



Intervention hesitancy among healthcare personnel: conceptualizing beyond vaccine hesitancy

Rachel Gur-Arie¹ · Nadav Davidovitch² · Anat Rosenthal²

Accepted: 1 February 2022
© Monash University 2022

Abstract

We propose an emerging conceptualization of “intervention hesitancy” to address a broad spectrum of hesitancy to disease prevention interventions among healthcare personnel (HCP) beyond vaccine hesitancy. To demonstrate this concept and its analytical benefits, we used a qualitative case-study methodology, identifying a “spectrum” of disease prevention interventions based on (1) the intervention’s effectiveness, (2) how the intervention is regulated among HCP in the Israeli healthcare system, and (3) uptake among HCP in the Israeli healthcare system. Our cases ultimately contribute to a more nuanced conceptualization of hesitancy that HCP express towards disease prevention interventions. Our case interventions included the seasonal influenza vaccine, the Mantoux test, and the hepatitis B (HBV) vaccine. Influenza and HBV are vaccine-preventable diseases, though their respective vaccines vary significantly in effectiveness and uptake among HCP. The Mantoux test is a tuberculin skin test which provides a prevention benchmark for tuberculosis (TB), a non-vaccine preventable disease. We conducted semi-structured interviews with relevant stakeholders and analyzed them within Israeli and international policy context between 2016 and 2019, a period just prior to the COVID-19 pandemic. We propose the conceptualization of “intervention hesitancy”—beyond “vaccine hesitancy”—as “hesitancy towards a wide range of public health interventions, including but not limited to vaccines”. Results suggested that intervention hesitancy among HCP is rooted in weak trust in their employer, poor employment conditions, as well as mixed institutional guidelines and culture. Conceptualizing intervention hesitancy expands the ability of healthcare systems to understand the root of hesitancy and foster a supportive institutional culture and trust, cognizant of diverse disease prevention interventions beyond vaccination.

Keywords Intervention hesitancy · Healthcare personnel · Infection control · Vaccines · Nonpharmaceutical interventions · Occupational health · Policy · Trust

Extended author information available on the last page of the article

1 Introduction

Public health is built upon multilayered interventions (Blankenship 2000). Such interventions include nonpharmaceutical interventions such as masking, isolation, and quarantine, as well as pharmaceutical interventions like vaccines. There is an established literature on vaccine hesitancy, defined by the SAGE working group as “to delay in acceptance or refusal of vaccination despite availability of vaccination services” (MacDonald and Hesitancy 2015). Understanding and combatting vaccine hesitancy is undoubtedly important, but focusing solely on vaccine hesitancy can often be too narrow of a focus when trying to understand contributing to hesitancy, given that public health interventions include, but are not limited to, vaccines. The COVID-19 pandemic has made this obvious, as non-vaccination interventions such as hygiene, masking, and social distancing have not been embraced or implemented by all parts of the global community equally and equitably. For this reason, we propose and conceptualize the term “intervention hesitancy” as “hesitancy towards a wide range of public health interventions, including but not limited to vaccines”. We suggest that conceptualizing and investigating intervention hesitancy can allow for the better understanding of vaccine hesitancy.

We conceptualize intervention hesitancy in this paper based on a variety of influences and emerging themes resulting from a qualitative case-study approach. We investigated three disease prevention interventions among HCP—the influenza vaccine (influenza), the Mantoux test (TB), and the HBV vaccine (HBV)—to better understand intervention hesitancy among HCP in the Israeli healthcare system. We chose these interventions to represent a “spectrum” of diseases, interventions, and uptake among HCP. Influenza and HBV are viruses that are vaccine-preventable (albeit, with different vaccine effectiveness: the HBV vaccine being close to 100% effective while the influenza vaccine has relatively low and inconsistent effectiveness) (Batra et al. 2015) (Nichol 2006). The Mantoux test, a tuberculin skin test, provides a benchmark for TB prevention (Nayak and Acharjya 2012). Each case intervention prevents a different occupational risk to HCP. The variation in diseases and case interventions allows for a more nuanced conceptualization of intervention hesitancy among HCP. Thus, while the three diseases, and their respective interventions, are different, together they contribute to a more holistic understanding of intervention hesitancy among HCP in Israel.

2 Background

2.1 Healthcare Personnel

Healthcare personnel (HCP) have a unique professional position, being both an extension of healthcare systems and part of the public (Gesser-Edelsburg et al. 2014). HCP are “persons who have special education on health care and who are directly related to the provision of healthcare services” (2019), and encompass, for example, the following occupational groups: physicians, nurses, physician and nursing assistants, technicians, emergency medical service personnel, dental personnel, pharmacists,

laboratory personnel, trainees, and non-clinical essential workers. HCP professional obligations vary, but generally include caring for, and sometimes being responsible for, the lives of others. Oftentimes, HCP professional obligations are assumed and unspoken, raising important ethical concerns regarding HCP decision making within the context of infection control (Gesser-Edelsburg et al. 2015).

HCP are well-trusted sources of evidence-based information regarding disease prevention interventions, like vaccines and various microbiological tests. For this reason, hesitant HCP pose a risk to lowering intervention uptake among the general population and potentially contributing to otherwise-preventable disease outbreaks (Karafillakis et al. 2016). Recently, multiple studies have shown that HCP are losing confidence in vaccines, contributing to the phenomenon of vaccine hesitancy (Karafillakis et al. 2016) (MacDonald and Dube 2015) (Sundaram et al. 2018) (Dube 2017). Due to the conceptual and empirical gap of understanding hesitancy among HCP towards interventions that are not vaccines, we propose an emerging definition and conceptualization of “intervention hesitancy”.

2.2 Trust

Trust is a key determinant of intervention hesitancy (Verger et al. 2015). Broadly speaking, trust is a relational notion or psychological state that influences individuals’ willingness to act on the basis on words, motives, intentions, actions, or decisions of others under conditions of uncertainty, risk, or vulnerability (Okello and Gilson 2015). Given the heterogeneous nature of vaccine and intervention hesitancy (Larson et al. 2014), the issue of trust may disproportionately affect certain vaccines and disease prevention interventions differently, depending on the given intervention, in addition to social, cultural, and political influences.

Trust relations exist at three levels: interpersonal, organization, and institutional (Cohen et al. 2009) (Calnan 2007). Research on trust within healthcare systems has traditionally focused on the interpersonal patient-provider relationship (Cohen et al. 2009), often implying the doctor-patient relationship as the central significant determinant of public trust in healthcare (Calnan and Sanford 2004). Studying trust within healthcare systems on institutional levels is less common (Cohen et al. 2009). For this reason, this study conceptualizes intervention hesitancy among HCP within the institutional culture of the Israeli healthcare system.

2.3 The Israeli Healthcare System

Israel has a universal healthcare system which considers basic healthcare as a fundamental right (2015). In 1994, Israel enacted the National Health Insurance Law (1994) that provides universal health coverage for every citizen and permanent resident, who choose to receive health services from one among four competing, non-profit health plans (Rosen 2015) (Balicer et al. 2011). Though efforts over the last decade have led to a relatively comprehensive primary care system, Israel’s hospital system is overcrowded, characterized by a low bed-to-population ratio (Chernichovsky and Kfir 2019).

Table 1 Interviewee Demographics, HCP and Stakeholders

Interviewee	Title	Gender	Training (when available)
1	District Epidemiological Nurse, Ministry of Health	Female	Nurse
2	Former Director of Israeli Center for Disease Control, Ministry of Health Professor	Female	MD (Family and Community Medicine), PhD
3	District Physician Chairman, Advisory Committee on Infectious Diseases and Immunizations, Ministry of Health Professor	Male	MD (Family and Community Medicine), MPH
4	Department Head, Public Health, Sick Fund Headquarters	Female	Nurse
5	District Public Health Nurse, Ministry of Health	Female	Nurse, PhD
6	Director, National Center for Infection Control, Ministry of Health Professor	Male	MD (Internal Medicine and Infectious Disease)
7	Former Head, Public Health and Occupational Health, Ministry of Health Professor	Female	MD, MPH (Family and Community Medicine)
8	District Physician, Ministry of Health	Female	MD, MPH, MBA
9	District Physician, Ministry of Health Senior Lecturer	Male	MD, MPH
10	Head, Infectious Diseases, Sick Fund Research Institute Professor	Male	MD (Internal Medicine), MPH
11	Head District Epidemiological Nurse, Ministry of Health	Female	Nurse
12	District Epidemiological Nurse, Ministry of Health	Female	Nurse
13	Head, Public Health Physician Association Professor	Male	MD (Family and Community Medicine), MPH
14	Head, Department of Pediatrics and Pediatric Infectious Diseases, Major Hospital	Male	MD (Pediatrics and Infectious Disease)
15	Head, Tuberculosis and AIDS, Ministry of Health Professor	Male	MD
16	Head Nurse, Occupational Health, Sick Fund Clinic	Female	Nurse
17	Global Epidemiologist Professor Emeritus	Male	MD (Infectious Disease)
18	Founding Director, Health and Risk Communication Center Professor	Female	PhD
19	Head, Infection Surveillance and Medical Data Monitoring, National Center for Infection Control, Ministry of Health	Male	MD (Internal Medicine), MPH
20	Director of Occupational Health, Sick Fund Headquarters	Male	MD (Environmental and Occupational Health)

The global shortage in healthcare workforce affects developing and developed countries alike (Liu et al. 2017). Israel's HCP workforce has been steadily declining in recent years and is already posing one of the most significant challenges to the healthcare system (Toren et al. 2012; Gamzu et al. 2016). The nurse-to-population ratio is low (5.0 per 1,00 population compared to the OECD average of 8.0 nurses per 1,000 population) and decreasing (OECD) (Rosen 2015). In addition, Israel has the third lowest medical graduate-to-population in the OECD (7.4 per 100,000 population compared to the average of 13.1 per 100,000 population) as well as a low nursing graduate-to-population ratio (24 per 100,000 population compared to the average of 32 per 100,000 population) (OECD).

This study conceptualizes intervention hesitancy by unpacking different contributors to trust between decision makers and HCP within the Israeli healthcare system, and their impact on intervention hesitancy.

Table 2 Overview of Diseases and Associated Case Disease Prevention Interventions

	Influenza	Tuberculosis (TB)	Hepatitis B (HBV)
Epidemiology	Acute respiratory infection caused by influenza virus (strains A, B, C) ((WHO) 2018) Airborne ((WHO) 2018) Seasonal ((WHO) 2018)	Caused by bacteria Mycobacterium tuberculosis (WHO 2019) Affects lungs primarily (WHO 2019) Top 10 global death causes (WHO 2019) Treatable with antimicrobials (WHO 2019) Airborne (WHO 2019)	Virus attacks the liver and causes hepatic dysfunction (Baghianimoghadam et al. 2011) Acute and chronic disease 33% of world population infected (350 mil chronic, 65% asymptomatic) (Baghianimoghadam et al. 2011) Percutaneous/mucosal exposure to blood/bodily fluids (Ziglam et al. 2013)
Disease Prevalence among HCP	Increased occupational risk (Kuster et al. 2011) 1 of 5 of HCP: symptomatic for influenza annually (Kuster et al. 2011)	Increased occupational risk (Napoli et al. 2017) Risk for MDR-TB (multi drug resistant TB) 6x higher among HCP than among patients (Napoli et al. 2017) Dutch study: 42% of HCP with TB infected at work (de Vries et al. 2006)	Increased occupational risk (Ziglam et al. 2013) Contracted through needle sticks, sharp device exposure, infected non-skin contact, splash injuries (Ziglam et al. 2013) Pre-vaccination era: 5-10% of HCP became chronic carriers (Roggendorf and Viazov 2003)
Standard Prevention Intervention	Seasonal Influenza Vaccine 1 annual dose (Pearson 2006)	Mantoux/Tuberculin Test upon hire/annually (Chemtob 2010)	HBV Vaccine 3 doses over 6 month period (Burnett et al. 2011)
Intervention Effectiveness Among HCP	Inconclusive CDC: 2017–2018 seasonal vaccine 25% effective (against H3N2) but reduced medically-attended influenza by 59% among children (Flannery et al. 2018)	Hypersensitivity test which is a global standard (Sosa et al. 2019)	HCP show substantial immunity after even just 1 dose (Zuckerman et al. 1997) 88% developed sero-protection (Averhoff et al. 1998) Over 18 year period: 98.8% persistence of anti-HBs (Averhoff et al. 1998)

3 Methods

This study took a comparative, instrumental case study approach, which investigated intervention hesitancy among HCP through the following case disease prevention interventions: the seasonal influenza vaccine, the Mantoux test, and the HBV vaccine, shown in Table 1. Methods comprised of semi-structured, open ended interviews with decision makers in the Israeli healthcare system, as well as critical document review of relevant Israeli and international HCP occupational standards.

3.1 Semi-structured, open-ended interviews

Twenty stakeholders in the Israeli healthcare system participated in semi-structured, open-ended interviews. Recruitment for stakeholders was done using a purposeful, snowball sample. Appropriate informed consent for each interviewee population was received before beginning interviews, which were conducted in either Hebrew or English. All interviews were conducted one-on-one, at the preferred time and place of the participant, whose choice participate or decline participation in the interview did not affect their professional status. Additionally, interviewees, whose demographics are shown in Table 1, were encouraged to speak freely and ensured that their confidentiality was protected. Each interview was tailored specifically to the interviewee, according to pre-established interview guide (Table 2).

3.2 Critical Document Analysis

Critical, integrative document analysis in this study provided a comprehensive understanding of issues relevant to intervention hesitancy among HCP (Whittemore 2005). Analyzed documents were all publicly available and primarily included government policy and reports.

3.3 Coding and Analysis

The recorded interviews were professionally transcribed into Hebrew or English text, depending on the language of interview. After transcription, Hebrew interviews were translated into English. All interviews and documents in English were coded using NVivo Software based on trends, patterns, and themes related to disease prevention interventions, its respective policy and decision-making process, attitudes towards interventions, and institutional influences. Overarching themes were identified in the data and informed the results of the study.

4 Ethics

Institutional Review Board (IRB) approval from the Faculty of Health Sciences at Ben-Gurion University of the Negev (BGU) was received before commencing interviews with stakeholders. Interviewee confidentiality was emphasized during interview recruitment and execution, as well as during data analysis. Interviewees were

invited to follow-up with any questions at any time. Interview transcripts and translations were sent to interviewees for approval to maintain data and analysis integrity.

5 Results

In this section, we unpack our conceptualization of intervention hesitancy through themes which emerged during interviews with stakeholders in the Israeli healthcare system. These themes include unclear intervention benefits, diminished trust of HCPs in their employer, HCP employment conditions, confusing intervention guidelines, and institutional culture.

5.1 Unclear Intervention Benefits

Intervention hesitancy among HCP was influenced by many factors, including their views regarding individual benefit of interventions and perceived risk. A physician who led the one of the largest influenza vaccination campaigns among HCP in Israel, working within the National Division of Infection Control, Israeli Ministry of Health, explained:

I speak first of all about the personal benefit. Of course, if the (influenza) vaccine is 100% effective like HBV, if it's 99% effective, or 95% effective after the first dose, so I say, it protects HCP and is very effective. Maybe if the vaccine wasn't effective, they would say, okay, it's trying to protect me but it's not effective. Personal benefit and effectiveness weighs in that.

This physician who focused on increasing HCP influenza vaccination uptake within their hospital stressed not only the importance of high vaccine effectiveness, but "100%" effectiveness, when understanding what incentivizes HCP to get vaccinated against influenza. Previous studies show that HCP feel threatened by certain diseases more than others therefore place different values upon different diseases (Gesser-Edelsburg et al. 2015) (Nutman and Yoeli 2016). This is consistent with the findings our as HCP stated that they feel less threatened by influenza. In combination with their uncertainty surrounding the influenza vaccine's effectiveness, HCP get vaccinated against influenza "less" than other diseases.

Additionally, decision makers and HCP regularly brought up the many and diverse external influences, rooted in their personal lives, that cross their mind during the period between declaring (either outwardly or internally) the intention to get vaccinated and actually getting vaccinated. A head district nurse explained:

I think that there is the person who says that I need to get vaccinated, okay... tomorrow I'll do it...then tomorrow passes...and then the next day passes... and then life happens and the intention to get vaccinated gets lost. This also happens to HCP.

Oftentimes, “life happens”, preventing HCP from keeping on top of their intervention uptake status. From an individual perspective, intervention hesitancy is often a result of individual life circumstances and not necessarily ideological.

5.2 Diminished Trust of HCPs in their Employer

HCP behavior and attitudes towards intervention hesitancy were rooted in their trust and belief in their employing institutions (which, in an Israeli context, are an extension of the Israeli healthcare system). An Israeli expert in health communication and infectious diseases discussed the relationship between the Israeli healthcare system and HCP:

HCP working in the healthcare system are educated and informed people, but the healthcare system is very rigid and unsupportive towards HCP, lacking understanding, and questions remain among HCP. Questions regarding communicable disease prevention interventions still remain because HCP themselves view themselves as individuals (with personal beliefs and values). HCP are questioning (the authority of the healthcare system).

According to the interviewee, HCP may have questions regarding disease prevention intervention decision making, but are left to continue “doubting” due to a “very rigid and unsupportive” healthcare system that prevents open communication on the subject. HCP are pressured and expected to act in accordance with existing regulation which they are not involved in determining. Trust is damaged when HCP do not understand how decisions are made, especially decisions impacting their own health.

Although a minority, there are HCP that speak up. A district physician described a vaccine-refusing nurse within their district health bureau who refused required occupational vaccines and opted to stand her case using the legal system:

It is possible to solve things while avoiding the legal system, because if a vaccine-refuser nurse is not devoid of all intelligence, they can go and sue us (the district health bureau) since we are not letting them work for us. The moment a HCP sue...it becomes some sort of embarrassing situation that no one wants to place themselves in, even if they really are a vaccine refuser.

The district physician’s story shows that disease prevention intervention policy among HCP has been established in a way that deters regular, transparent conversation on the topic. Suppressing transparent conversation on an institutional level poses a significant roadblock to effective policy making (Witting 2017) and rebuilding trust (Okello and Gilson 2015)—components which are crucial to addressing intervention hesitancy among HCP and increasing intervention uptake. In this study, HCP’s diminished trust in their employer (and ultimately the Israeli healthcare system) partially resulted from a lacking and often purposefully missing dialogue between decision makers and HCP.

5.3 HCP Employment Conditions

Staffing patterns, the physical environment, and working conditions such as heightened exposure to bloodborne infections and percutaneous exposures are risk factors for occupational injuries and infections among HCP (Stone et al. 2004) (Baldo et al. 2002) (DiBenedetto 1995). Given the dynamic nature of modern healthcare settings, HCP are also regularly confronted with significant changes and challenges in psychosocial working conditions characterized by skill shortage or imbalance, increasing workload, and task complexity (Wagner et al. 2019). For a large proportion of HCP, subpar occupational work conditions and expectations increase exposure to stress, fatigue, burnout, anxiety, depression, and substance abuse (The 2009). Within an Israeli context, these effects are common and often exacerbated due to the under resourced healthcare system and shortage of healthcare workforce (Rosen 2015). Ultimately, this impacts HCPs' trust in their employers, and, as a result, their trust in communicable disease prevention interventions. The head nurse of occupational health at an HMO clinic explained how specifically working as a HCP in Israel, in comparison to other countries, is challenging due to low compensation and high cost of living, and often encourages HCP to leave Israel and work abroad:

Many Israeli nurses travel to Africa to make money. They travel to Africa for a few years until they can afford to save enough money to build a house in Israel... Many nurses moved to Canada; it is easier to get licensed in Canada as a nurse in comparison to the US. There is a shortage of nurses everywhere. I know many smart people that run away from Israel, because it's hard here, there nothing to do about that. It's hard with low salaries and lifestyles....

The regularity of travelling abroad to “make money” among HCP in Israel speaks to the challenging employment conditions of the Israeli healthcare system—and is a well-known phenomenon in high-income countries, termed “brain drain” (Toren et al. 2012) (Tzafrir et al. 2007). Compensation and cost of living in Israel pose difficulty “to progress” in life financially and often socially. Stresses caused by respective employment-induced conditions influence HCPs' intervention uptake. These employment-condition-induced stressors expand beyond economic compensation and bureaucratic considerations to day-to-day physical and mental challenges. Based on their personal experience, a public health physician and epidemiologist elaborated on how the health of HCP contributes to their participation in communicable disease prevention interventions and is strongly determined by their occupational environment:

If a healthcare professional does not eat lunch every day and does not sleep enough, it's no coincidence that they would also not necessarily get vaccinated. Obviously, if they are not taking good care of themselves in general, this is also part of their occupational health. The solution is to create environments that support a better, healthier place for the healthcare professionals and for the patients. There are no shortcuts.

This public health physician and epidemiologist was not surprised that HCP intervention hesitancy is heightened when basic occupational health determinants, such as proper nutrition and sleep, are regularly not met. After criticizing such institutional factors, the public health physician and epidemiologist stated that “there are no short-cuts” in changing such status quo.

Institutional factors such as under-staffing and systematic pressure add additional, preventable stress. Israel’s HCP, like most HCP globally, struggle occupationally due to HCP shortages, geographic maldistribution, lacking resources, and specialty misalignment in the context of an aging population (Maier and Aiken 2016) (Rosen 2015). Such conditions propagate the normalization of poor institutional support for HCP within an Israeli context (Helfand 2013) (Gesser-Edelsburg et al. 2014) (Whitby 2006). Data collected through this research suggested that within the institutional culture of Israeli healthcare system, there is an expectation that HCP will understand the importance of preventative health behaviors such as vaccines and other disease prevention interventions. An epidemiologist and public health physician elaborated:

Physicians and nurses are not necessarily taught preventive medicine. The fact alone that they are physicians does not necessarily mean that they will do whatever they can to protect themselves. This is relevant for other professions as well. Why do we think healthcare professionals would behave differently? Blue collar workers do not necessarily protect themselves from noise or from chemicals, that’s well known. It’s not about trusting the healthcare workers to protect themselves—it’s about setting an environment which protects them.

In this study, HCP employment conditions impacted HCP’s participation in interventions. The shortage of healthcare workforce in Israel lays the foundation for challenging HCP employment conditions, including poor compensation and physically and mentally trying shiftwork, causing many Israeli-trained HCP to move and work abroad, further exacerbating the shortage in healthcare workforce. Against this background, HCP reported insufficient institutional support for promoting their wellbeing, including disease prevention intervention uptake.

5.4 Confusing Intervention Guidelines

Confusing guidelines surrounding disease prevention interventions in combination with poor HCP employment conditions led to HCP’s dwindling trust in the Israeli healthcare system and heightened intervention hesitancy. Interviewees suggested that spotty intervention uptake among HCP derived from the limited resources, manpower, and interest invested by the Israeli Ministry of Health in communication about HCP occupational interventions—particularly when it comes to non-vaccination interventions such as the Mantoux test. A district physician involved in the national committee on HCP vaccination and communicable disease prevention interventions explained:

There is no concrete legislation, and I, all these years, said that HCP vaccination needs to be legislated, otherwise it is impossible to enforce it. I was told,

“It is not in the priorities of the legal department of the Ministry of Health, it is overwhelmed by many other things, when there is regulation or if we ever become free, we will translate the law, the procedure, to regulation and to law. And that’s how it’s been, to this day, I, every time a new procedure comes over, I—“wait, maybe this is the time to turn it into law?” and the answer (from the legal department at the Ministry of Health) is: “it’s not in our priorities, because the non-regulated procedure works”.

The district physician expressed frustration in the lack of support and importance they felt the Israeli Ministry of Health placed upon disease prevention interventions among HCP. Due inadequate institutional interest on the topic, the responsibility of following through with disease prevention intervention uptake fell upon HCP who already have a full workload, like nurses within the district health bureau or occupational health nurses within clinics. Despite these HCP’s good intentions, they were frequently of no with little occupational training or bandwidth to prioritize disease prevention uptake among HCP. The public health department head of an Israeli health fund expressed their concern with the mixed messages regarding disease prevention interventions among HCP in light of the lack of consistent leadership on the issue:

I don’t go there. But there needs to be some sort of uniform behavior with some sort of clear message and the trust was built in the Ministry of Health tier after tier. There is distrust regarding vaccines among HCP because the Ministry of Health goes back and forth (“zigzags”), they do not say something uniform and continuous and consistent.

This public health department head of an Israeli health fund’s expression that they “don’t go there” (meaning, they try to avoid discussing inconsistent messages regarding disease prevention interventions among HCP) shows how provoking of a subject it was to discuss.

This study identified unclear, inconsistent, and often unknown regulation regarding disease prevention interventions among HCP across different levels of the Israeli healthcare system. Mixed messaging regarding intervention expectations of HCP were communicated to HCP, which impacted HCP intervention hesitancy and uptake.

5.5 Institutional Culture

This study identified elements of a fragmented institutional culture of the Israeli healthcare system which contributed to intervention hesitancy among HCP. Significant miscommunication and false assumptions between HCP and decision makers also contributed to broken trust and hesitancy. An Israeli expert in health communication and infectious diseases described how they noticed the conflict during their fieldwork in hospitals during a flu outbreak:

A good few years ago, a hospital head came and got angry at doctors who questioned vaccines...it really prevented the entire discourse between decision makers and HCP. What happens is that there are “underground” streams of

discussion among HCP. HCP won't tell the department head, but that doesn't mean that HCP won't ask questions. It does not mean that HCP won't express concerns to others, don't talk...it is a system in which it's impossible to speak up, to say: "what are you even talking about?" to a department head.

The expert's fieldwork among HCP revealed how the pressure from decision makers and the healthcare system deterred HCP from questioning, criticizing, or even clarifying decisions and policies made regarding communicable disease prevention interventions. Shunning discussion did not translate to quiet acceptance by HCP, but rather forged an "underground" network of HCP who received answers and held discussions with alternative sources. An Israeli expert in health communication and infectious diseases elaborated:

Maybe if a HCP raises concerns, then maybe they are not a good HCP. Maybe they aren't a good doctor, or sorry, "what kind of doctor are you; you don't even understand infections?", or "you're not a virologist, what right do you have to speak up?" ... It is very possible that the same doctor does understand less, and that –raises questions regarding their professional reputation.

The threat to the professional reputation of HCP can cause fear of speaking out outside of their personal circles. Many HCP are not questioning based on an anti-vaccination agenda, but rather due a genuine desire and need to better understand and clarify disease prevention interventions they are being asked to participate in. The Israeli expert in health communication and infectious diseases continued:

Doctors who question turn into the enemies of the institution. The system tells the doctors don't speak, 'be silent'. But doctors have their own opinion, so, that's the issue for the healthcare system.

The Israeli expert in health communication and infectious diseases described the hypothetical situation in which an HCP dares to start a conversation regarding established policy. As a result, low HCP intervention uptake may occur, resulting deriving HCP intervention hesitancy. The repetition of this phenomenon is what generates, according to this expert, distrust between HCP and decision makers.

Institutional culture contributes to the different conceptualizations of hesitancy among decision makers and HCP, impacting intervention uptake among HCP. Diverse influences impact intervention hesitancy. By highlighting how (dis)trust in interventions themselves as well as in the healthcare system in this study among HCP, poor institutional culture became evident as a significant contributor to intervention hesitancy among HCP in Israel.

6 Discussion

Understanding HCP hesitancy towards the various prevention interventions studied in this work resulted in the first conceptualization of 'intervention hesitancy'. Inter-

vention hesitancy among HCP was impacted by diminished trust of HCPs in their employer, HCP employment conditions, confusing intervention guidelines, institutional culture, and unclear intervention benefits.

Personal benefit and responsibilities contributed to HCP attitudes and action towards interventions. Previous research has suggested that personal benefit is a major contributor to HCP intervention participation (Nutman and Yoeli 2016) (Norton et al. 2008). HCP hesitancy towards interventions due to concerns surrounding personal benefit in this study tended to focus on the “non-100%” nature of intervention effectiveness. Additionally, this study suggested that HCP intervention uptake is rooted in a complex combination of personal and professional obligations. After all, HCP are not only professionals, but complex individuals with personal lives, values, and opinions that impact their attitudes, hesitancy, and behaviors towards disease prevention interventions.

This study’s results explore how (dis)trust manifests intervention hesitancy among HCP through the intervention itself as well as institutionally. Institutional public health interventions aim to target social, economic, and political challenges that shape health outcomes (Blankenship 2000). Similarly, institutional interventions may be targeted at one level (individually, organizationally, etc.), but have an unintended impact on one or both of the many (Blankenship 2000). In this study, fragmented institutional culture fostered HCP’s distrust in the healthcare system, contributing to heightened intervention hesitancy.

Trust is also crucial when understanding HCP’s intervention hesitancy in the context of ethnicity. While not a focus of study, previous research has identified the impact of ethnicity on the lived professional experiences of HCP in Israel, particularly among Israeli Arab HCP (Keshet et al. 2015, Shalev 2016, Keshet and Popper-Giveon 2018). In Israel, low vaccination uptake is frequently found among minority populations (Rosen et al. 2021). Existing research among Arab HCP vaccine uptake in Israel found low uptake of the influenza vaccine (Dubnov et al. 2010), in contrast to research among non-HCP Arab populations in Israel who generally get vaccinated in high numbers (Tur-Sinai et al. 2019). As a result, future investigation into intervention hesitancy among HCP, specifically in an Israel context, should be sensitive of the potential influence of ethnicity.

The Israeli healthcare system functions with a shortage in healthcare workforce and limited resources (Rosen 2015) (Gamzu et al. 2016) (Chernichovsky and Kfir 2019). This study suggests that the worker shortage is leveraged by intervention-hesitant HCP to not partake in disease prevention interventions, including those that are technically required. Managers of clinics and healthcare settings “in the field”, given the shortage of and need for workforce, often find themselves with no choice but to employ HCP without proof of completion of employment-conditioned interventions. Such respective situation creates a “don’t ask, don’t tell” atmosphere between decision makers and HCP. In summary, intervention hesitancy does not exist in a vacuum. Institutional (dis)trust shapes intervention hesitancy among HCP.

7 Conclusions

Hesitancy among HCP can expand beyond vaccines to other disease prevention and structural interventions. As a result, we propose conceptualizing hesitancy towards disease prevention interventions beyond “vaccine hesitancy” to that of “intervention hesitancy”. This study found that intervention hesitancy among HCP was impacted by (dis)trust. Data collection for this study was completed in a period just prior to the COVID-19 pandemic. Though COVID-19 is not highlighted in this study, the ongoing COVID-19 pandemic influenced its analysis and conclusions. COVID-19 vaccines were only available one year into the COVID-19 pandemic (Triggle 2020). As a result, nonpharmaceutical interventions such as masking, social distancing, and quarantine were the only means of combatting the COVID-19 pandemic pre-vaccines (Cheng et al. 2020). Respective interventions quickly became politicized, remaining so even after the development of COVID-19 vaccines (Ansari 2021). For this reason, the ongoing COVID-19 pandemic further supports the need for the conceptualization and empirical investigation of intervention hesitancy. Results of this work can also provide a baseline for understanding intervention hesitancy within an Israeli context in a period just prior to the COVID-19 pandemic.

Perhaps the most important and challenging choice that decision makers face in combatting intervention hesitancy among HCP is accepting the reality that there will be no “quick victories”. Building institutional trust between HCP and decision makers is the foundation for an institutional culture that promotes transparent dialogue and recognizes the complex personal and professional obligations of HCP.

Funding statement This work was supported by the Faculty of Health Sciences, Ben-Gurion University of the Negev; the Oxford-Johns Hopkins Global Infectious Disease Ethics Collaborative (GLIDE); and the Zuckerman-CHE STEM Leadership Program.

Conflict of interest The authors have no conflicts of interest to declare.

References

- National Health Insurance Law. 1994. I. M. o. Health.
- Israel Policy Brief. 2015. Health at a Glance, OECD.
- “Health Care Personnel (HCP) Law and Legal Definition.” 2019. from <https://definitions.uslegal.com/h/health-care-personnel-hcp/>.
- (WHO), W. H. O. 2018. “Influenza (Seasonal).” from [https://www.who.int/news-room/fact-sheets/detail/influenza-\(seasonal\)](https://www.who.int/news-room/fact-sheets/detail/influenza-(seasonal)).
- Ansari, T. 2021. *Iowa Bans Face-Mask Mandates in Schools, Joining Texas*. The Wall Street Journal.
- Averhoff, F. M., F.; Coleman, P.; Schatz, G.; Hurwitz, and E.; Margolis, H. 1998. “Immunogenicity of Hepatitis B Vaccines Implications for Persons at Occupational Risk of Hepatitis B Virus Infection.” *The American Journal of Preventative Medicine* 15 (1): 1–8.
- Baghianimoghadam, M. H., M. N. Shadkam, and H. Hadinedoushan. 2011. “Immunity to hepatitis B vaccine among health care workers.” *Vaccine* 29 (15): 2727–2729.
- Baldo, V. F., A.; Dal Vecchio, L.; Cristofolletti, M.; Carletti, M.; Majori, S. Di Tommaso, and A.; Trivello, R. 2002. “Occupational Risk of Blood-Borne Viruses in Healthcare Workers: A 5-Year Surveillance Program.” *Infection Control and Hospital Epidemiology* 23 (6): 325–327.

- Balicer, R. D., E. Shadmi, N. Lieberman, S. Greenberg-Dotan, M. Goldfracht, L. Jana, A. D. Cohen, S. Regev-Rosenberg, and O. Jacobson. 2011. Reducing health disparities: strategy planning and implementation in Israel's largest health care organization. *Health Serv Res* 46 (4): 1281–1299.
- Batra, V. G., A.; Dadhichb, S.; Kotharia, and D.; Bhargavab, N. 2015. Hepatitis B immunization in healthcare workers. *Annals of Gastroenterology* 28: 276–280.
- Blankenship, K. M. B., and S. J.; Merson, M.H. 2000. "Structural Interventions in Public Health." *AIDS* 14: S11–S21.
- Burnett, R. J., G. Francois, M. J. Mphahlele, J. G. Mureithi, P. N. Africa, M. M. Satekge, D. M. Mokonoto, A. Meheus, and M. van Sprundel. 2011. "Hepatitis B vaccination coverage in healthcare workers in Gauteng Province. *South Africa*." *Vaccine* 29 (25): 4293–4297.
- Calnan, M. R., R. 2007. "Trust and Healthcare." *Sociology Compass* 1 (1): 283–308.
- Calnan, M. W., and E. Sanford. 2004. "Public trust in health care: the system or the doctor?." *Qual Saf Health Care* 13 (2): 92–97.
- Chemtob, D. R., E. 2010. "Healthy Israel 2020: Objectives, targets, and evidencebased strategies to prevent tuberculosis and HIV infection in Israel." *International Public Health Journal* 2 (3): 289–297.
- Cheng, K. K., T. H. Lam, and C. C. Leung. 2020. "Wearing face masks in the community during the COVID-19 pandemic: altruism and solidarity." *The Lancet*.
- Chernichovsky, D., and R. Kfir. 2019. *The State of the Acute Care Hospitalization System in Israel: The Current Situation. State of the Nation Report*. Jerusalem, Taub Center for Social Policy Studies in Israel.
- Cohen, N., E. Vigoda-Gadot, and S. Mizrahi. 2009. "Trust, Participation, and Performance in Public Administration." *Public Performance & Management Review* 33 (1): 7–33.
- de Vries, G., M. M. Sebek, and C. S. Lambregts-van Weezenbeek. 2006. "Healthcare workers with tuberculosis infected during work." *Eur Respir J* 28 (6): 1216–1221.
- DiBenedetto, D. V. 1995. Occupational Hazards of the Health Care Industry: Protecting Healthcare Workers. *Workplace Health & Safety* 43 (3): 131–137.
- Dube, E. 2017. "Addressing vaccine hesitancy: the crucial role of healthcare providers." *Clin Microbiol Infect* 23 (5): 279–280.
- Dubnov, J. K., W.; Bisharat, and B.; Rishpon, S. 2010. "Influenza Vaccination Coverage Determinants among Employees of the Nazareth Hospital in Israel." *Israel Medical Association Journal* 12: 338–341.
- Flannery, B. C., J. R.; Belongia, and E. A.... Fry, A. M. 2018. Interim Estimates of 2017–18 Seasonal Influenza Vaccine Effectiveness—United States, February 2018. *Morbidity and Mortality Weekly Report* 67 (6): 180–185.
- Gamzu, R., N. Kaidar, A. Afek, and T. Horev. 2016. "Physician density planning in a public healthcare system: Complexities, threats and opportunities-The case of the Israeli healthcare system." *Health Policy* 120 (8): 920–927.
- Gesser-Edelsburg, A., N. Walter, and M. S. Green. 2014. "Health care workers—part of the system or part of the public? Ambivalent risk perception in health care workers." *Am J Infect Control* 42 (8): 829–833.
- Gesser-Edelsburg, A., N. Walter, Y. Shir-Raz, and M. S. Green. 2015. "Voluntary or Mandatory? The Valence Framing Effect of Attitudes Regarding HPV Vaccination." *J Health Commun* 20 (11): 1287–1293.
- Helfand, B., and K. J. K. I. M. 2013. "Healthcare and lifestyle practices of healthcare workers: do healthcare workers practice what they preach?." *JAMA internal medicine* 173 (3): 242–244.
- Karafilakis, E., I. Dinca, F. Apfel, S. Ceconi, A. Wurz, J. Takacs, J. Suk, L. P. Celentano, P. Kramarz, and H. J. Larson. 2016. Vaccine hesitancy among healthcare workers in Europe: A qualitative study. *Vaccine* 34 (41): 5013–5020.
- Keshet, Y., and A. Popper-Giveon. 2018. "Race-based experiences of ethnic minority health professionals: Arab physicians and nurses in Israeli public healthcare organizations." *Ethn Health* 23 (4): 442–459.
- Keshet, Y., A. Popper-Giveon, and I. Liberman. 2015. "Intersectionality and underrepresentation among health care workforce: the case of Arab physicians in Israel." *Isr J Health Policy Res* 4: 18.
- Kuster, S. P., P. S. Shah, B. L. Coleman, P. P. Lam, A. Tong, A. Wormsbecker, and A. McGeer. 2011. "Incidence of influenza in healthy adults and healthcare workers: a systematic review and meta-analysis." *PLoS One* 6 (10): e26239.

- Larson, H. J., C. Jarrett, E. Eckersberger, D. M. Smith, and P. Paterson. 2014. "Understanding vaccine hesitancy around vaccines and vaccination from a global perspective: a systematic review of published literature, 2007-2012." *Vaccine* 32 (19): 2150–2159.
- Liu, J. X., Y. Goryakin, A. Maeda, T. Bruckner, and R. Scheffler. 2017. "Global Health Workforce Labor Market Projections for 2030." *Hum Resour Health* 15 (1): 11.
- Loulergue, P., F. Moulin, G. Vidal-Trecan, Z. Absi, C. Demontpion, C. Menager, M. Gorodetsky, D. Gendrel, L. Guillevin, and O. Launay. 2009. "Knowledge, attitudes and vaccination coverage of healthcare workers regarding occupational vaccinations." *Vaccine* 27 (31): 4240–4243.
- MacDonald, N. E., and E. Dube. 2015. "Unpacking Vaccine Hesitancy Among Healthcare Providers." *EBioMedicine* 2 (8): 792–793.
- MacDonald, N. E., and S. W. G. o. V. Hesitancy. 2015. "Vaccine hesitancy: Definition, scope and determinants." *Vaccine* 33 (34): 4161–4164.
- Maier, C. B., and L. H. Aiken. 2016. "Expanding clinical roles for nurses to realign the global health workforce with population needs: a commentary." *Isr J Health Policy Res* 5: 21.
- Napoli, C., F. Ferretti, F. Di Ninno, R. Orioli, A. Marani, M. G. Sarlo, C. Prestigiacomo, A. De Luca, and G. B. Orsi. 2017. Screening for Tuberculosis in Health Care Workers: Experience in an Italian Teaching Hospital. *Biomed Res Int* 2017: 7538037.
- Nayak, S., and B. Acharjya. 2012. Mantoux test and its interpretation. *Indian Dermatol Online J* 3 (1): 2–6.
- Nichol, K. L. T., J. J. 2006. Vaccines for Seasonal and Pandemic Influenza. *The Journal of Infectious Diseases* 194: S111–S118.
- Norton, S. P., D. W. Scheifele, J. A. Bettinger, and R. M. West. 2008. Influenza vaccination in paediatric nurses: cross-sectional study of coverage, refusal, and factors in acceptance. *Vaccine* 26 (23): 2942–2948.
- Nutman, A., and N. Yoeli. 2016. "Influenza vaccination motivators among healthcare personnel in a large acute care hospital in Israel." *Isr J Health Policy Res* 5: 52.
- OECD. "Israel." Selected indicators Retrieved July 16, 2020. from <https://data.oecd.org/israel.htm>.
- Okello, D. R., and L. Gilson. 2015. "Exploring the influence of trust relationships on motivation in the health sector: a systematic review." *Hum Resour Health* 13: 16.
- Pearson, M. B., and C. B.; Harper, S.A. 2006. Influenza Vaccination of Health-Care Personnel Recommendations of the Healthcare Infection Control Practices Advisory Committee (HICPAC) and the Advisory Committee on Immunization Practices (ACIP). Morbidity and Mortality Weekly Report. *Centers for Disease Control and Prevention*. 55: 1–16.
- Roggenendorf, M., and S. Viazov. 2003. Health care workers and hepatitis B. *Journal of Hepatology* 39: 89–92.
- Rosen, B., R. Waitzberg, A. Israeli, M. Hartal, and N. Davidovitch. 2021. "Addressing vaccine hesitancy and access barriers to achieve persistent progress in Israel's COVID-19 vaccination program." *Isr J Health Policy Res* 10 (1): 43.
- Rosen, B. W., and R.; Merkur, S. 2015. "Israel Health System Review." *Health Systems in Transition* 17 (6): 1–212.
- Shalev, G. 2016. A Doctor's Testimony: Medical Neutrality and the Visibility of Palestinian Grievances in Jewish-Israeli Publics. *Cult Med Psychiatry* 40 (2): 242–262.
- Sosa, L. E., Njie, G. J.;... R. Belknap. 2019. "Tuberculosis Screening, Testing, and Treatment of U.S. Health Care Personnel: Recommendations from the National Tuberculosis Controllers Association and CDC, 2019." *Morbidity and Mortality Weekly Report* 68 (19): 439–443.
- Stone, P. W. C., S. P.; Cimiotti, and J.; Correa-de-Araujo, R. 2004. "Nurses' Working Conditions: Implications for Infectious Disease." *Emerging Infectious Diseases* 10 (11): 1984–1989.
- Sundaram, N., K. Duckett, C. F. Yung, K. C. Thoon, S. Sidharta, I. Venkatachalam, A. Chow, and J. Yoong. 2018. "I wouldn't really believe statistics"—Challenges with influenza vaccine acceptance among healthcare workers in Singapore. *Vaccine* 36 (15): 1996–2004.
- The, L. 2009. "Doctors get ill too." *The Lancet* 374 (9702): 1653.
- Toren, O., R. Zelker, M. Lipschuetz, S. Riba, S. Reicher, and N. Nirel. 2012. "Turnover of registered nurses in Israel: characteristics and predictors." *Health Policy* 105 (2-3): 203–213.
- Triggler, N. 2020. Covid-19 vaccine: First person receives Pfizer jab in UK. BBC.
- Tur-Sinai, A., R. Gur-Arie, N. Davidovitch, E. Kopel, Y. Glazer, E. Anis, and I. Grotto. 2019. "Vaccination uptake and income inequalities within a mass vaccination campaign." *Isr J Health Policy Res* 8 (1): 63.
- Tzafir, S. S., I. Meshoulam, and Y. Baruch. 2007. "HRM in Israel: new challenges." *The International Journal of Human Resource Management* 18 (1): 114–131.

- Verger, P., L. Fressard, F. Collange, A. Gautier, C. Jestin, O. Launay, J. Raude, C. Pulcini, and P. Peretti-Watel. 2015. "Vaccine Hesitancy Among General Practitioners and Its Determinants During Controversies: A National Cross-sectional. *Survey in France*." *EBioMedicine* 2 (8): 891–897.
- Wagner, A., M. A. Rieger, T. Manser, H. Sturm, J. Hardt, P. Martus, C. Lessing, A. Hammer, and C. Work-SafeMed. 2019. Healthcare professionals' perspectives on working conditions, leadership, and safety climate: a cross-sectional study. *BMC Health Serv Res* 19 (1): 53.
- Whitby, M. M., and M.; Ross, M.W. 2006. "Why Healthcare Workers Don't Wash Their Hands: A Behavioral Explanation. " *Infection Control and Hospital Epidemiology* 27 (5): 484–492.
- Whittemore, R. K., K. 2005. The integrated review: updated methodology. *Methodological Issues In Nursing Research* 52 (5): 546–553.
- WHO. 2019. WHO guidelines on tuberculosis infection and prevention and control.
- Witting, A. 2017. "Insights from 'policy learning' on how to enhance the use of evidence by policymakers." *Palgrave Communications* 3(1).
- Ziglam, H., M. El-Hattab, N. Shingheer, A. Zorgani, and O. Elahmer. 2013. "Hepatitis B vaccination status among healthcare workers in a tertiary care hospital in Tripoli. *Libya*." *J Infect Public Health* 6 (4): 246–251.
- Zuckerman, J. N. S., C.; Craig, F. M.; Williams, and A.; Zuckerman, A.J. 1997. Immune response to a new hepatitis B vaccine in healthcare workers who had not responded to standard vaccine: randomised double blind dose-response study. *British Medical Journal* 314: 329–333.

Publisher's Note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Authors and Affiliations

Rachel Gur-Arie¹ · Nadav Davidovitch² · Anat Rosenthal²

✉ Rachel Gur-Arie
rgurari1@jhu.edu

¹ Berman Institute of Bioethics, Johns Hopkins University, Deering Hall, 1809 Ashland Avenue, 21205 Baltimore, Maryland, USA

² Department of Health Policy and Management, School of Public Health, Faculty of Health Sciences, Ben-Gurion University of the Negev, Be'er Sheva, Israel