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Major Article

Speaking up about hand hygiene failures: A vignette survey study among healthcare professionals

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Background: Speaking up by healthcare professionals (HCPs) is an important resource to reduce risks to patient safety. Due to complex tradeoffs, HCPs are often reluctant to voice their concerns. A survey investigated HCPs' likelihood to speak up.

Methods: A cross-sectional survey study among HCPs in 5 Swiss hospitals addressed speaking-up behaviors, safety climate, and likelihood to speak up about poor hand hygiene practice described in a vignette. Likelihood to speak up was analyzed using a multilevel regression model.

Results: Of surveyed HCPs (n = 1217), 56% reported that they would speak up to a colleague with poor hand hygiene practice. Nurses as compared to doctors rated the situation as more realistic (5.25 vs 4.32, $P < .001$), felt more discomfort with speaking up (4.00 vs 3.34, $P < .001$), and reported a slightly lower likelihood of speaking up (4.41 vs 4.77, $P < .001$). Clinical function (hierarchy) was strongly associated with speaking-up behavior ($P < .001$). Higher risk of harm to the patient ($P < .001$) and higher frequencies of past speaking-up behaviors ($P = .006$) were positively associated with the likelihood to speak up. Higher frequencies of past withholding voice ($P = .013$) and higher levels of resignation ($P = .008$) were both associated with a lower likelihood to speak up.

Conclusions: Infection control interventions should empower HCPs to speak up about non-adherence with prevention practices by addressing authority gradients and risk perceptions and by focusing on resignation.

Speaking up by healthcare professionals (HCPs) to their colleagues is increasingly acknowledged as an important way to intercept errors, mitigate harm, and reduce risks to patient safety, such as healthcare-associated infections.[1] Non-adherence to infection prevention rules, such as hand hygiene protocols, is a typical situation in which speaking up by HCPs is warranted. Indeed, studies have shown that events such as missed hand disinfection or use of unsterile material frequently raise safety concerns in bystanders and prompt the question as to whether to speak up.[2] Breaches in hygiene protocols can be erroneous violations (e.g., accidental mishaps and lack of understanding or experience) or intentional violations (e.g., non-acceptance of the protocol and situational priority setting).[3] Speaking up by coworkers in such situations is a form of direct and real-time feedback. It can serve as a simple but effective and supportive reminder, particularly when rule violations are unintentional. In addition, speaking up is a signal of social norm, demonstrating that intentional deviations from standards are not accepted within the organization.

Despite the potential benefits of speaking up, research also reveals that HCPs are often reluctant to voice their concerns to coworkers and, in particular, to supervisors. HCPs who are considering speaking up are involved in complex, dynamic tradeoffs in which the strong motivation to protect patients competes with anticipated negative outcomes.[4,5] Various barriers to voicing concerns have been reported, such as fear of damaging social relationships. In a specific situation, a higher perception of the risk of harm to the patient is the key determinant for speaking up.[6-8] On the other side, strong authority gradients, power dynamics, and hierarchy inhibit the decision to speak up.[9] For example, Samuel et al. reported that most surveyed medical students were willing to speak up to fellow students about poor hand hygiene practices, but only a few would speak up to registrars (9%) or consultants (6%).[10] Past speaking-up behaviors, experiences, and interactions affect future decisions to voice

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or withhold concerns.[11] Contextual factors, such as the presence of an audience (patients or other coworkers), have strong moderating effects on HCPs' voicing behaviors.[11] On the organizational level, safety climate, teamwork culture, and strong leadership that encourages speaking up are related to HCPs' likelihood to speak up.[12]

Whether HCPs would speak up or remain silent about breaches in infection prevention practices is essential information for healthcare organizations. Data about willingness to speak up could serve as an outcome of interventions to improve infection control practices, implementation of hygiene protocols, or teamwork and leadership activities. However, studying speaking-up behaviors quantitatively is difficult. The decision to actively withhold voice is a "non behavior" and thus cannot be easily observed directly. Zero occurrences of HCPs' speaking up could result from an ultra-safe environment in which no rule violations occur or could originate from the diametric opposite—an organization with a very poor safety climate in which safety breaches occur frequently but employees either do not notice them or decide to remain silent. Simulation is one way to study speaking up by HCPs in depth under controlled conditions and has been successfully used in anesthesiology.[13,14] However, simulation studies are resource intensive and are thus often limited to smaller samples and single studies. The simulation setting may not be equally feasible for all groups of HCPs and not suitable to study reactions to "everyday" breaches of infection control practices. In this study, we used a brief clinical vignette of poor hand hygiene practice as a generic, standardized stimulus and surveyed HCPs about their hypothetical speaking-up behaviors. We assessed the self-reported likelihood to speak up and investigated factors associated with it. Based on prior research, we hypothesized that self-reported likelihood to speak up would be determined by clinical function (and thus hierarchical position), perception of risk to the patient, past speaking-up behaviors, and the speaking-up-related climate at the workplace.

METHODS

Study design and sample

We conducted a cross-sectional survey study of HCPs working in acute care hospitals. Four large general hospitals and 1 pediatric university hospital participated in the study.

HCPs in this study included doctors and nurses of various medical disciplines and levels of training and hierarchy. Doctors included resident, attending, senior, and chief physicians. Nurses included nurses in training and nursing assistants, qualified nurses, nursing experts (who have higher education and commonly hold specific expert roles), and head nurses (experienced nurses with managerial functions). Doctors and nurses in the sample were identified by hospitals' study coordinators. They were invited to participate and received a printed copy of the self-administered survey and a pre-paid envelope at their work or home address. Two electronic reminders were sent. The survey was anonymous and participation was regarded as informed consent. The study was exempt from review by the Ethics Committee of the Canton of Zurich, Switzerland (BASEC-Nr. Req-2016-00462).

Survey instrument and measures

We applied the "Speaking Up About Patient Safety Questionnaire." Development and psychometric properties have recently been reported in detail.[15] In brief, the instrument assesses respondents' past speaking-up behaviors, their evaluations of the speaking-up climate at their workplace, and their anticipated speaking-up behavior. Survey development was informed by prior qualitative research.[2,5] Psychometric testing included explorative factor analyses, reliabilities of the explored scales, and inter-item analysis. Analysis of variance (ANOVA) confirmed known-groups validity, (e.g., differences between staff members of lower and higher hierarchical status).

The survey includes a brief vignette that describes a hypothetical speaking-up situation, which is the main focus in this report. The vignette reads, "You are on a daily round with several doctors and nurses. During the round, the attending doctor shakes hands with a patient who recently had surgery. He wants to examine the patient's wound. However, the attending does not apply gloves and/or does not disinfect their hands." Responders were instructed to consider their anticipated behaviors if they would find themselves in the situation. After being presented with the vignette, they were asked to answer 4 questions addressing the realism of the situation, patient harm, and discomfort with and likelihood of speaking up (see Table 1 for description of all measures). These questions each used a 1-7 response scale with specifically labeled poles.

Two scales in the survey address past speaking-up-related behaviors: frequency of withholding voice and frequency of speaking up in specified situations. Response options for the items in these scales are anchored to "in the last four weeks" and range from "never" to "very often." Higher mean scale values (range: 1-5) indicate higher frequencies of past speaking-up and withholding-voice behaviors, respectively.

Speaking-up-related climate covers the subjective perception of work and organizational aspects that are relevant for speaking up. It is assessed by 11 items presented as statements and asking respondents for their level of agreement. The items are organized in 3 subscales: psychological safety for speaking up scale, which measures HCPs' fear of negative consequences; trust in colleagues and supervisors that speaking up is safe and encouraged scale, which measures the "normality" of speaking up and encouragement by colleagues and supervisors; and resignation scale, which measures frustration from previous ineffective episodes of speaking up. Higher mean scale scores (range: 1-7) indicate higher levels of perceived psychological safety at the workplace, higher levels of perceiving the workplace as encouraging speaking up, and higher levels of resignation with speaking up, respectively.

Data analysis

Descriptive statistics (mean and standard deviation [SD]) are reported for responses to the vignette. ANOVA was used to determine whether mean ratings to the vignette questions differed significantly between respondents of different clinical functions. For easier interpretation, vignette ratings were also dichotomized: responses on the 1-7 scales were split and recoded as "0" (values 1-4) or "1" (values 5-7). For past speaking-up behaviors and speaking-up-related climate scales, descriptive statistics are reported. Cronbach's alpha was calculated as a measure of internal consistency of scales. Mean scale scores were computed to be used as independent variables in the regression model.

Regression analysis was conducted to model HCPs' reported likelihood to speak up as outcome. Due to the natural hierarchical structure of data, we used multilevel regression modelling. "Level 1" comprised individual respondents, whereas "level 2" consisted of the 5 hospitals. Based on our hypotheses, past withholding-voice and past speaking-up behaviors and the 3 speaking-up-related climate scales (encouraging environment, psychological safety, and resignation), respondents' personal characteristics (age and clinical function), and potential of harm rating were included as independent variables.

An intercept-only model (without explanatory variables) was estimated to compute the intraclass correlation coefficient (ICC). The ICC is the variance between clusters (i.e., hospitals) divided by the

Table 1
Overview of survey measures with examples

Measure	Description	Wording / example	Response scale
Hypothetical judgments toward the hand disinfection vignette			
Realistic	Single item	How realistic is this situation?	1-7 response scale from "Not realistic" to "Very realistic"
Risk of harm	Single item	If nobody acts, how dangerous do you think this situation is for the patient?	1-7 response scale from "Very low risk" to "Very high risk"
Discomfort	Single item	Would you feel uncomfortable to instruct the attending to disinfect their hands/wear gloves?	1-7 response scale from "Not at all uncomfortable" to "Very uncomfortable"
Speak up	Single item	How likely is it that you try to alert the attending to the missed hand disinfection/ gloves (using words or gestures)?	1-7 response scale from "Very unlikely" to "Very likely"
Past behaviors			
Speak up	4 items, Cronbach's alpha = 0.86	Over the past 4 weeks, how often did you address a colleague (doctors and/or nurses) when he/she did not follow important patient safety rules, intentionally or unintentionally?	"never" (0 times in the last 4 weeks), "rarely" (1-2 times), "sometimes" (3-5 times), "often" (6-10 times) "very often" (more than 10 times during the last 4 weeks)
Withholding voice	4 items, Cronbach's alpha = 0.77	Over the past 4 weeks, how often did you not address a colleague (doctors and/or nurses) if he/she did not follow important patient safety rules, intentionally or unintentionally?	
Speak-up-related climate (overall Cronbach's alpha = 0.85)			
Psychological safety scale	5 items, Cronbach's alpha = 0.82	I can rely on the shift supervisor (person in charge of a shift) whenever I encounter difficulties in my work.	7-point-Likert like scale from "strongly disagree" to "strongly agree"
Encouraging environment scale	3 items, Cronbach's alpha = 0.78	I am encouraged by my colleagues (doctors and/or nurses) to speak up about patient safety concerns.	
Resignation scale	3 items, Cronbach's alpha = 0.64	Having to remind staff of the same safety rules again and again is frustrating.	

overall variance. A likelihood ratio test was conducted to compare random intercept (only the intercept is allowed to differ across clusters) and random coefficient models (where slope and intercept are allowed to vary across clusters) and demonstrated that the simpler random intercept model fitted the data better ($P = .98$). Variance inflation factors were computed to check for multicollinearity between the included level-1 variables. To examine the accuracy of model estimates, we used bootstrapping with 10,000 replications. All tests were 2-sided, and P-values <.05 were considered statistically significant. Statistical analyses were performed with STATA v13 software.

RESULTS

Of 3400 HCPs surveyed, 1217 nurses and doctors returned the survey with complete information on their clinical function (completion rate, 36%; range between hospitals, 31%-42%). Of respondents, 78% were women, 22% were doctors, and 39% had been working for at least 10 years in their hospital (Table 2) .

Past speaking-up behaviors and speaking-up-related climate

Among all respondents, 85.8% reported at least 1 episode of speaking up due to any safety concern in the past 4 weeks. However, 61.4% of respondents also reported at least 1 episode of withholding voice in the past 4 weeks despite safety concerns. The mean scores on the past withholding-voice behavior scale was 1.44 (SD 0.56) and 2.00 (SD 0.78) on the past speaking-up behavior scale. The mean scores were 5.36 (SD 1.18) on the psychological safety scale, 4.77 (SD 1.44) on the encouraging environment scale, and 3.14 (SD 1.42) on the resignation scale. Of respondents, 69.9% provided positive ratings on the psychological safety scale (mean scale score, ≥5), 52.9% indicated an environment encouraging speaking up (mean scale score, ≥5), and 12.4% indicated a high level of resignation with speaking up (mean scale score, ≥5).

Evaluation of the hand hygiene failure vignette

Across the entire sample, 67% of respondents perceived the situation described in the vignette as realistic, and 79% rated it as describing a considerable risk of harm to the patient. Of respondents, 56% reported that they would speak up to their colleague if they found themselves in the described situation. However, 43% would feel uncomfortable with speaking up. There were considerable differences in dichotomized vignette ratings between nurses and doctors (Fig 1).

Table 2
Characteristics of survey respondents based on self-reports (n = 1217)

	n	%
Women	947	78.3
Age, mean (SD) years	39.6	11.1
Function		
Nurse in training, nursing assistant	122	10.0
Nurse	687	56.5
Nursing expert	72	5.9
Head nurse	64	5.3
Resident doctor	109	9.0
Attending doctor	69	5.7
Senior / chief doctor	94	7.7
Supervisor role	158	13.0
Working hours in direct patient care / week		
<10 hours	60	5.0
10-24 hours	268	22.3
25-39 hours	507	42.2
≥40 hours	366	30.5
Years of employment in this hospital		
<2 years	301	25.0
2-<5 years	215	17.8
5-<10 years	219	18.2
10-<20 years	282	23.4
≥20 years	188	15.6
Clinical area		
Internal medicine	283	23.6
Operative and perioperative units	344	28.7
Emergency and intensive care unit	232	19.4
Other or multiple	338	28.2
Hospital		
A	290	23.8
B	178	14.6
C	317	26.1
D	151	12.4
E	281	23.1

SD, standard deviation.

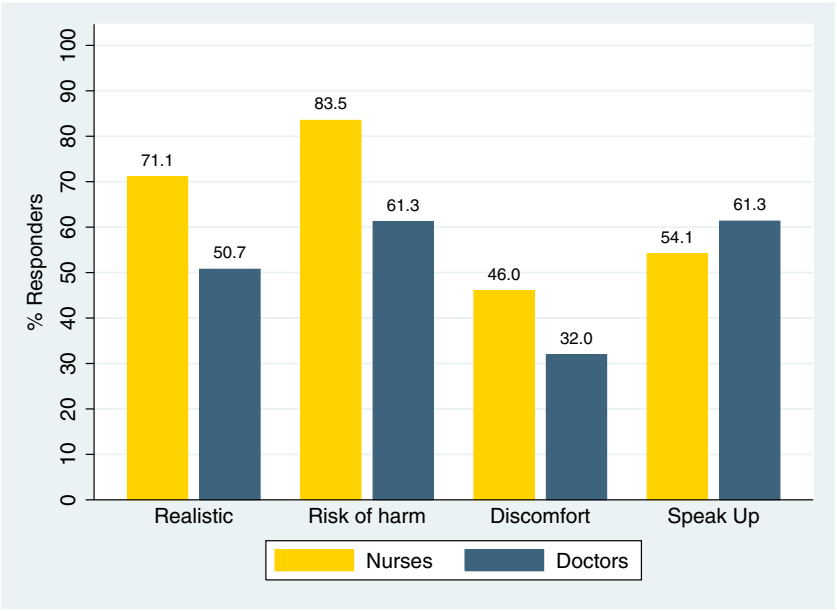

Fig 1. Vignette ratings (dichotomized) by professional group (n = 1217).

Table 3
Mean vignette ratings by clinical function (n = 1217)

	Vignette ratings*, mean (SD)			
Clinical function	Realistic	Risk of harm	Discomfort	Likelihood to speak up
Nurses	5.25 (1.86)	5.67 (1.26)	4.00 (2.20)	4.41 (2.07)
Nurses in training	4.51 (2.25)	5.70 (1.44)	4.58 (2.34)	3.65 (2.27)
Nurses	5.33 (1.76)	5.61 (1.24)	4.03 (2.14)	4.35 (2.01)
Nursing experts	5.50 (1.74)	5.97 (1.13)	3.84 (2.38)	5.20 (1.85)
Head nurses	5.50 (1.87)	5.98 (1.17)	2.79 (1.94)	5.48 (1.77)
Doctors	4.32 (2.01)	4.76 (1.53)	3.34 (2.01)	4.77 (1.90)
Resident doctors	4.22 (1.97)	4.71 (1.38)	4.30 (1.94)	4.01 (2.01)
Attending doctors	4.36 (2.17)	5.00 (1.48)	3.38 (1.89)	4.90 (1.77)
Senior / chief doctors	4.40 (1.95)	4.66 (1.72)	2.20 (1.55)	5.55 (1.51)
Total sample	5.04 (1.93)	5.45 (1.38)	3.85 (2.18)	4.49 (2.04)
$P^{\dagger}$	<0.001	<0.001	<0.001	<0.001

SD, standard deviation.
*All ratings measured on a 7-point scale. See Methods for question and response scale wording.
†One way analysis of variance for differences in mean ratings between respondents of different clinical function.

Table 4
Results of multilevel regression analysis with reported likelihood to speak up as outcome

Variable	Coefficient	95% CI	*P*
Risk of harm rating	0.287	0.206,0.368	<0.001
Past withholding-voice behavior	–0.298	–0.533,–0.062	0.013
Past speaking-up behavior	0.217	0.062,0.371	0.006
Psychological safety scale	–0.008	–0.143,0.127	0.910
Encouraging environment scale	0.003	–0.097,0.102	0.961
Resignation scale	–0.124	–0.215,–0.033	0.008
Clinical function (to base: nurse in training)			
Nurses	0.775	0.399,1.151	<0.001
Nursing experts	1.321	0.743,1.898	<0.001
Head nurses	1.319	0.735,1.902	<0.001
Resident doctors	0.909	0.390,1.428	0.001
Attending doctors	1.237	0.655,1.819	<0.001
Senior / chief doctors	1.525	0.974,2.076	<0.001
Age, years	0.043	0.033,0.054	<0.001
Constant	0.756	–0.373,1.885	0.189
R^2	0.17		
Overall model *P*	<0.001		
n	1164		
ICC	0.009		

CI, confidence interval; *ICC*, intraclass correlation coefficient.

ANOVA revealed significant differences in mean vignette ratings between staff members of different clinical functions (Table 3). First, nurses as compared to doctors rated the situation as more realistic and as posing a higher risk of harm to the patient, felt more discomfort with speaking up, and reported a slightly lower likelihood of speaking up. Second, within both occupational groups, we observed a robust alignment of mean ratings with hierarchical position. In particular, mean scores of likelihood to speak up were considerably lower for nurses and doctors of lower hierarchical status, whereas the perceived level of discomfort was inversely associated with higher hierarchical status. For example, the mean level of discomfort of residents was more than 2 points higher compared to that of chief/senior doctors. Nurses in training rated their likelihood to speak up nearly 2 points lower than head nurses.

Multilevel regression on likelihood to speak up

The ICC of the empty model was 0.011, indicating that the variance at the hospital level accounted for only 1.1% of the total variance for the reported likelihood to speak up. A likelihood ratio test against an ordinary linear regression model (without hospital level), however, confirmed superiority of the random effects model ($P = .0037$). The variance inflation factor was 1.7, indicating low multicollinearity. Results of the final multilevel model are reported in Table 4. All signs of coefficients are in the hypothesized direction. A higher perceived risk of harm to the patient and higher frequencies of past speaking-up behaviors were positively associated with the likelihood to speak up. Higher frequencies of past withholding-voice behaviors and higher levels of resignation were both associated with a lower likelihood to speak up. Clinical function was strongly associated with anticipated speaking-up behavior, with senior/chief physicians, nursing experts, and head nurses having the largest coefficients. Neither psychological safety nor encouraging environment to speak up was significantly related to likelihood to speak up. The model explains 17% of the variance for reported likelihood to speak up. Only 0.9% of the variance can be attributed to differences between hospitals (ICC).

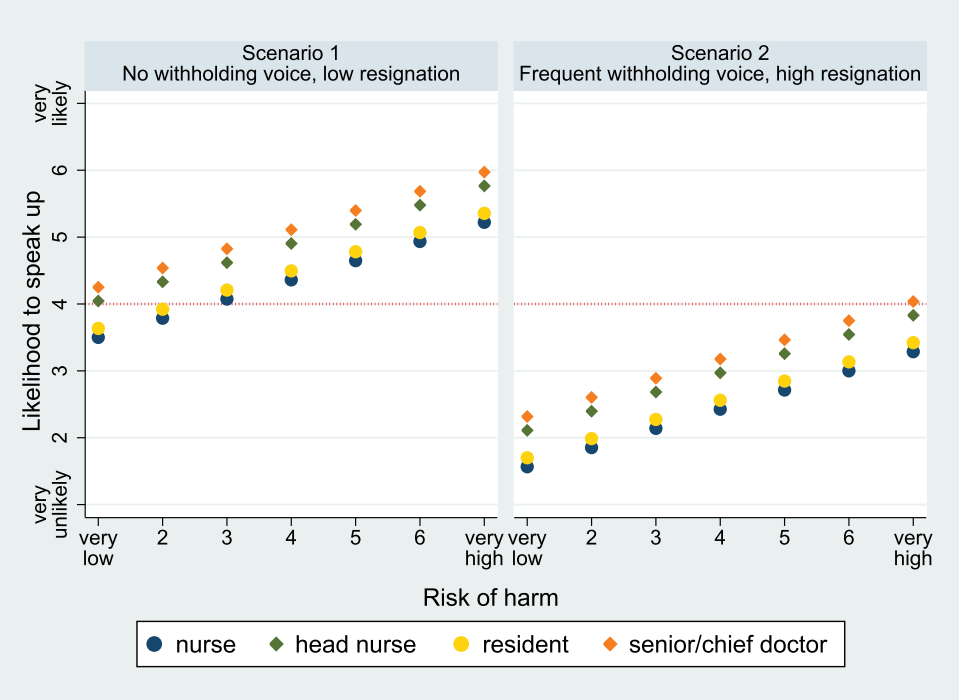

Fig 2. Predictions of anticipated likelihood to speak up for 2 scenarios by clinical function and perceived risk of harm to patients, keeping all other variables at their mean. The dashed line indicates the theoretical cutoff (value 4 on the y-axis) between "unlikely" and "likely" to speak up.

The estimated model was used to predict the anticipated likelihood to speak up under 2 extreme conditions (scenarios) and relative to perceived risk of harm to the patient and the respondent's clinical function. The 2 extreme scenarios are characterized by 2 important variables: no previous withholding-voice episodes and lowest level of resignation versus frequent past episodes of withholding voice combined with high levels of resignation. As Figure 2 illustrates, the joint effect of these 2 factors on the likelihood to speak up is considerable. To evaluate the effect of the different constellations of predictors on the likelihood to speak up, the theoretical cutoff between "likely and "unlikely" to speak up is a critical value (y-axis). Predicted values of likelihood to speak up below 4 indicate that respondents would be unlikely to speak up, whereas at predicted values above 4 respondents are more likely to speak up. For example, at intermediate risk of harm (value 4 on the x-axis), the effect of past withholding-voice behavior and resignation shifts the reported likelihood to speak up for all groups of staff members from well above to below the dashed line at value 4 on the y-axis. At lowest levels of perceived risk for patients (value 1 on the x-axis), both nurses and residents are unlikely to speak up (values below 4 on the y-axis) even with no prior history of remaining silent and no indication of resignation.

DISCUSSION

Across medical sub-disciplines and clinical functions, half of respondents in our study reported that they would speak up to an attending doctor who misses the hand disinfection prior to inspecting the wound of a patient, even though most rated it as a considerable risk to the patient. Since we surveyed a diverse group of HCPs from 5 different hospitals, including various clinical functions and work areas, the results are likely to be generalizable to similar settings. Our results confirm prior research that strong authority gradients exist that inhibit speaking up by HCPs with less authority.[4,7,16] The results strengthen prior qualitative research and emphasize the relevance of past speaking-up and withholding-voice behaviors for predicting future behaviors.[11] Szymczak reported that real-life decisions to speak up are strongly influenced by previous interactions and experiences. We observed that this association extends to hypothetical anticipated behaviors. This finding can also be regarded as validation of our vignette approach, as past true experiences seem to predict future hypothetical behaviors. Our results indicate a dose-response relationship, with higher frequencies of past withholding voice gradually decreasing the reported likelihood to speak up. The more often HCPs have remained silent in the past, the less likely they are to think they would speak up, thus suggesting that remaining silent "perpetuates itself."

This interpretation is supported by the considerable effect that level of resignation has on likelihood to speak up. We found that a climate in which speaking up about safety threats is perceived as "frustrating" and as "making no difference" contributes to a "culture of silence," lowering the chance that an HCP will speak up even in a clearly illustrated situation. Surprisingly, perceiving the environment as encouraging of speaking up and high levels of psychological safety did not facilitate speaking-up intentions. The perceived risk of harm to patients plays a major role in intentions to speak up and has been previously reported for a number of settings (e.g., cancer care, surgery, and obstetrics).[6-8] The effect of harm perception on speaking-up behavior is probably strongest when there is a direct, causal, and immediate relationship between the instance causing concern and patient harm. However, the link between single failures in infection control practices and acquiring an infection is often less certain and evident for staff members.[11] This may explain in part the relative high reluctance to speak up about non-adherence to hygiene protocols and could actively be approached in interventions to motivate speaking up.

Our study had some limitations. First, we elicited hypothetical speaking-up behaviors. Respondents may have over- or underestimated their own behaviors in an emotionally complex tradeoff, though simulated decisions obtained in a vignette exercise commonly

match real decisions quite well.[17] Confidence in our results is also strengthened by the fact that most respondents perceived the described situation as realistic. Future research should explore the correlation of vignette responses with actual behaviors and the sensitivity of vignette ratings to interventions aimed at supporting speaking-up behaviors. Second, all variables were generated using the same survey, making the associations potentially subject to common-methods bias.[18] Third, differences in response rates between groups of staff members may have introduced bias. Finally, we had information only on respondent affiliation with the hospital, not unit, to model the multilevel effect. Safety climate research indicates, however, that variance in climate is located rather on the micro (i.e., unit or even ward) than the macro level of organizations (hospital).[19,20] This may explain the lack of association we observed for the 2 climate scales with likelihood to speak up. Due to participant confidentiality, it was not possible to collect unit-level data.

Recent infection control intervention research suggests that speaking up by HCPs can be an effective driver of better adherence with hygiene protocols. Linam et al. reported on a hospital-wide quality improvement initiative that included a speaking-up training that specifically addressed hand hygiene failures at the moment of occurrence as part of a multimodal intervention.[21] Staff members were clearly instructed on how to address hygiene failures of colleagues and received leadership support. Hand hygiene behavior was measured by covert direct observation. The intervention proved successful and yielded sustainable high compliance rates with hand hygiene, particularly among doctors. Phelps and Reed implemented a speaking-up intervention to increase compliance with hand hygiene and explicitly addressed power hierarchies and dealing with "repeat violators."[22] The latter—an expression of strong leadership—seems particularly valuable given the dangerous multiplicative effects that resignation over ineffective speaking up can have for the organization. Our study contributes to a deeper understanding of speaking-up behaviors in infection control and can be used for designing such interventions. Our vignette exercise could serve as a supplemental measure of effectiveness of interventions aimed at empowering speaking up.

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