not typically paid to engage in health-related work. Work system models have been developed that specifically attend to health-related work in extra-institutional settings (Holden et al., 2013; National Research Council, 2011). Similarly, efforts are underway to translate the concept of workload for the patient context (Nathan-Roberts, Holden, Yin, & Valdez, 2015). In addition to theoretical and methodological considerations, home and community environments raise unique challenges for initiating and conducting fieldwork (Furniss et al., 2014; Holden, Scott, Hoonakker, Hundt, & Carayon, 2014).

[Figure 2 about here]

The HF/E community is amassing experience within home and community environments through projects spanning health care phenomena (e.g., care coordination, self-monitoring, personal health information management), patient diagnoses (e.g., chronic obstructive

pulmonary disease, hypertension, Type 2 diabetes), and designs (e.g., qualitative inquiry, clinical trials). These experiences illuminate the challenges and competing priorities that must be managed during fieldwork. Moreover, the lessons learned inform best practices for health care HF/E professionals to follow when interacting in this space.

Challenges and competing priorities: the community, the study team, and the project

There are multiple stakeholders whose priorities must be adequately addressed to successfully complete fieldwork in the home and community. The three primary stakeholders are: 1) community members, or the patients and informal caregivers whose activities and environments are the focus of inquiry, 2) study team members, or the HF/E professionals who are conducting the investigation, and 3) the project, which although not an independent stakeholder, has specific goals associated with its integrity and may be represented by a client or funder. Figure 3 details the priorities of each stakeholder. The challenge is balancing these priorities, which may conflict. Two brief examples are provided below:

[Figure 3 about here]

1. Javier leads a new project to develop an app for asthma management at home. The project has a short turnaround time; thus, the team has limited time to devote to fieldwork. During a visit with a key community partner, Javier is taken by surprise when he discovers the individual has low literacy and asks for assistance with using the app. Javier is concerned about the amount of time this interaction will take, although he realizes that obtaining data from individuals with low literacy may provide unique insights, improving his product's quality.

2. Rachel investigates how social and physical environments impact the effectiveness of care coordination (i.e., organization of patient care activities and information sharing among all individuals involved in a patient's care). Her methods include interviews and still photography of the physical environment. During a home visit, a participant offers to show the challenge of storing medical equipment in a basement closet. Rachel is unsure how to proceed. The project would benefit from the photographs and Rachel is wary of offending or diminishing the participant's trust, but feels that venturing into a space far from an exit compromises her personal safety.

These cases illustrate only some of the challenges encountered in fieldwork. Many other examples are presented by Holden and colleagues (2015), who developed a framework of challenges encountered in home and community based health care HF/E fieldwork, including difficulties gaining trust from participants, problems interacting with sick or impaired patients, confidentiality and compensation challenges, and questions of data quality (Figure 4).

[Figure 4 about here]

Best practices: strategies for health care HF/E fieldwork in the home and community

To address these challenges and competing priorities, best practices for health care HF/E fieldwork in the home and community should be used before, during, and after a site visit. Prior to visiting a participant in an extra-institutional setting, assess potential challenges related to the legal and ethical implications of their interaction with human subjects, develop contingency plans, and obtain the necessary approval from an institutional human subjects authority. Establish contact with the participant to plan the logistical aspects of the visit. In collaboration with other members of the study team, determine how situations compromising safety and

miscommunication would be addressed. During the site visit, demonstrate respect for the participant while simultaneously protecting personal safety and staying within the scope of HF/E expertise. Also, be alert and flexible in responding to unexpected situations. After leaving the site visit, immediately document the experience, paying particular attention to unusual events and unique insights. Finally, before formally ending a relationship with a participant, extend the interactions as necessary to complete the study rigorously. Figure 5 provides a checklist of specific strategies that may be implemented when conducting health care HF/E fieldwork in the home and community.

[Figure 5 about here]

Examples of strategies that could be used to address Javier and Rachel's challenges are provided below:

1. Javier may have been better prepared for a low-literacy participant if he had contacted the participant prior to the site visit and asked about special needs requiring accommodation. With this information, he could have obtained permission from his institution's human subjects authority to use an oral consent process and to provide assistance with app usage. Even if he had not followed the recommendations above, with an established protocol for managing unexpected situations, Javier would have been able to comfortably ask the participant to reschedule the meeting to give himself time to address these matters.
2. Rachel would have been better prepared to handle the invitation to visit a participant's basement if she were accompanied by another team member and had informed a third team member of her whereabouts. With two people at the site visit and a communication plan for relaying safety concerns, Rachel would have been more comfortable taking the requested photographs. In her fieldwork protocol, Rachel should also have committed to maintaining

constant access to an exit. Despite these precautions, Rachel may still have had concerns about entering the basement, in which case she should have prepared phrases to respectfully decline this or other discomforting offers. For example, Rachel could have said, “Your example would be really useful for the study, but unfortunately I am running low on time today. Could we perhaps schedule another time to take the photograph?” or, “My supervisor does not allow me to enter people’s basements, out of concern for safety.”

The strategies we have recommended are grounded in our experience conducting health care HF/E fieldwork in home and community settings and the guidance provided to us by the institutional review boards at the institutions with which we have been affiliated. For individuals whose activities in the home and community are overseen by an IRB, we recommend having a discussion about the specific protocol you intend to implement. In our own experiences we have encountered conflicting advice about the types of information that may be requested from or about potential participants prior to informed consent, the degree to which an interaction must be scripted, and how to determine study eligibility for individuals whose roles overlap (e.g., patient and caregiver). Building flexibility into the protocol is also advisable. For example, in Rachel’s scenario the participant may have asked if he could take the picture and send it to her securely. If this form of data collection was written into the protocol, Rachel could have obtained the photographs without compromising her safety or inconveniencing the participant with a second visit.

Conclusion

HF/E professionals working in health care are committed to designing innovations aligned with patients' needs and preferences. Laboratory-based assessments are limited in that they primarily facilitate an understanding of interactions between the user, the task, and the

technology. Designing systems that are also responsive to patients' social, organizational, and physical environments requires assessing needs and preferences in the home and community, as well. However, fieldwork in extra-institutional settings is challenging and requires balancing the priorities of multiple stakeholders. By articulating strategies to address these challenges and competing priorities, we aim to provide a foundation for best practices for health care HF/E fieldwork in the home and community. Future work is needed to address the many challenges that arise from conducting fieldwork in this new domain, such as translating an abundance of field data into concrete design recommendations (Valdez, Holden, Novak, and Veinot, 2015). and adapting HF/E paradigms for systems-oriented assessments of home and community-based health care.

Acknowledgements

RSV was supported by grants R36 HS 018809-01 and 1 R03 HS022930-01 from the Agency for Healthcare Research and Quality (AHRQ). RJH is supported by grant K01AG044439 from the National Institute on Aging (NIA) of the US National Institutes of Health (NIH). The content is solely the responsibility of the authors and does not necessarily represent the official views of AHRQ or NIH. Additionally, the authors would like to thank Patti Brennan, Pascale Carayon, Peter Hoonakker, Ann Hundt, Jenna Marquard, Enid Montague, Calvin Or, Dan Nathan-Roberts, Teresa Zayas-Caban, and all community partners and study participants.

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Author Biographies

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Figure 1. Progression of human factors/ergonomics research in health care.

A new frontier for health care human factors/ergonomics

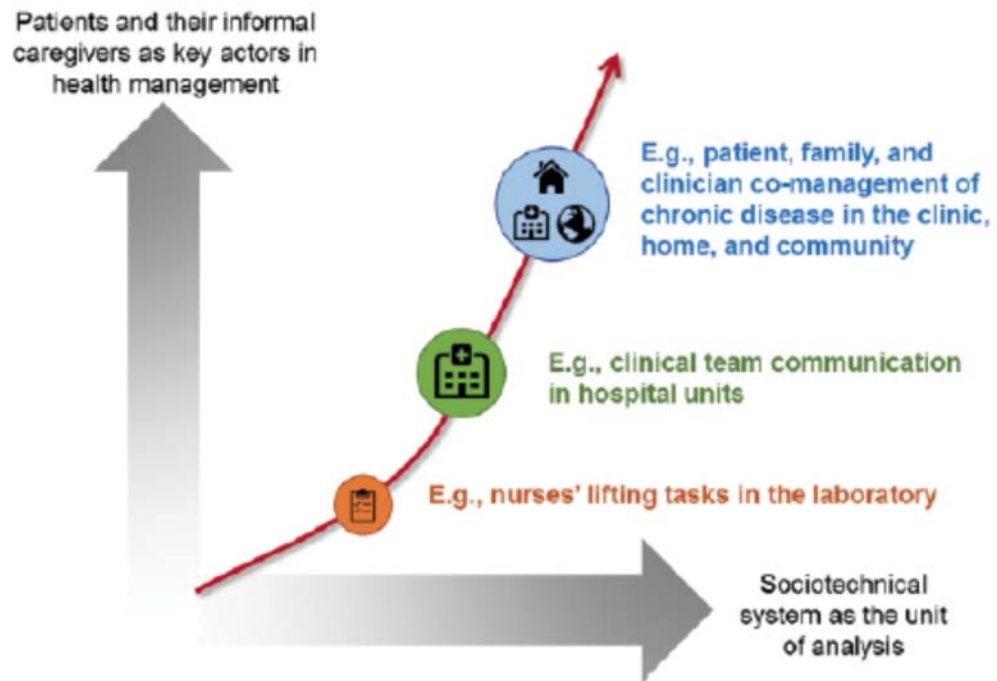


Figure 2. Characteristics of patients' home environments.

Patient home environments are both complex and personal.
Other aspects of the home might include pets, allergens, firearms, family members, and lighting or noise issues.

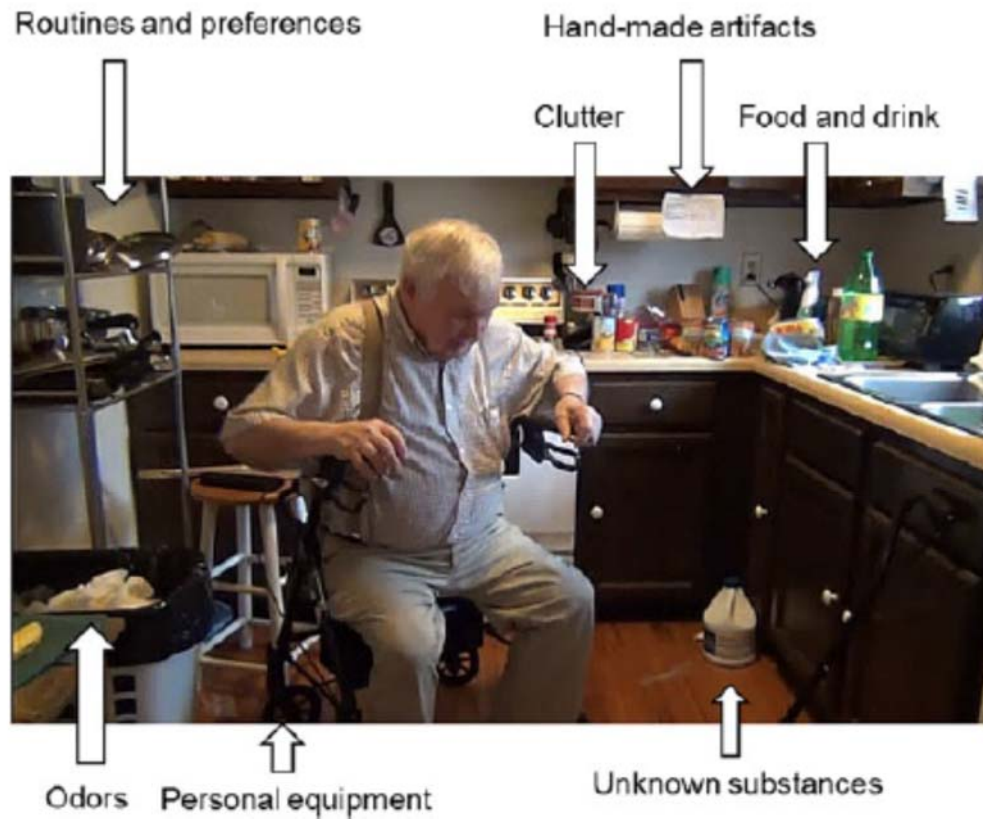


Figure 3. The priorities of stakeholders in home- and community-based human factors/ergonomics fieldwork.

The priorities of stakeholders in home and community based HF/E fieldwork

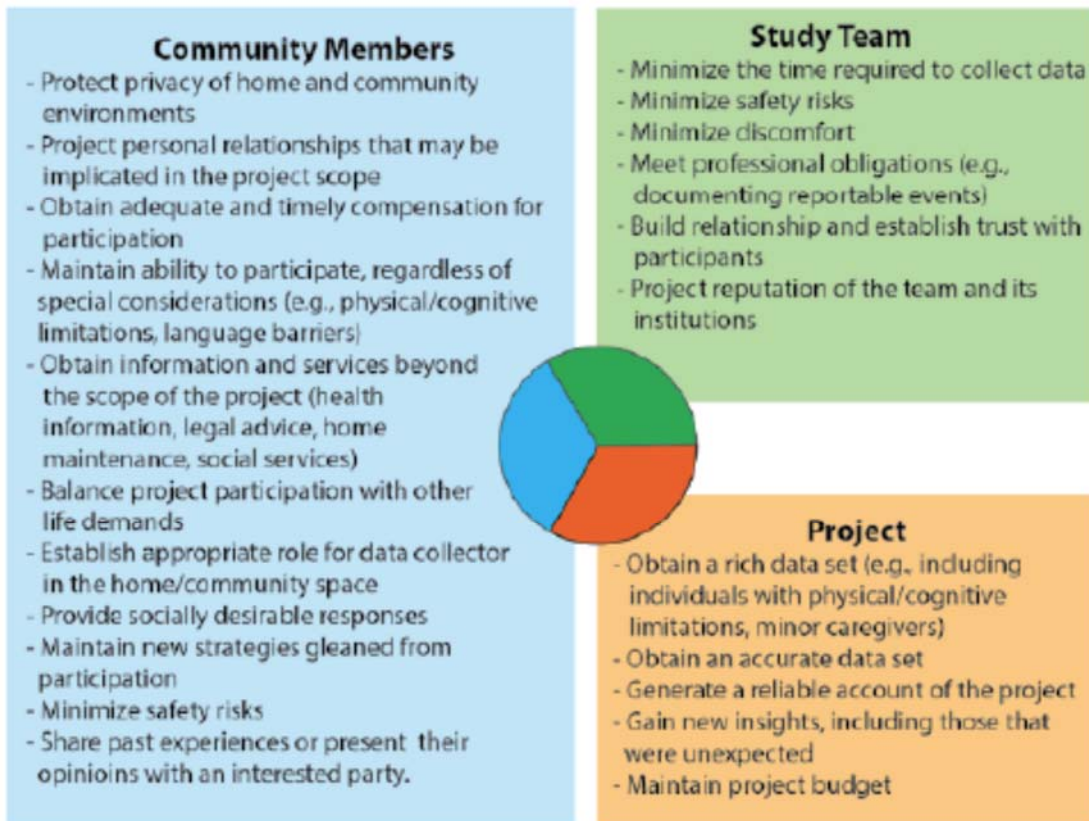


Figure 4. Challenges associated with fieldwork in the home and community environment.

[Adapted from Holden, Scott, Hoonakker, Hundt, & Carayon, 2015]

Challenges associated with fieldwork in the home and community environment
(Adapted from Holden et al., 2015)



1. Challenges of professional-participant partnership	3. Challenges of research logistics/procedures
<ul style="list-style-type: none"> • HF/E professional-participant differences in priorities • Mistrust and misunderstanding of HF/E professionals • Differences in language, perspective, personal norms 	<ul style="list-style-type: none"> • Patient identification and recruitment • Logistical issues • Maintaining participant privacy, confidentiality • Conflicts with compensation
2. Challenges of participant characteristics	4. Challenges of data quality and interpretation
<ul style="list-style-type: none"> • Participants' competing life and health demands • Psychosocial, cognitive, perceptual limitations 	<ul style="list-style-type: none"> • Questions of data quality, interpretation, and integration of data

Figure 5. Health care human factors/ergonomics home and community fieldwork checklist.

[continued next page]

Before arriving	Obtain approval from a human subjects authority	<ul style="list-style-type: none"> ✓ Include language in IRB protocol that explicitly discusses the possibility of unexpected situations and outlines that all decisions will be guided by an attempt to balance the goals of the project team, participant, and study ✓ Have consent and assent forms available for other individuals who may be pulled into data collection ✓ Provide a separate release form and provide the option of censoring for visual media (e.g., photographs, videos) ✓ Understand legal reporting requirements and institutional regulations related to compensation, data storage for sensitive information, etc. ✓ Prepare and obtain approval for consent processes that are both oral and written to accommodate participant differences, including literacy level
	Talk to your participant	<ul style="list-style-type: none"> ✓ Inform participants of what to expect prior to data collection (e.g., length of visit, content of visit, and who to expect). Include whether or not the participant will be asked about their relationships with others ✓ Prior to data collection, ask participant if he/she has particular needs that should be accommodated. To the extent possible, arrange to meet these needs (e.g., interpreter, presence of a second team member) ahead of time ✓ Verify that sites have adequate technological infrastructure prior to data collection ✓ Ask participants if they own pets or firearms prior to the visit. Ask if pets are comfortable around new people, and if firearms are secured, explaining that you need to ask this question as a part of your protocol. If you or your colleague has an animal allergy, consider pre-medicating, substituting another colleague, or moving the location of the data collection ✓ Ask for directions from the participant to complement GPS directions
	Get organized	<ul style="list-style-type: none"> ✓ Establish a lexicon of appropriate phrases that acknowledge the importance of participants' statements, while redirecting the conversation to the project scope ✓ Script alternative ways to phrase statements and questions in case the original wording is not well understood. Develop visual aids to help the participant through cognitively challenging activities ✓ Wear or carry identification with institutional affiliation ✓ Establish a communication plan with your colleague to indicate that the site visit must be ended because of safety concerns. The plan should involve communicating an apology to the participant and an explanation that the team realized it is not prepared to complete the site visit at this time. Termination of a site visit should be followed up by a call to the participant to reschedule the meeting time and place, if appropriate, or to terminate the relationship ✓ Use technology for data collection that does not contain any personal information. If possible, use an institutional cell phone, rather than personal, to communicate with participants ✓ Follow an appropriate dress code, which may require dressing in formal business attire, or more informal clothing when working with populations that historically do not trust the institution or do not want neighbors to ask questions ✓ Bring a colleague or someone familiar with the participant with you to all site visits for safety and reliability of data collection, and inform a third colleague about arrival and departure. If resources are limited and the environment is deemed safe, bring a colleague only for the initial visit ✓ Brainstorm potential problematic scenarios and talk through strategies for addressing them

Figure 5. [continued]

While present	Interact with respect	<ul style="list-style-type: none"> ✓ Accept requests to assist with minor tasks to facilitate relationship and trust building (e.g., check mail, download app/computer program) Respectfully decline offers of food and beverage by using phrases such as, "That looks wonderful, but I just ate." ✓ If a participant expresses fatigue or the need to address other responsibilities, respect this expression and reschedule a follow up visit ✓ Ask the participant if he/she would prefer to have materials in writing, or if they would prefer to have them read aloud. ✓ Provide compensation immediately following data collection (i.e., no waiting period) unless participants are willing to wait for compensation in a form requiring a waiting period (e.g., check) ✓ Respectfully, but directly respond to inquiries that are out of your scope of practice by stating that you cannot provide certain information or services. ✓ Begin data collection with a statement acknowledging the diversity of experiences and importance of learning about the participant's unique perspective. Assure the participant that he/she is not being judged or graded in any way
	Stay attentive and adapt to the situation	<ul style="list-style-type: none"> ✓ To the extent possible, stay within communal spaces of the home (e.g., kitchen, living room) and maintain an exit strategy ✓ Ask participant for guidance if an issue arises that he/she can help resolve (e.g., continuing the data collection with another member of the household present, hunger, medical needs, unscheduled visitors or phone calls) ✓ Signal an end to the interaction when there are about five minutes remaining and use a closing gesture, such as providing the incentive and/or a business card with contact information if the participant should have any questions ✓ Reflect the participant's vocabulary and demeanor, in terms of how they talk about health-related issues (e.g., blood pressure vs. hypertension) and level of energy ✓ Be patient, open-minded and observant, adapting data collection instruments when participants lead conversation in fruitful directions
After leaving	Document	<ul style="list-style-type: none"> ✓ Write out all decisions and observations made throughout the data collection process
	Manage contact	<ul style="list-style-type: none"> ✓ If data collection on site becomes unexpectedly time consuming, consider follow up data collection using other modes of communication (e.g., telephone, Skype) ✓ Bring results of data analysis to participants for feedback and reflection (member checking) ✓ Terminate your relationship with the participant after all interactions have been completed