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Gee, Stephanie; Skovdal, Morten

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Navigating ‘riskscapes’: The experiences of international health care workers responding to the Ebola outbreak in West Africa

Stephanie Gee^{1,2*} and Morten Skovdal²

¹ Department of Health and Related Research, University of Sheffield

²Department of Public Health, University of Copenhagen, Øster Farimagsgade 5, 1014 Copenhagen, Denmark

*corresponding author: gee_stephanie@hotmail.com

Abstract

This paper draws on interview data to examine how international health care workers navigated risk during the unprecedented Ebola outbreak in West Africa. It identifies the importance of place in risk perception, including how different spatial localities give rise to different feelings of threat or safety, some from the construction of physical boundaries, and others mediated through aspects of social relations, such as trust, communication and team dynamics. Referring to these spatial localities as ‘riskscapes’, the paper calls for greater recognition of the role of place in understanding risk perception, and how people navigate risk.

Key words: Risk perception; Riskscapes; Place; Health care workers; Ebola; West Africa

INTRODUCTION

Managing risks, and perceptions thereof, are paramount to any global infectious disease response (Smith, 2006), both for the public and for the front-line health workers who are providing care. The ability to maintain a cadre of ‘willing and able’ health workers while minimizing any physical and psychological impact to them is an important need in outbreak management (cf. Chan and Huak, 2004; Maunder, 2006; Wu et al., 2009). Yet, we know surprisingly little about the contextual factors that attenuate or amplify perceptions of risk (cf. Kasperson et al. 1988) in a global infectious disease outbreak, impacting the availability, effectiveness and well-being of

skilled health professionals. The 2013-2016 Ebola outbreak in West Africa, with its unprecedented magnitude, complexity, and human resource challenges, provides a unique opportunity to examine the perceptions of risks that determine the readiness and capacity of health care workers to carry out their duties under risky circumstances. Through interviews with international health care workers recently returned from West Africa, we unpack some of these perceptions of risk and locate them in a broader discussion on the role of spatial localities in modifying risk perception.

Risk perception of health care workers during infectious disease outbreaks

Since the first recognized Ebola outbreak in 1976 in a Belgian mission station in rural Zaire, spread by unsterilized needles and resulting in the deaths of 11 of 17 hospital staff and hundreds of locals (Burke and Ghysebrechts, 1978), health care structures have been places of both aid and of risk. Insufficient hospital infrastructure, equipment, training or staffing may amplify the spread of the disease in both patients and health workers alike (WHO, 2015). Indeed, health care workers in the most recent Ebola outbreak were impacted at an unprecedented level. Analysis by the US Center for Disease Control (CDC) of Ebola infections in health-care workers in Sierra Leone found incidence of Ebola infection among this group to be 8,285 per 100,000, a rate which is 103-times higher than that in the general population (Kilmarx et al., 2014).

The reasons for these infections are multi-faceted, and not fully understood. Several reports have observed multiple risk factors in facilities in West Africa, including lack of standard operating procedures; staff shortages; incorrect triage or recognition of Ebola patients; delayed lab diagnosis; lack of or improper usage of personal protective equipment (PPE); poor delineation between high and low risk areas, amongst others (Kilmarx et al., 2014; Pathmanathan et al., 2014). Behavioral risks such as working longer than the recommended hours in isolation areas or rushing to the aid of sick patients before protecting themselves have been identified elsewhere (WHO, 2015).

Given the importance of a 'willing and able' cadre of front-line health workers during such outbreaks to the effectiveness of the public health response, it is important to understand how such risk environments are experienced by health workers. The

literature around the experiences of health care workers in Ebola outbreaks is very limited however relevant findings can also be found in studies of health staff experiences during the H1N1 influenza and SARS outbreaks. Not surprisingly, fear of contracting and/or transmitting the disease, particularly to family members, emerges as a common theme in studies of experiences of health care workers during these emerging infectious disease outbreaks (Corley et al. 2010; Gershon et al. 2016). The 1995 Ebola outbreak in Kitwit, DRC suffered from a high nosocomial infection rate, with 38% of all cases occurring in health staff which resulted in extreme fear, with many staff and patients fleeing the hospital (Guimard et al., 1999). Other studies have demonstrated that despite fear and emotional distress, many staff feel a professional responsibility to continue, with feelings of professional duty conflicting with worry about potential transmission to loved ones (Ho et al. 2005; Hewlett & Hewlett 2005). Beyond viral contagion, fear also resulted from attacks, threats, and hostility against health workers arising from community members suspicious of Ebola workers (Haggman et al., 2016; Gershon et al., 2016).

In many of these studies, personal protective equipment (PPE) emerged as a predominant factor in creating feelings of safety or risk in health staff. In some cases PPE was found to not be user-friendly (Lam and Hung, 2013), or in short supply (Hewlett and Hewlett, 2005; Guimard et al., 1999), and ambiguity in PPE guidelines left health workers feeling unprotected and undervalued, a feeling exacerbated by frequent changes in guidelines (Corley et al., 2010). In the most recent Ebola outbreak, in addition to creating feelings of safety (Haggman et al., 2016), the PPE was found to be uncomfortable and a barrier to patient care. Notably, in one study, 80% of participants reported a breach of PPE during their work (Gershon et al., 2016). Staff working during SARS in Toronto felt a sense of danger was exacerbated by uncertainty related to frequent changes in infection control procedures, when staff developed a fever, or entered quarantine (Maunder et al., 2003). Another SARS study, this one in Hong Kong (Ho et al., 2005) found the majority of respondents (56%) had low perceived control over the procedures in place to prevent infection. A number of factors influenced staff's ability to follow infection control procedures including heavy workload, stress, and sudden changes in procedures (ibid.)

Institutional support and communication factors were found to impact feelings of risk in a number of studies. Lack of organizational clarity, unclear policies and procedures, and lack of basic resources increased stress in international health volunteers involved in the West Africa response (Gershon et al. 2016). Health worker experiences during previous Ebola outbreaks (Hewlett and Hewlett, 2005; Guimard et al., 1999) found institutional level factors played a significant role in increasing risk as staff, basic medicines and equipment were in short supply and hospital infrastructure was often inadequate (ibid.). Lessons learned from a US hospital caring for an Ebola patient noted the need for constant communication including “repeated, redundant, and detailed communications to all in and around a clinical situation” (p.5) in order to counter fear messages coming from the media (Matlock et al., 2015). The importance of training is highlighted in a study in Sierra Leone, with fear among health staff reduced following infection control training and remained higher among those health workers who did not receive trainings or have sufficient access to PPE (Dynes et al., 2015). Focus groups with nurses following the Kitwit outbreak revealed that nurses who volunteered to care for Ebola patients felt disappointed about lack of recognition by authorities, felt abandoned by management, and received insufficient psychological and financial support (ibid.).

The above studies, while elucidating important components of experiences of risk in infectious disease outbreaks, largely refer to local health staff. We found very few studies looking at experiences of international health workers responding to Ebola. The dimensions of mobility and temporality, as well as the additional resources, built structures, and policies and procedures of international agencies operate separately from local health systems. This creates a separate, often privileged position, differentiating international workers from local ones. This unique context is valuable to explore, as international health workers impacted the West African Ebola response capacity greatly, and will likely be required again in the future as pandemics become increasingly globalized. This study explores the unique perspectives of such international staff.

Analytical focus: Navigating ‘riskscapes’

The word ‘risk’ was once a nautical term, incorporated into English from the Portuguese and Spanish, referring to the hazard of sailing into uncharted waters. As such, it had a strong spatial connotation (Denney, 2005). Later, a more temporal usage was adopted as the term was used in commerce, often adopted to refer to general conditions of uncertainty (ibid.). The word risk, in current usage, may refer to a hazard, a probability, a consequence, or a potential adversity or threat (Slovic and Weber, 2002; Slovic et al., 2004). A frequent usage is an ‘actuarial’ definition of risk, which sees risk as a numerical expectancy (probability x magnitude) which can be determined independently from its social or cultural context (Tversky and Kahneman, 1975). However, most social science research rejects a concept of risk as objective, existing independently of human minds and cultures. A social constructionist view has developed, which views risk as inseparable from its contextual factors:

There is no ‘right’ definition of risk. Risk is a socially construed concept. Which components are taken into account and how they are weighed is not a question that can be decided scientifically or technically. Instead, the risk concept emerges and changes in the course of social and political debates. (Kasperson et al., 1988: p. 141)

The term ‘riskscape’ is commonly used to refer to places, or environments, associated with significant risk (Mair et al., 2011). Much of the riskscape literature takes a socio-ecological, and macro-level perspective to identify the set of individual, interpersonal, environmental and political factors that increase vulnerability to hazards (Cutter, 1996) or poor health (Morello-Frosch et al., 2001; Morello-Frosch and Shenassa, 2006; Hickson et al., 2015; Mair et al., 2011). What the riskscape literature lacks, however, are studies that explore how *perception* of risk contributes to the construction of the riskscape, as well as influences how it is navigated at a micro-level. Here we take inspiration from other ‘scape’ dimensions available in the geographical literature, particularly the agency dimension, key to conceptualisations of ‘caringscape’. The concept of ‘caringscape’ was originally coined by McKie et al (2002) to offer a theoretical framework for conceptualizing the time-space dimensions of parents’ responsibilities for childcare and paid work in the global North. Drawing on Lefebvre’s (2004) ideas about the ‘reciprocal action’ between time and space in

everyday life, the caringscapes concept has been further developed to analyse the complex ways in which young people negotiate their caring trajectories temporally and spatially in African contexts (Evans, 2012). The concept explicitly locates individual experience and embodied practice (as individuals negotiate and navigate a route through a changing and varied terrain) in the context of social processes operating through time and space (Bowlby et al., 2010). As international health workers parachute in and out of uncertain environments, we will hone in on their micro-level ‘riskscapes’ to explore the spatial localities, or ‘lie of the land’ that make up a constellation of structures, people, relationships and policies that shape, and are shaped by, *perceptions of risk*. In doing so, we hope to disentangle concrete spatial localities of risk as perceived and experienced by international health workers responding to Ebola in Sierra Leone.

We use the term spatial locality to mean a place that is socially produced, whether that place is ‘home’ or the ‘hospital’, and infused with significance, meaning and representations. Massey describes the meaning of place in a globalized world, which is pertinent to international health workers responding to a global infectious disease such as Ebola:

Place may be “the sphere of the everyday, of real and valued practices, the geographical source of meaning, vital to hold on to as ‘the global’ spins its ever more powerful and alienating webs. For others, a ‘retreat to place’ represents a protective pulling-up of drawbridges and a building of walls against the new invasions” (Massey, 2009: p. 5)

This understanding of place encourages exploration of how meanings of place, containment boundaries, and the use of ‘retreat to place’ may strengthen or weaken feelings of risk for international health workers during this outbreak. As will be seen, how risks are perceived have numerous important consequences, from determining how physical structures of health facilities are constructed, to what care is provided therein, and to the ability of international health workers to successfully work in this context without compromising their mental and physical wellbeing.

METHODOLOGY

This qualitative study reports on data generated between July 2014 and January 2015. Ethical approval was obtained from the School of Health and Related Research, University of Sheffield. Written informed consent was obtained from all participants upon reassurance of anonymity. Data was also collected by way of review of communications from MSF, including letters and debates on internal online fora. Any internal data quoted in the study has received permission from the author for inclusion.

Study setting and participants

The setting of this study is an international one, as participants worked at Ebola Management Centers (EMCs) in Sierra Leone and Liberia, and were subsequently interviewed in their home country or a third country during the post-mission period. Due to the qualitative methodology, non-probability sampling was undertaken (Bryman, 2008). Purposeful sampling was used to identify a diverse selection of international health care workers who had recently returned from working as front-line health staff in the West African Ebola outbreak. Two of the participants were recruited through the first author's professional networks. Other participants were identified through snowballing, a process in which the researcher identifies participants through contact information given by other participants, and as such utilizes natural social networks (Noy, 2008). Recruitment was also done through notices posted on closed social media sites for staff from Médecins Sans Frontières (MSF), an international medical humanitarian organization. Criteria to participate included being an international health care worker and having had direct contact with affected patients. Efforts were made to include a mix of males and females, both doctors and nurses, and a diversity of nationalities. Non-medical auxiliary staff such as water and sanitation, or management positions who were not in direct contact with patients were excluded from the study.

All participants were working for the same international non-governmental organization – MSF, and all but one participant had past work experience with this organization. The majority of participants worked in Ebola Management Centers (EMCs) - health facilities dedicated exclusively to the testing and management of

patients acutely ill with Ebola Virus Disease. Two of the participants were also charged with community outreach and contact tracing, which took them into local communities. The participants represented seven different nationalities including Canadian (2), Japanese (2), Nigerian (1), Ugandan (1), Italian (2), Danish (2), and US American (1). The participants were experienced medical professionals, with a mean of 10 years professional experience (range 5-22 years). They consisted of six nurses (55%), four doctors/clinical officer (36%) and one public health specialist (9%). The mean age is 35 years old (range 28-46).

Table 1: Description of Participants

Identifier/ Interviewee	Age/Sex	Profession	Years of professional experience	Number of Ebola missions	Nationality
1	38/F	Nurse	12	1	Japanese
2	46/M	Doctor	10	2	Nigerian
3	43/F	Nurse	22	2	Japanese
4	39/F	Doctor	10	1	Italian
5	32/F	Nurse	6	1	Danish
6	29/F	Nurse	7	1	Italian
7	36/F	Doctor	10	1	Danish
8	37/M	Clinical officer	13	5	Ugandan
9	29/F	Nurse	7	1	Canadian
10	29/F	Public health specialist	5	2	American
11	28/F	Nurse	8	1	Canadian

Data collection and analysis

The majority of interviews (n=9) were done via Skype, and the remainder (n=2) were done face-to-face in Copenhagen, Denmark. The interviews were conducted in English. Only one of the participants had English as a first language, which meant

that some participants occasionally struggled to articulate their perspectives. The interviews followed a topic guide which placed emphasis was on narrative questions, followed up with semi-structured questions when needed. This provided the advantage of placing greater emphasis on the perspectives of the participant rather than on the researcher's concerns (Bryman, 2008). The interviews were designed to elicit information on their perceptions of risk before exposure, during exposure and after they have returned home from their mission. This paper reports on responses from the part of the interview that explored their risk perception and management during exposure. The opening narrative question opening this part of the interview was: "With respect to feelings of risk, what was life like for you during the mission?" This broad question was followed up with questions like:

- What aspects of the daily life (both in and outside of work) did you feel were the most risky to your health and safety?
- What did you do to keep yourself healthy and safe (in and outside the work area)?
- What were some of the challenges you faced keeping yourself healthy and safe?
- What policies and procedures did you feel best supported you?

The interviews averaged 1 hour 50 minutes in length and took place within two months of participants' return from West Africa. The interviews were done retrospectively to capture any changes in risk perception that occurred throughout the experience, including before, during and after the mission.

Analysis of the data was approached using conventional qualitative thematic analysis (Hsieh and Shannon, 2005). Anonymized transcripts were read repeatedly in their entirety, to establish familiarity and to get a holistic view of the data set. The interviews were then analyzed line-by-line and the entire data set was systematically and inductively coded for content. Representative quotations were selected for each main theme emerging from the analysis.

FINDINGS

Navigating risk at the Ebola Management Centre

The EMC, by necessity, was a constructed place of division – divided by different levels of risk (high risk and low risk areas) and levels of certainty (triage, suspect, probable, confirmed). Providing patient care within the EMC required a continuous negotiation of risk – including negotiating between distance and proximity, and between risks to self and risks to the patient. The use of personal protective equipment (PPE) and controversies around limits of patient care, including the use of intravenous (IV) therapy arose as predominant themes within this environment, as did the importance of relational elements including trust, communication and team dynamics in modifying perceptions of risk.

Personal Protective Equipment

Personal protective equipment for health workers in high-risk zones of the EMC included a complete head-to-toe covering including a impermeable body suit, waterproof apron, double gloves, often taped at the wrists, goggles, face mask and rubber boots. The role of PPE in managing risks raised very dichotomous views from participants. It was described as both creating a safe space to physically and emotionally care for patients, but also as acting as a source of risk and as an emotional barrier. The majority of participants expressed feelings of safety within the PPE, resulting in them feeling safer in the high-risk zone than any other place due to the perceived certainty it provided:

And maybe that's also a part of being in the PPE – I felt safe in the PPE. I knew that, ok when I have this on, I mean, I am safe... even though it is in the high-risk zone, and even though it's very dangerous in a way, I feel very safe in PPE.

S: More safe than outside?

A: More safe than outside. Because outside you don't know. (*Anna – nurse*)

The discomfort felt due to the equipment and the heat was universally described, including excessive sweating, and difficulty feeling, seeing and breathing. Several participants used the word “choking” to describe the sensation of not being able to breathe well in the PPE. However, in addition to providing protection, the PPE *created* risks through decreased sensory ability as well as mental fatigue, and the potential for dehydration, heat stroke and fainting. This fatigue coupled with the physical constraints of the PPE equipment limited both the time that could be spent providing patient care and the content and quality of care provided. John describes the risks created by PPE:

You get choked up, hypoxic and you know you don't get to concentrate sometimes... Sometimes your goggles get foggy, you can't see very well, and you don't even notice if you have dropped the needle on the floor, not on the safety box. It was not a deliberate intention by anyone to do that, but just because you cannot concentrate or you don't really see well with your goggles you make these mistakes. (*John – doctor*)

The participants described their appearance in PPE with words such as astronaut, outer-space, space-suit, and alien. There is recognition of the un-human nature of the situation, particularly in the unnatural separation of the caregiver from the sick. It is from this extreme situation - the use of physical distance and layers of protective materials, that the connection between physical space and emotional space becomes so apparent. Several participants discussed the impact of the PPE on their ability to establish a therapeutic relationship with the patient. Conversely, some described PPE as creating a barrier between them, while others describe it as creating a space to connect.

Ahhh, well as I said, it is not a conventional way of attending to patients. And it poses some physical barriers and emotional barriers. So, patient care, and I mean, you want to touch someone, but you cannot really touch someone the way you should. And then even if you are emotional, you don't easily create a bond between you and the patient because you are putting on PPE. So even if you are feeling for the patient, the patient is not really appreciating that you

are feeling, because he doesn't really see you, you are hidden in something.
(*John- doctor*)

One participant, who had become infected with Ebola while working in a previous outbreak, stressed the importance of not relying solely on PPE for safety in the high-risk area. He coined the terms PPB and PPD – personal protective behaviour and personal protective distance, which must be used with PPE for it to keep oneself safe from contamination. While this is referring to physical protection, relational correlates can be made to emotional self-protective behaviour and distance. Many participants reported weighing the emotional risks of becoming 'close' to patients and described the need to "put up a wall" emotionally, to be able to continue to carry on despite the high number of deaths.

To not be too involved, to see at least half of your patients die. I had to treat them with a bigger distance to not get emotionally involved in every patient. So I was not trying to get to know the patient too well, rather I would try to focus on the medical work I had to do related to the patient. (*Hannah – doctor*)

Removal of the PPE was seen as a potentially risky moment, as it involved both mental and physical exactitude that was not always present due to fatigue. The construction of a separate exit and undressing room minimized the risks of cross-contamination. As well, the presence of a monitor to safely guide the PPE doffing was seen as essential:

I think the main risk is when you undress, like, there is undressing station. In that case you have someone who is spraying you then telling you step-by-step what you have to do, like ok now you wash your hand and take out the first layer of gloves, then wash your hands again and take out the apron, wash your hands, do this... following you through the undressing procedures. But if you do any mistake, or any splash, it is the most risky part of getting accidental contamination. (*Carla – nurse*)

The risks of IV therapy

A risk decision within the high-risk zone with potentially serious impacts for both the health care worker and the patient revolved around the use of intravenous therapy. Decisions were made to stop using sharps, and most notably, intravenous fluids, in the high-risk area for a period of time, due to overwhelming patient loads that created the perception of increased risk to the health care workers from accidental needle-sticks and blood exposure. Lack of clear medical science at the time on the effectiveness of IV therapy in improving Ebola patient outcomes added to the uncertainty of the risk decision. This ultimately created an institutional culture that effectively framed the EMC as a place of palliation and quarantine, rather than of treatment. A tension was created within the therapeutic space due to different perceptions of this risk within the organization.

We stopped using IV therapy because the most experienced doctor was very reluctant to do it because of the risk for the staff and it was also maybe because it was a little bit difficult because the patients would always remove the lines and then we would always have to go back and put in another IV line. And also a little bit that a very experienced colleague kept saying that he didn't think it would change so much for the patients so there was no point in taking a risk if you didn't think it would change anything for the patient.
(*Hannah – doctor*)

But a challenge was the kind of medical care that we wanted to provide, I guess if you wanted to do more, that may put more staff at risk. So every blood work you ask for, every IV you ask for, it's an invasive procedure, you are putting people at risk by doing it. (*Anna – nurse*)

Despite their professional impressions that patients were improving with IV fluids, several participants reported that these were countered by “expert” opinions that IV therapy was minimally effective and therefore not worth taking the risk of a sharps injury for. Emma goes on to describe how she felt the need to hide the fact that she was providing IV therapy due to the risk-averse climate in her team:

So with one of the doctors we were a bit hiding. We would go inside and take three bags of Ringers Lactate and three catheters, and look and go “you, you, you” [pointing to patients] and then go out. But we had to do it discretely, because some of the people trying to lead did not agree with this. (*Emma – nurse*)

Participants describe how these risk decisions around IV therapy impacted both patients and themselves, creating a moral distress that persisted well past the end of the mission:

We were so tired we stopped doing invasive care. I mean IV therapy stopped, everything.... Yes our safety is a priority, of course. But by stopping IV's I saw many patients die, compared to before when we did IV's for patients. I felt really guilty about that...we all felt guilty about that. (*Mae – nurse*)

I feel, after coming back home, I have read over a lot of the scientific case stories that are public from people being treated in the US and in Europe and there you can really see that the Ebola patients, they are severely hypovolemic and they maybe need maybe 5-10 L of fluid a day. And afterwards, I've been feeling really bad about us not doing more for our patients. (*Hannah – doctor*)

Despite the serious impact of these decisions, there was a recognition that the burden of responsibility for their restrictions on care lay more distally – in the global inequities and insufficient international response that created the overwhelming risk conditions to which they were responding locally, as a project coordinator communicated in a letter to other MSF members regarding IV therapy:

I can only continue to attempt to absolve my personal shame in dealing with that horrible situation, and somehow having to represent the pathetic international response, through the awareness that such a situation is the fault of the outbreak itself and the failures of others.

Navigating risk relationally

The creation of a safe place in the Ebola epicenter not only relied on creating physical boundaries, but was also dependent upon building trust, ensuring communication and maintaining team dynamics. Trust in one's teammates was paramount, from practical matters, such as checking that their PPE was in place and assisting with the strict step-by-step undressing procedure, as well as trusting that their teammates were not putting them at risk through poor decision-making or coming to work sick. Mae, a nurse, describes how her trust in her team leader (related to positive qualities of that leader) and positive team dynamics created a feeling of safety:

It was really hard because we were working from 6 am to 10 pm sometimes. But the team, medical staff, we were 4. We were a good team. So good that I felt safe. Also MTL [Medical Team Leader], had experience in Ebola mission before in Guinea. She was so strong in decision-making and kept the rules really strict. She was tough but she was so nice to people. So I felt safe if I worked with her [...] When putting on the PPE, there is dresser checking that I wear it correctly. We worked in pairs. My partner always checked me if I was ok, and also I checked him or her all the time, if he was feeling ok or not, you know. So I felt really safe. (*Mae – nurse*)

Surprisingly, there was a feeling by many participants that they were more 'at risk' of being contaminated by their co-workers than by the patients. John and Hannah, both doctors, describe the perceived risk from co-workers as well as the importance of positive relational dynamics in mitigating this risk:

You can have all the knowledge in the world, still the person next to you can infect you. It was a very stressful environment and I was praying for people to be kind with their words and actions because if someone was emotionally or psychologically unstable it could affect the whole team. (*John – doctor*)

I think it is very important that you feel that you can trust the people you work with. It is important that everyone follows the rules to avoid infection. If someone puts themselves at risk they will also put me at risk. (*Hannah – doctor*)

Policies and procedures around infection control have a clear place in minimizing the physical risk of infection for health care workers, but they also seem to have a significant role in minimizing *perceptions* of risk through mitigating fear, and allowing the worker to exert a sense of control over the uncertainty and chaos they find themselves in. However, for a psychological sense of safety to develop from rules, policies and procedures, there needs to be sufficient trust in the organization, the team, and the hierarchy putting these regulations in place. Mae, a nurse, described how she was able to continue on after a series of co-workers became infected:

After that, well, after that I still believed if I stick to the rules that they have, I will be fine. I had to believe, otherwise I was so afraid. So I just tried to keep our rules, very very strictly....The rules really saved my mental health I think.
(*Mae – nurse*)

A critical incident - the infection of a colleague, highlighted how communication, and recognition of the voluntary nature of their risk-taking allowed team members to manage their feelings of risk. Marcia, a doctor, describes how she was able to overcome her initial reaction to leave the project upon hearing the news:

It was Sunday evening that we were informed that the expat doctor got infected [...] some people said, maybe we should think about how we can keep on going? Maybe if we are feeling a little bit fear, even a little bit fear, we can choose to go back to our countries. I think we could understand that it's all up to us. (*Marcia – doctor*)

However in contrast, when trust and communication were lacking in the team, perceptions of risk increased and the impacts of this were significant, including deciding to return home early. Allison, a public health specialist, left the project early when the team leadership changed:

The people who were in charge at the time when I arrived were experts. They knew Ebola and they knew haemorrhagic fevers and I trusted them. When

they left I started to feel really uncomfortable with the new management...They started to do things that felt more like they were responding out of fear and panic and at that point I had already extended to seven weeks, and I was exhausted and I had watched so many people die, and I didn't have faith in our coordination and there was nothing left. When you don't trust the people making the decisions in Ebola then you shouldn't be there. (*Allison – public health*)

Another participant describes an example where poor communication, lack of leadership and a chaotic team atmosphere added to her distress, and put her in a risky situation:

At one point it really did because I remember, just an example, there was one time I opened the door of the ambulance and for me it was a really difficult moment, to open that door, and everybody came out, everybody was quite sick. There was a mother at the end of the ambulance, and she was obviously dead in the ambulance, and I saw there was something on her, so I went in, and it was a baby. I took the baby- it was alive. I confirmed the death of the mother, and I took the baby out. And you know I was a bit shaky. And I came out, and there was like 10 people across the gate, looking at me, and it was the Wat-san advisor, the head of Wat-san, the medical advisor, like everybody. It was so unnecessary but everybody wanted to lead. I don't need 10 people to look at me, to do that. It was so stressful. They all decided to fight together about what to do with the baby. They were shouting "No! Bring the baby there!", " No! The other side." I was so, already like, this is unnecessary. And then the baby was covered in shit and vomit, so I decided to give a bath to the baby and I didn't realize it, because I was shocked and upset by being shouted at by 7 people, but all my forearms were exposed, and I was giving a bath to a baby that was full of Ebola because she was on her mother. So its just an example, how it can create a lot of anxiety, a lot of anger, frustration and stress that is unnecessary, then your mind is not concentrating on what you should do. (*Emma – nurse*)

Overall, it can be seen that navigating the risky contours of the EMC had both physical and relational determinants. However this navigation of risk did not end at the gates of the EMC, but instead extended to other localities, including the home and the community.

Navigating risk at ‘home’ and in the community

The security and safety of the home, a place that acts as an affective anchor and promises a refuge from the dangers of the outside world (Fitchen, 1989), played an important role in this uncertain environment. The living quarters at the project site were a place that evoked many contrasting feelings. Some participants highlighted how their private room was the only place where they could truly relax, as they felt they had control over contamination within this space, while others never felt completely at ease. Most felt that there was a high standard of cleanliness and prevention measures that kept them feeling safe, and allowed them a mental space to rest. Home was also an important place to connect to teammates and build trust in a social atmosphere:

We were always together, listening to music, playing games, dancing. It was really nice. The team spirit was really good I think... being able to have a good team, and you can talk about it, and you can come home at night and have a bit of fun, that helps a lot...I mean, because you get to know them, and you talk about how to work and how to remember things, and that everybody speaks about the work, and you get to know each other. And for me it was important to know people to also trust people. (*Anna – nurse*)

Within common living areas however there was uncertainty around whether they could be put at risk by their colleagues or house staff. For those who did not feel safe in the home, or with the team, it intensified a state of mental stress and paranoia, and in some cases resulted in leaving the project early:

I would come back and take a shower and I never felt clean. I never felt safe. If I touched anything I would wash my hands. I was completely crazy about it.

I would go to the kitchen, I would wash my hands before entering the dining hall. I would get my plate, get my food, I would put my plate down, and then I would go back and wash my hands again before going back and picking up my utensils. I didn't want to touch anything I was eating. I washed my hands with chlorine probably too much. (*Emma – public health*)

Another critical incident, where an international staff member from another organization became ill with Ebola in their shared living quarters evoked a strong fear reaction in many team members, despite their routine daily contact with infected patients in the Ebola Management Centre. Encountering Ebola in an unexpected place – their home, a place that had been relied upon to be safe, reduced the sense of control and increased the sense of vulnerability, bringing the risk of contagion 'closer to home', literally and figuratively. As a result of this incident, a majority of the international team present at the time evacuated, ending their missions early:

Because my MSF colleagues, other expats, many of them got really, really scared. Really, really scared. Then many of them left... Like, we were 35 or almost 40 expats at the time, and after they left, we were 12 people. (*Mae – nurse*)

This incident severely hampered the project's capacities due to loss of staff. Another participant who experienced this incident decided to leave due to lack of trust in team leadership decisions to effectively manage issues of health and safety following the contamination event, and expresses her retreat to a safe place in response:

Nobody has entered my room all week, and that is the place I feel safest. In my mind, I thought if these people – who have just arrived – say no, it's not possible, I am going to run to my room and lock myself inside and I'm leaving tomorrow (*Allison – public health*)

Except for two participants, all worked exclusively in the Ebola Management Centre and as such had no professional duties in the surrounding communities. Many participants self-restricted their movements, avoiding entering the nearby town or city despite there not being any formal policy preventing them from doing so. Feelings of

uncertainty and a lack of control associated with being in the broader community created this self-imposed barrier to movement. Anna, a nurse, expressed this clearly:

I didn't want to go out. I was thinking – I don't have to see the town of Kailahun, because why would I want to go there? I mean, for what reason? For myself, it was too dangerous to go because I didn't know the people out there, and what I would touch and what I wouldn't touch. So for me that was too risky, so I didn't go in the community. (*Anna – nurse*)

DISCUSSION

This study set out to empirically explore international health care workers' perceptions of risk and strategies to navigate riskscape. Our findings indicate that international health care workers' perceptions of risk shape, and are shaped by, their ability to navigate these spatial localities and trust the people, equipment and procedures in place to safeguard them. We noted that the participants not only considered their own health and well-being, but continually struggled to balance their personal risks with providing patient care. At times, staff safety, patient wellbeing and public health could not always be met simultaneously, forcing a choice of priorities and shifting risk between the groups.

While use of the term 'riskscape' elsewhere describes how individuals' social and physical environments determine their risk for various health issues, this study highlights the important role *perception* of risk has in shaping the riskscape. It was seen that actors in multiple dimensions (individuals, institutions, global bodies) contribute to both the construction of these riskscapes as well as determining in what manner they are navigated. In this study, subjective risk perceptions of individuals and institutions were found to shape the riskscape through influencing the design and structure of constructed places such as the EMC and the PPE; framing the type and quality of patient care that is provided; and determining the ability of health staff to effectively function in conditions of extreme risk.

Trust, and the way it manifested in the different spatial localities, emerged as a key mediator of perceptions of risk. Siegrist, Gutscher, and Earle (2005) have shown that

both general trust (the belief that others can be relied upon) and general confidence (the conviction that things are under control) reduce perceived risks. We noted both of those in relation to interpersonal trust and institutional trust. Variations in interpersonal trust frequently acted as a risk amplifier or attenuator (cf. Kasperson et al., 1988) in this study and contributed to feeling safe or unsafe. Interpersonal trust manifested as concerns about being infected by other team members' mistakes; relying on others to keep them safe by use of the buddy system; pointing out problems with PPE; and trust (or lack of trust) in leaders' risk decisions impacting feelings of safety. While levels of interpersonal trust varied tremendously, within and between participants, trust in the organization they worked for surprisingly never wavered. The health care workers trusted the organization to keep them safe, and the equipment, policies and procedures in place to reduce cross infections were seen to reduce feelings of risk. This institutional trust, as well as interpersonal trust related to familiarity with one another, communication style, and team dynamics, provided the international health workers the confidence and support to continue their work. Similar observations have been made by Chan and Huak (2004), whose study on the psychological impact of SARS on health care workers, found support from colleagues as well as clear communication within the hospital reduced levels of emotional distress and trauma. Marjanovic, Greenglass and Coffey (2007) found that vigor, organisational support and trust in equipment and infection control predicted lower levels of avoidance behaviour, emotional exhaustion and anger in a survey of nurses who had worked with SARS in Toronto.

While the spread of a risk-averse attitude within the organization related to IV-fluids occurred as a local response to globally-determined conditions, its genesis is also linked to the increasing 'securitization' of foreign aid workers. The increasing focus on securitization of the aid worker in areas of conflict or instability is explored by Smirl (2008) in her analysis of the spatialization of humanitarian aid. Smirl notes the spatial and material practices of international agencies, including protective mechanisms such as high-walled compounds and ubiquitous white Land Cruisers create an 'auxiliary space' in post-disaster reconstruction efforts, and contain an implicit politicization (ibid.). Similarly, the increasing 'bunkerization' of foreign aid workers in insecure contexts is described by Duffield (2012) as both a way to reduce risk and as having a therapeutic purpose in an environment of perceived hostility. A

similar manipulation of spatial localities for security was seen in this study, although the threat is not war or robbery but instead, viral contagion. Within the Ebola epicenter, a place of safety was necessary to allow a mental reprieve from feelings of contagion, and this was created in part through reliance on safe spaces such as the home and being within the PPE.

By looking at the ways participants navigated their spatial localities at a micro-level – their home, the staff compound, and their place of work, this study has found place and ‘meaning of place’ to be closely connected with risk perception. For instance, the perceived riskiness of the act of inserting an IV shifted the ‘meaning’ of the EMC away from one of treatment towards one limited to quarantine and palliation, a decision both shaped by, and contributing to, conditions of global inequity. Similarly, the violation of the socially constructed place of safety represented by the ‘home’ created an unacceptably high perception of risk for some international health staff, resulting them to leave the mission en masse. This interaction between place and risk perception has been observed by Masuda and Garvin (2006), who in a study of industrial development in a rural Canadian region, found that local residents’ ‘meaning of place’ shaped their perception of the risks associated with industrial development in their region. Our study also suggests that place exists as a key meta-variable, being influenced by, and influencing, risk perception.

Some limitations deserve mentioning. Self-selection bias may have led to participants with particularly bad or good experiences to present themselves for participation. The timing of the interviews, in many cases within one month of completing the mission, while adding to accuracy of recall, may also have impacted the findings as participants may have been tired and may not have had time to fully reflect and process their experiences. Participants may have felt constrained for different reasons, including fatigue, emotionality, lack of trust in the researcher, or a social desirability bias including fear for their or their organization’s reputation. It should be noted that only one of eleven participants had English as a first language, which may have created barriers to their expression of feelings and ideas. The first author’s prior involvement with and respect for MSF may have influenced the interviews and analysis of the data.

CONCLUSION

Given the importance of front-line health care workers in providing care during infectious disease outbreaks, it is critical to understand factors that influence their perceptions of risk and capacity to navigate riskscape, as this may impact their willingness to respond, ability to safely function in a high-risk environment, as well as impact the quality of patient care received. In the context of Ebola, we observed the creation of riskscape in a manner analogous to a Russian doll – nested sets of spatial localities – from the PPE separating the patient from the health worker; to the double fencing separating high-risk area from the low-risk, the walls of the EMC separating it from the community, and finally affected communities and whole countries quarantined from their neighbours. These places of containment were constructed by physical materials, but also by regulations, attitudes and behaviors, and informed by the dynamics of risk perception at individual, institutional, and global levels. As the health care worker moved through these spaces, different feelings of threat or safety were created, some from the manipulation of physical barriers and others through aspects of relational dynamics, such as interpersonal and institutional trust and communication within their team. It appears to be the unique combination created between the physical and the relational that influenced perceptions of risk, and determined the social construction of spatial localities that felt either safe or unsafe.

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