HCI Observations on an Oncology Ward: A Fieldworker's Experience

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This column contains more abstract themes and questions drawn from the details of the case study.

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Abstract
These reflections convey some of my experience when doing a study on the design and use of medical devices in an Oncology Ward. I spent 10 days and 4 nights on the ward doing field research in the form of observations and contextual interviews. I draw out challenges that I faced at a personal, practical and scientific level. Some of these I have learnt from, e.g. some healthcare professionals will be like 'research champions' that can unlock fruitful data whereas others will not; others remain unresolved, e.g. should we focus on the data we have access to or on interesting but infrequent events where we have little data? These and other reflections will hopefully help spark debate and sensitize other researchers who plan to do observational studies in a healthcare context.

Author Keywords
Healthcare; fieldwork; ethnography.

ACM Classification Keywords
H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

Research Focus
This case study reports my experiences as a fieldworker on an Oncology Ward. I was engaging with this ward after completing an observational study of an Oncology

Research management: Researchers and students should have emotional support in this sometimes challenging context.

Research management: Research ethics are an important, necessary and time consuming part of a study's design. This process should be managed as efficiently as possible.

Data gathering: Am I right to think that dedicated uninterrupted sit down time for interviews with nurses is unfeasible? What are other's experiences?

day care unit (an outpatient unit), and before similar planned studies in a Haematology Ward and ITU. In all of these contexts the research focus was on the design and use of medical devices in context. The intention was to pay special emphasis to infusion pump use (a device used to pump fluids into patients), but the use of other interactive programmable medical devices was not excluded from the research. Part of my rationale was to investigate whether and how the design requirements of infusion pumps differed between different contexts in hospital but more generally I wanted to find interesting usability problems with medical devices.

Study Design

The study's design was an extension of the research I did in the Oncology outpatient unit. I needed approval from the NHS Research Ethics Committee (REC) for that original study, which took about five months. I submitted an amendment to extend the original approval to include the Oncology Ward, Haematology Ward and ITU, which took one month in comparison. Given these timeframes requesting amendments for subsequent similar studies seems more efficient than submitting a new study proposal for REC approval.

As before, I would explain the study to staff at the beginning of every shift and get their consent through written forms. Any observations would be voluntary and I would work-shadow the nurses at appropriate times to see how medical devices were used. All staff and patients would remain anonymous in any written reports. The only time that anonymity would be broken is if I felt that patient safety was compromised and I needed to alert other members of staff to the situation.

I had access to hospital counselors should I need it, e.g. if I was disturbed by anything I saw. An experienced HCI researcher who had done similar work before recommended this.

Furthermore, I had developed a questionnaire for staff and patients about medical device issues. This was designed to provide another data gathering tool to be used with staff and to encourage my interaction with patients, which had happened less often than I would have liked in the first study. I had not talked to patients about their experiences because I had felt awkward disturbing people who were sick and receiving treatment.

I was allowed to take photos provided that no staff or patients were in them.

Methodologically, since the first study I had learnt: (1) it is not practical to get dedicated uninterrupted sit down time with nurses for interviews. Staff were too busy in the Oncology outpatient unit and so the manager rejected this after two short interviews were attempted; and (2) it is not practical to get written informed consent from patients when you're just work-shadowing staff. Instead I politely asked the patient if it was OK to observe the nurse perform the treatment.

Study Experience

This section conveys some of my experience of doing the observational study in a roughly linear order: from gaining access to reflecting on my study's results. Here we encounter personal, practical and research challenges with lessons learnt.

Since doing the first study in the Oncology outpatient unit I was more familiar with the hospital and staff, e.g.

Research management: The time to get things done in healthcare should not be underestimated.

Rapport: The researcher should 'break the ice' with every member of staff.

Research management: Emotional challenges of this context need to be considered and accounted for.

I had met the matron of the Oncology Ward in passing. Consequently I thought gaining access to it would be relatively quick. This was not the case. It took two weeks to organize a meeting with the Lead Specialist Nurse who has overall responsibility for the wards, a further two weeks to meet the matron who was different to the one I met due to staff restructuring, and then a further two weeks to meet the ward manager. All needed to give their permission to allow me on to the ward for the study.

I was apprehensive about my first day. Despite this being the second study this was still a big change from the Oncology outpatient unit and I was worried about what I might find. Unlike the outpatient unit, patients on wards are likely to be much more unwell and bed ridden. A close friend of mine had passed away due to cancer previously, and some of those memories and emotions were still with me. The ward manager showed me around when I met her to get her permission before the study had started, which was great to acclimatize myself, but this was still brief. Researchers and managers should be mindful of emotional baggage related to healthcare contexts, a concern likely to be largely foreign to studies in most other contexts.

I joined the nurses for their safety briefing. This was at the very start of the shift when all the nurses were together so it was a good opportunity to speak to them all at once. The introduction went well and I distributed the information sheets and consent forms. However, there was a sense of urgency and business that pervaded the whole meeting so the nurses ran off immediately to attend to their patients. I couldn't get them to sign the consent forms in a rush, I didn't want to delay their work and felt it more important that they understood the main issues, so I highlighted these: that it was a purely voluntary study, any observations would remain anonymous, and I was here to learn as much as possible about medical device use and design.

On subsequent mornings I did not get a chance to introduce myself to the whole group; instead I spoke to the one or two members of staff I hadn't yet met individually. I came to learn that it was good practice to introduce myself to every member of staff after the safety briefing, regardless of whether I got a general introduction or not, to help break the ice.

From the first study I had learnt that it was important to try to take an apprenticeship stance, as advocated in *Contextual Design* [1]. I got a better response from staff if I was there to 'learn with them' rather than 'observe them,' which seemed more formal and imposing. However, as the study progressed I found that this stance was not always appropriate. For example, I would need to be an expert when explaining my research and encouraging staff to think that they are not always at fault if a piece of equipment is difficult to use but it could be the design of the device – an old adage in HCI that can be difficult to grasp if you are completely unfamiliar with it. Furthermore, there was a situation where I felt the need to intervene further than an apprentice stance might comfortably allow because I was sure that a device that was disturbing a patient could be better controlled (described in the oximeter example later).

Soon after I introduced myself the ward manager instructed me to put my bag and coat in the staff room, as these were not allowed on the ward. Inadvertently this gave me access to the staff common room where I

Rapport: Staff communal areas are great for building rapport and gathering data.

Data gathering: It can be hard to find a convenient place to sit or stand.

Data gathering: What people say and what is observed can be very different, which can make getting a coherent picture hard especially in the absence of frequent observational data.

Data gathering: Different people will have different opinions about whether there are problems and what they are if there are any, which can make finding the right problems to engage with difficult.

was welcomed to have breaks and lunch too. This invitation never happened in the Oncology outpatient unit and the manager in that situation was keen to protect what little breaks the staff had. After that experience I was keen not to exploit staff breaks for formal data gathering (e.g. interviews) but only in so far as the staff prompted me and it felt comfortable. Access to the staff communal spaces was great as it naturally led to me building rapport and gathering extra data. However, it needed sensitivity to protect breaks and this access won't be allowed in some situations.

The ward manager showed me around the ward paying particular attention to safety issues, e.g. that I should follow nurses' instructions and avoid rooms that were still radioactive from radiotherapy patients. The ward manager also gave me a tour of their medical devices, describing what they were used for and whether there were any usability issues with them in her opinion. Someone had previously directed me to the ECG machine as a potential area of interest. Apparently, staff often loaded its paper incorrectly. The manager said this wasn't an issue, which was confirmed by the rest of the staff later. She directed me to the CPAP machine as a potential source of interest as the staff didn't like using it – this was a machine that forced air into patient's lungs using a mask and positive pressure, it was used for patients who have difficulty breathing and low oxygen levels in their blood. She introduced me to many other devices like the infusion pumps, hoists, blood glucose monitors and oximeters which she thought may be of interest to me but she hadn't identified any particular problems with their use.

After the manager's introduction and tour I was left to talk to staff and ask them if I could shadow them if they were using the medical devices. I soon found that everyone was busy and I had no place to conveniently sit or stand where I was out of the way but not too far - so I was not forgotten and could get a feel for what was happening. I had experienced similar in the Oncology outpatient study. The main action seemed to be happening around the clinical area where drugs were prepared, it frequently had nurses going in and out, and there was room there so that became my preferred place to hang out, chat and get acclimatized further.

Over the next few study days I found that infusion pumps, which were the main focus of the study, were not used as frequently as I was led to believe. Staff were confident that they were used frequently but this is not what I found. Many infusions were gravity fed and didn't use a pump. Furthermore, I was not around for some infusions e.g. if they were set up at night, some infusions were for seriously ill patients which was considered too sensitive for me to observe by some staff, and other infusions were administered when other private activities occurred (e.g. changing a patient's incontinence pads) so this was not appropriate for me to attend either. However, I did make some infusion pump observations that proved interesting but the length of time I was spending on the ward did not reflect the relatively little data I was gathering on these devices. Consequently, I sought broader observations on medical devices, the context, and looked for interesting data that I could access more frequently.

One device that presented itself as a potentially interesting case where I could gather data more frequently was a new blood glucose meter that had just been introduced to the ward. The healthcare assistants that used this device were happy for me to shadow

Data gathering: You may need to adapt your study's focus in response to what data you can access and what appears interesting.

Rapport: Staff should not be undermined even in stressful situations, which might take some tact on the researcher's behalf.

Data gathering: Opportunities might present themselves serendipitously.

Rapport & Data gathering: Some staff will be much more engaging and willing to help, opening up fruitful data and lines of enquiry whilst others will be less engaged.

them on their blood glucose rounds that happen before meal times. This gave me data for a thorough evaluation of the device's design and use, and made me feel more confident that I would get something solid out of the time I was spending on the ward.

I was also mindful of other opportunities and leads that might present themselves as interesting areas for study. The CPAP machine was used so infrequently I never saw it set up. I did find a spare one so I could make notes on its design but I never saw it in use. Serendipitously, an interesting situation occurred with an oximeter that I was present for and engaged with. Previously the ward manger had introduced the oximeter as a non-problematic device. They were wheeled up to patients to take their heart rate and oxygen blood saturation levels. This was confirmed through subsequent observations. These patient spot-checks were frequent and different to the continuous monitoring that was happening one Saturday morning: A doctor emerged from a patient side room where a device was alarming very loudly. She asked the nurse if there was anything that could be done about the alarm, but the nurse said she had tried everything. When I asked what was happening the nurse explained that the patient was very unwell, had received medication, and their heart rate was very high. The oximeter alarms when the oxygen saturation levels in the blood or the heart rate are too high or low. The nurse said she had tried turning the volume down but it hadn't worked. I found a spare oximeter to look at and turning the volume down didn't appear obvious even though the instructions were printed on top of the device. I found the nurse to ask what she had done. She said she had tried everything. I asked her to show me on the spare one. She pointed to the down arrow. I highlighted the instructions which indicated that the down arrow alone changes the pulse volume, and that to change the alarm volume she should hold the alarm silence button down for at least 3 seconds and then use the down arrow. She repeated that she had tried everything, but said she would try what I had shown her. The fact the nurse kept saying she had tried everything made me feel that she wasn't too open to suggestions and wanted to appear competent and confident, I got the feeling that she didn't want to talk about it as she was very busy with other things too, but I thought the ongoing situation with the patient was very sensitive and was sure she would try things to make the situation better. I was clear to point out that the device looked tricky to use. She asked if I wanted to come in the side room to try, but I declined as I was not allowed to control the devices and the situation had been considered too sensitive for me to attend previously – the patient's wife was in the room comforting him and no one was sure how long he had left. The interaction I suggested didn't work either and I later discovered other issues with the device's use.

Over the course of the study my perception that some staff were more helpful and engaging than others was reified. In terms of data gathering it can prove productive to recognize 'research champions' that will open up opportunities and data that other staff might not. I also learnt to be aware of signs that staff are not keen on taking part even if they have not directly declined participation in the research. This might be fairly short term if they are having a bad day or longer term for any number of other reasons.

I had never done night shifts before and found staying awake grueling to the point I could barely concentrate

Rapport: Fitting with staff practices can build rapport.

Research management: Should we focus on the data we have access to or on other interesting data that we have little of?

Data gathering: How have others engaged with patients on wards?

Research management: What is ideal practice in terms of gaining consent, bearing in mind its practical impact?

or think straight. Staff covered for each other whilst they had extended breaks to sleep, although I don't think this was officially approved. I was invited to have a break too and I accepted. After taking part in the sleeping breaks I felt more accepted by the staff. Although staff were busy they were concerned with my welfare, e.g. they'd ask me to sit down if they thought I had been stood for too long and offered me drinks.

I still never achieved the levels of patient interaction I thought I would. I have chatted to patients when shadowing nurses but not for more formal data gathering about their views, including getting informed consent. This is partly because of the awkwardness of disturbing people when they can be so unwell, and also because it is hard to know how people are feeling, whether they are drugged or in pain, and whether they can speak English. For example, a student nurse invited me to observe her using a blood pressure machine. As we approached the patient's bed I introduced myself and asked if it was OK if I observe the nurse doing her work as normal. The patient looked at me scared. I explained again saying there was nothing to worry about, and realized that she couldn't speak English. I suppose I looked more like a doctor and she probably wondered what I wanted, e.g. "Was it bad news?" A more experienced nurse stepped in and made the patient feel at ease – the nurse was cleaning urine from the floor after a patient's accident. The patient didn't really want to be confronted with things she didn't understand in her state – imagine if I was asking her to sign forms and read information sheets. It made me think that consent needs to be proportionate otherwise it can overly worry some patients.

The more substantial data that I gathered in this study was around the blood glucose meter use because it was accessible. The infusion pump observations were more infrequent, and the very interesting scenario of the oximeter only happened once. It seems easier to publish on the substantial data I have than the infrequent and interesting events I chanced upon. Furthermore, more recently, a member of staff asked whether my critique of the blood glucose meter was engaging with the real problems of the ward, e.g. when patients in four bed bays are being deprived of sleep from each other's devices alarming. In a sense it is like the drunk looking for his key under the streetlight, this is where we have data and it is harder to publish scientific papers on events where we have little data.

Summary

Different practical, personal and research themes and lessons present themselves in this case study, e.g. in terms of building rapport, data gathering strategies and research issues. Some will spark debate e.g. what form of consent is ideal. For me others are unresolved, e.g. interacting with patients more and learning from infrequent events with little data. These experiences can be shared to facilitate learning but time is needed to mature and get a feel for healthcare contexts too.

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References

[1] Beyer, H. & Holtzblatt, K. (1998). Contextual Design: Defining customer centred systems. San Francisco, CA: Morgan Kaufmann Publishers.