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Talking about communication: challenges and chances in medical communication from the patients' and healthcare professionals' perspective

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Sebastian Severin Gross

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Signatur 

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Table of Content

Abstract

Introduction: Poor communication between healthcare professionals (HCP) and patients can lead to misunderstandings and adverse outcomes in different situations. This thesis focuses on improvements in communication in different settings by studying perceived communication challenges of HCPs including communication of sensitive topics during the clinical ward rounds, patients' preferences for participation in medical decision-making, and the role of communication and shared decision-making regarding the preference for or against cardiopulmonary resuscitation within patients and HCPs.

Methods: The following methodological approaches were used: three ancillary analyses of a randomised controlled multicentre trial conducted between 2017 and 2019 at three Swiss teaching hospitals to assess HCPs perceptions, patients' participation preferences and the impact of sensitive topics discussions during clinical ward rounds; two observational, cross-sectional surveys to assess resuscitation preferences and predictors influencing decision-making in the general Swiss population as well as HCPs regularly involved in resuscitation.

Results: Systematic feedback of HCPs (measured by a VAS on preference from 0 to 100) concerning their perception of ward rounds (n=891) revealed that ward rounds conducted at the bedside are preferred by the nursing staff (69.20 ± 20.32 versus 65.32 ± 20.92, respectively; adjusted difference 4.35, 95% CI –1.79 to 10.51; p<0.001), while physicians prefer outside the room presentation of patients during ward rounds (82.63 ± 13.87 versus 66.59 ± 21.82; adjusted difference –16.51, 95% CI –20.29 to –12.72; p=0.002) due to perceived better discussion of sensitive topics, better time management and less staff discomfort.

Sensitive topics are found in a large proportion of medical inpatients (51.6%, n=919) particularly medical uncertainty (n=251) among others. Discussing sensitive topics during ward rounds was associated with lower satisfaction with care (87.7 ±14.6 versus 90.2 ±12.1; adjusted difference -2.5, 95%CI -4.28 to -0.72; p=0.006). Importantly, disagreement between physicians and patients was found to be a risk factor for low patient satisfaction.

Concerning the analysis on patients' preference for participation in medical decision-making, most patients (62.2%, n=761) prefer collaborative decisions together with their physician. An active decision-making preference is associated with lower trust in the healthcare team (adjusted difference -5.08, 95% CI -8.69 to -1.48 points; p=0.006) and lower overall satisfaction (adjusted difference -7.17, 95% CI -11.01 to -3.34 points; p<0.001).

Looking at resuscitation preferences in the general Swiss population (n=1044), the majority wishes to be resuscitated in a hypothetical case vignette with a 10 minute down time (59.5%) and as a personal preference (79.7%). Main predictors for do-not-resuscitate (DNR) preference were the personal resuscitation preference (adjusted OR 2.44, 95%CI 1.67 to 3.55; p<0.001) and the overestimation of survival with good neurological outcome after cardiac arrest (adjusted OR per decile 0.91, 95%CI 0.84 to 0.99; p=0.02).

Within HCPs, preference for DNR code status was found in 85% (n=1532) in the case vignette and 53.2% (n=932) when making a personal decision for their own preference. Main predictors for DNR Code Status for the case vignette included personal preferences for their own DNR Code Status (adjusted OR 2.97, 95% CI 2.25 to 3.92; $p < 0.001$) and lower estimated OHCA survival (adjusted OR 0.98, 95% CI 0.97 to 0.99; p=0.001). Importantly, correct estimation of survival was a key parameter because underestimation of survival was positively and overestimation was negatively associated with a DNR Code Status. Compared to the general population who overestimated survival probabilities, HCP had more realistic cardiac arrest survival estimates.

Discussion: This thesis, which is based on several secondary analyses of randomised trials, as well as observational data, highlights situations where communication is a crucial factor directly influencing satisfaction and outcomes of patients. These results stress the importance of teaching HCPs on how to communicate in clinical practice, particularly to address sensitive topics during ward rounds. Also, considering the patient's individual participation preferences during ward rounds is important and can lead to a more personalized approach in decision-making. Moreover, regarding DNR, HCPs should provide in-depth discussions with patients regarding resuscitation preferences to prevent misconceptions.

1 Theoretical Background

1.1 The medical ward round – a cornerstone of patient-centred care

Over the last decades, medicine has shifted from a paternalistic to a participatory, patient-involving model.(Schifferli, 2005) This includes involving patients in medical decisions with “shared decision-making” discussions as a key element. Particularly, for inpatient care, this includes discussions of the patient's illness during ward rounds.(Bardes, 2009; Castro, Van Regenmortel, Vanhaecht, Sermeus, & Van Hecke, 2016; Wensing, 2000) Patient case presentation at the bedside could provide a unique opportunity for healthcare professionals (HCPs) to ensure direct participation of patients in medical discussions and decision-making as physician and patient meet face to face.(Kithri, 2012; O’Mahony, Mazur, Charney, Wang, & Fine, 2007; Pucher, Aggarwal, & Darzi, 2014; Zwarenstein, Goldman, & Reeves, 2009)

Ward rounds may be performed differently dependent on different cultural and hospital policies as well as personal preferences of the treating team. In most Swiss and many European hospitals patients are visited daily on morning ward rounds by a resident physician (“Assistenzarzt”) and the responsible nurse whereas the resident is supervised by an attending physician (“Oberarzt”). Residents typically care for about 10 to 12 patients on a ward, and the attending physicians supervise 3 residents. Once a week (on a weekday), a consultant (“Chefarzt”, for example, the head of service or one of their deputies) joins the medical team and the responsible nurse during the morning ward round for a consultant ward round (“Chefarztvisite”). In this context usually patients are presented to the team by the resident, and the patients' cases are discussed in detail, including diagnostic and therapeutic measures and further plans of care. Hereby, the consultants usually are not familiar with the patients' cases beforehand, the full patient history and electronic health chart, including laboratory variables and vital signs. These parameters are discussed during the course of the ward round. Within this context, patients may also receive important information about diagnosis, treatment, and further plans of care. Depending on individual practices these patient case presentations can take place *at the bedside* or *outside the room*. At the bedside case presentation, the patient has a chance to participate into the discussions and to gain insights into the current illness and its management. Also, there might be more time directly spent with the patient. Yet, there is concern that patients may be unable to cope with the magnitude of medical information and misunderstandings may occur potentially leading to mistrust if a patient feels that uncertainties exist. Conversely, discussing a patient’s case outside the room and later present a “patient-friendly” version of the medical situation at the bedside may be more easily understandable, but the patient has less chance to be actively involved in the overall discussions.

In order to answer the question, whether bedside or outside the room presentations are more beneficial for patients in terms of their knowledge about their disease and its management, our research team recently conducted a large, randomised controlled trial in three Swiss teaching hospitals, the BEDSIDE-OUTSIDE trial.(C. Becker et al., 2021) Results indicated that, compared with outside the room case presentation, bedside presentation was shorter and resulted in similar patient knowledge, but sensitive topics were more often avoided and patient confusion was higher. Thus, the communication at the bedside may be crucial to patient’s medical understanding, especially when

medical jargon is used. To also assess the treating team`s perspective, a pre-planned secondary analysis focusing on HCPs' preferences and satisfaction during ward round was conducted. The HCPs' perspective might be an important aspect as literature on this topic is sparse and satisfaction and well-being of HCPs are linked to delivery of higher quality care.(Wallace, Lemaire, & Ghali, 2009)

Also, evidence of the preferences of medical and nursing staff members regarding outside versus bedside ward rounds so far was sparse. One study revealed that nursing staff prefer outside the room over bedside presentations.(Wang-Cheng, Barnas, Sigmann, Riendl, & Young, 1989) Further, there are controversial findings about residents' and attending physicians'preferences.(Chauke & Pattinson, 2006; Gonzalo, Masters, Simons, & Chuang, 2009; Seo, Tamura, Morioka, & Shijo, 2000; Wang-Cheng et al., 1989) However, the present studies have limited sample sizes and there is no evidence from recent years. Thus, aims of *study I* within dissertation is to fill this knowledge gap by comparing satisfaction and preferences of physicians and nurses concerning bedside and outside the room ward rounds.

1.2 Patients' participation preferences in medical decision-making

Although the concept of patient-centred care generally recommends to involve patients in medical decisions, there may be differences among patients regarding their preferences in active involvement. In fact, these differences have already been described by Degner et al. who introduced the Control Preference Scale, an instrument to assess the degree of control an individual patient prefers during healthcare decision-making, the "decisional control preference" (DCP).(Degner, Sloan, & Venkatesh, 1997) To assess the personal DCP, the patients are shown five cards with different statements concerning decisional preference (e.g. *"I prefer to make the final selection about which treatment I will receive"*, see **Appendix f**.). Depending on which of the cards patients choose, they can be allocated to five categories: active, active-shared, collaborative, passive-shared, and passive control preference.

The Control Preference Scale has been already introduced in 1997, and is now well established and used in many trials. Especially in oncology and palliative care, DCP has become an important element of care in the recent years in order to individualise treatment according to patients' preferences. However, in clinical practice, a patient's DCP is often unknown and physicians may fail to meet the patients' individual needs.(Degner, Kristjanson, et al., 1997) Accordingly, most pre-existing studies on DCP have focused on well-defined and homogenous patient populations such as patients with cancer or in end-of life settings whereas research in general medical populations is scarce. Previous research has found passive DCP to be associated with low education, older age, and ethnic minority.(Hack, Degner, & Dyck, 1994) In contrast, patients with active or collaborative DCP are often younger, have a higher education, and demand more detailed medical information to participate in the decision process.(Chiu, Feuz, McMahan, Miao, & Sudore, 2016; Hack et al., 1994; Tricou, Yennu, Ruer, Bruera, & Filbet, 2018) Also, previous studies suggest that patients' preferences may influence patient-related experience measures.(Ross, Steward, & Sinacore, 1993; Ruhnke, Tak, & Meltzer, 2020) Moreover, there is evidence that physicians may provide passive patients with fewer medical information.(R. F. Brown et al., 2002) As a consequence, these patients may have less knowledge regarding their illness. Therefore, *study II* of this dissertation aims to investigate the association

between patients' DCP, their medical knowledge, and different aspects of perceived quality of care in a broad internal medicine patient population i.e., the cohort of the initial BEDSIDE-OUTSIDE trial.

1.3 Sensitive topics in medical care

When discussing a patient's illness and treatment during medical ward round, addressing personal and sensitive topics (e.g., life threatening disease, conflict with patients, patient non-adherence, psychiatric comorbidities, substance abuse, medical uncertainty) is often crucial. These topics may be important to address as they could affect the patient's well-being and include relevant healthcare information. On the other hand, the sharing of personal and sensitive information during clinical ward rounds in a non-private setting could potentially offend patients and interfere with the perceived doctor-patient confidentiality.(Weber, Stöckli, Nübling, & Langewitz, 2007) Physicians may thus avoid addressing sensitive topics e.g. by terminating problematic conversations, withholding accurate responses, ignore the patient's expressed emotions, or inadequately acknowledging the sentiment underlying the patient's statements.(Ahluwalia, Levin, Lorenz, & Gordon, 2012; C. Becker et al., 2021)

Overall, literature on the occurrence of these topics is scarce and there is no gold standard on how to deal with these issues. Most research in this regard is mainly qualitative.(Cowles, 1988) The initial BEDSIDE-OUTSIDE trial suggests that sensitive topics were more often avoided when case presentations took place at the bedside during ward rounds.(C. Becker et al., 2021) Despite concerns about addressing sensitive topics with patients, evidence in outpatient settings indicates that discussing these topics may be associated with high satisfaction, positive perceptions of healthcare, reduced worry, and increased patient participation in treatment decisions in the outpatient setting.(Brahmania et al., 2015; J. D. Brown & L. S. Wissow, 2009) Thus, further research is needed to understand frequency and implications of discussing sensitive topics during ward rounds in clinical practice. *Study III* within this dissertation aims to analyse audio tapes from internal medicine ward rounds of patients included in the BEDSIDE-OUTSIDE trial quantitatively and qualitatively and to determine if discussing sensitive topics in clinical practice is associated with patient satisfaction.

1.4 Code Status discussions in medical care

The final part of this dissertation shall focus on a common communicational challenge in daily clinical practice: discussions regarding patients' resuscitation preferences are no longer possible during an acute cardiac arrest. Thus, the question of whether a patient wishes to be resuscitated or not during an acute event must be addressed earlier. In Switzerland, this discussion is routinely being held at time of a patient's hospital admission in a shared decision-making process involving both, the patient and treating physician. This practice is recommended by the Swiss Academy of Medical Sciences (SAMW).("Decisions on cardiopulmonary resuscitation," 2021)

Overall, patients suffering an in-hospital cardiac arrest (IHCA) or out-of hospital cardiac arrest (OHCA) have a high risk for mortality, and debilitating neurological impairment is prevalent in survivors.(Benjamin et al., 2019; Berdowski, Berg, Tijssen, & Koster, 2010; Chocron et al., 2021; Pachys, Kaufman, Bdolah-Abram, Kark, & Einav, 2014; Yan et al., 2020) Current evidence suggests that IHCA and OHCA survival rates until hospital discharge with a good neurological outcome (i.e.

“independence in activities of daily life”) average around 18.0% for IHCA and 8.5% for OHCA.(Virani et al., 2021) Accordingly, the number of do-not-resuscitate orders (DNR Code Status) stipulating the withholding of cardiopulmonary resuscitation has been increasing over the last decades, especially in chronically ill and elderly patients.(Cherniack, 2002) Despite the resulting importance of Code Status discussions, the available data is scarce. Previous studies have found that communication interventions addressing shared decision-making regarding cardiopulmonary resuscitation (CPR) were significantly associated with a preference for DNR status.(Christoph Becker et al., 2021) However, there is room for improvement regarding Code Status discussions in general clinical practice: an alarming survey of medical and surgical inpatients at a Swiss University Hospital revealed that 61.4% did not remember discussing Code Status and 72.4% of physicians attested having implemented a DNR Code Status without consulting the patient.(Becker et al., 2020) Previous studies have shown that the general population may be too optimistic regarding outcomes following cardiopulmonary resuscitation (CPR) - possibly influenced by the unrealistic depiction of positive CPR results on television and in movies.(Adams & Snedden, 2006; C. C. Bitter, N. Patel, & L. Hinyard, 2021; Diem, Lantos, & Tulsky, 1996; Jones, Brewer, & Garrison, 2000; Levinson et al., 2017; Marco & Larkin, 2008; Nava, Santoro, Grassi, & Hill, 2008) This might substantially bias the shared decision-making and informed consent process between patient and physician. As in unconscious patients without next of kin readily available, physicians frequently act as surrogate decision-makers, fuller knowledge not only of the general population’s but also of the physicians DNR preferences, understanding of CPR and its outcomes, personal values and expectations possibly influencing the ultimate decision may provide important guidance for shared decision-making discussions concerning DNR Code Status is warranted.(Uy, White, Mohan, Arnold, & Barnato, 2013) Thus, the last two studies in this dissertation aim to assess DNR Code Status rates and its predictors in a representative sample of the general Swiss population (*study IV*) and a large sample of HCPs including physicians, nurses and paramedics (*study V*).

2 Aim of the Thesis

This thesis is aimed towards pointing out communication challenges in medical care based on several clinically relevant and practical examples: HCPs perceptions on the communication during medical ward rounds, medical patients wish for participation in clinical decision-making, the challenge of discussing sensitive topics with patients and the general population's preferences towards resuscitation. Further, a synopsis of the various new insights shall elaborate possible chances for future communication in healthcare.

To this end, the following studies have been conducted:

Study I: Perception of physicians and nursing staff members regarding outside versus bedside ward rounds: ancillary analysis of the randomised BEDSIDE-OUTSIDE trial.

Aim: to assess preferences of medical and nursing staff members regarding outside versus bedside ward rounds and attitudes on specific communication elements.

Study II: Patients' Preference for Participation in Medical Decision-Making: Secondary Analysis of the BEDSIDE-OUTSIDE Trial.

Aim: to investigate the extent to which patients want to be involved in medical decisions (decisional control preference, DCP) and how this is associated with their medical knowledge, ward round performance measures (e.g., duration, occurrence of sensitive topics), and perceived quality of care measures (e.g., trust in the healthcare team, satisfaction with hospital stay).

Study III: The occurrence of sensitive topics during ward round: An ancillary analysis of the BEDSIDE-OUTSIDE Trial.

Aim: to investigate the interplay between sensitive topics in medical ward round discussions and low reported satisfaction with care.

Study IV: "Do-not-resuscitate" preferences of the general Swiss population: Results from a national survey.

Study V: Misconceptions and do-not-resuscitate preferences of healthcare professionals commonly involved in cardiopulmonary resuscitations: Results from a national survey.

Aim: to assess the do-not-resuscitate (DNR) preferences of the general Swiss population and of HCPs regularly involved in cardiopulmonary resuscitation (CPR) and to identify predictors influencing decision-making.

3 Methods

3.1 Three ancillary analyses of the randomised controlled BEDSIDE-OUTSIDE trial

Study setting and population: The pragmatic, investigator-initiated, open-label, noncommercial, multicentre randomised BEDSIDE-OUTSIDE trial was conducted in the general medical divisions of 3 Swiss teaching hospitals (University Hospital Basel, Kantonsspital Aarau, and Kantonsspital Baselland) between July 2017 and October 2019.(C. Becker et al., 2021) Included were consecutive adult patients newly admitted to medical wards for inpatient care who had their first once weekly consultant ward round. Only 1 patient per room was eligible for study inclusion. Exclusion criteria for patients were cognitive or hearing impairment, being unable to understand the local languages, or previously being included in the study. All patients provided written informed consent.

Data collection: Data was collected at different time points, namely at baseline before the ward round (sociodemographic characteristics; perceived quality of life using the EuroQol EQ-5D-3L questionnaire ("EuroQol - a new facility for the measurement of health-related quality of life," 1990), ongoing medical investigations, therapeutic treatments and comorbidities including the Charlson Comorbidity Index (Charlson, Pompei, Ales, & MacKenzie, 1987)), during the ward round (ward round timing per patient, physician–patient communication elements), in the afternoon after the ward round, and 30 days after patient inclusion (telephone interview). The complete ward round was audio recorded in order to code different predefined communication elements used as secondary outcomes.

Outcome measures: The primary endpoint of the BEDSIDE-OUTSIDE trial was patients' average subjective knowledge of their medical care in 3 dimensions: understanding of disease, therapeutic approach, and further plans for care. Each dimension was rated by on a visual analogue scale (VAS) from 0 to 100 (0 = “I have no knowledge about the situation” to 100 = “I have the best possible knowledge about the situation”). This outcome was developed involving patients in terms of Patient and Public Involvement (PPI). The questionnaire was validated for appropriateness and ease of understanding within the physician–researcher team and with PPI.

Key secondary endpoint in the initial trial was the objective rating of patient knowledge by the study team in the 3 dimensions described above. This data was collected by patient interviews conducted in the afternoon after the morning ward rounds and asking patients to recall information about their main illness, the therapeutic measures, and further plans for care. The information was then compared with the medical information from the chart and rated on a VAS of 0 to 100 by a blinded study team member who was not present during the ward round.Further secondary endpoints were aspects of perceived quality of care (VAS from 0 to 100) and specific communication elements and topics rated from audio tapes e.g., sensitive topics as medical uncertainty, social issues, and non-adherence.

3.1.1 *Perception of physicians and nursing staff members regarding outside versus bedside ward rounds: ancillary analysis of the randomised BEDSIDE-OUTSIDE trial*

Outcome measures: primary outcome for this ancillary analysis was staff satisfaction with ward round measured on a VAS of 0–100 with 0 indicating lowest and 100 highest possible satisfaction. Secondary outcomes included:

- Further satisfaction measures (i.e., satisfaction with time management, team interaction and team-patient interaction)
- Perception of time management during ward round (i.e., sufficient time, being rushed, ward round as planned, ward round terminated on time)
- perception of sensitive topics discussions during ward round (i.e., being able to discuss sensitive topics, all important matters discussed)
- perceived discomfort during ward round (i.e., feeling insecure, feeling uncomfortable, affected, unpleasant incidents)

Each was rated on a VAS 0–100 with 0 indicating lowest and 100 highest possible. Finally, preference of bedside versus outside ward rounds regarding six ward round related aspects:

- being informative for patients
- being instructive for staff
- being economical
- efficiency
- patient comfort
- HCPs comfort

Each was rated on a VAS 0–100 with 0 indicating bedside preference and 100 outside the room preference. Additionally, within the survey there was the opportunity to provide qualitative feedback using free text remarks within the survey.

Statistical analysis: For primary and secondary analyses, staff satisfaction with the ward round was compared between randomization arms using Student's t-test. Multivariable hierarchical models adjusted for age, gender and centre were calculated. As some physicians and nurses completed several questionnaires, hierarchical regression models were used to control for participants as a random effect. Last, subgroup analyses within the different professions were performed.

3.1.2 *Preference for Participation in Medical Decision-Making: Secondary Analysis of the BEDSIDE-OUTSIDE Trial*

Outcome measures: Primary endpoint was patients' average subjective knowledge regarding their medical care as described above. Secondary outcomes included patients' objective knowledge as described above, different aspects of perceived quality of care such as satisfaction with hospital stay or patients' trust in the healthcare team, all rated on a visual analogue scale from 0 to 100. Moreover, timeliness of the ward rounds per patient and whether sensitive topics were discussed on a nominal 3-point scale (1 = yes, 2 = no, 3 = not applicable) were rated from the audio recordings of the ward

rounds. Patients' DCP was assessed through the Control Preference Scale by a member of the study team before the ward round. The five categories of the Control Preference Scale were collapsed into three categories: "*active*" (combining active and active- shared), "*collaborative*", and "*passive*" (combining passive-shared and passive).

Statistical analysis: Descriptive statistics such as frequencies as well as means and standard deviations were calculated to describe population characteristics. One-way ANOVA was performed in order to compare primary and secondary outcomes between patients with passive, collaborative, and active DCP. Additionally, to evaluate differences between patients with passive and collaborative as well as passive and active DCP regarding primary and secondary outcomes, linear and logistic regression analyses were performed. Linear and logistic regression models were adjusted for study centre and randomization.

3.1.3 The occurrence of sensitive topics during ward round: An ancillary analysis of the BEDSIDE-OUTSIDE Trial

Outcome measures: The primary endpoint for this analysis was patients' overall satisfaction, defined by the mean of all satisfaction measures (see above) measured on a visual analogue scale (VAS) of 0-100, with 0 indicating the lowest and 100 the highest possible satisfaction. For this study, patient satisfaction below the median was defined as low satisfaction. Secondary endpoints included specific satisfaction outcomes, patients' subjective and objective knowledge of their own medical situation, timeliness of the ward round, multiple items relating to patients' perception of time spent on the ward round, patients' discomfort during the ward round, physician behaviour during the ward round, and general quality of care (all as described above).

Statistical analysis: Baseline parameters and outcomes were stratified among patients with and without sensitive topics. Logistic regression analyses were conducted to evaluate factors associated with sensitive topics. Univariate linear and logistic regression models were conducted to investigate associations of sensitive topics with primary and secondary endpoints. Additionally, multivariable models adjusted for study centre and randomisation arm (bedside or outside) were calculated. In the subgroup of patients with sensitive topics, potential risk factors for low satisfaction compared to high satisfaction were assessed using Student's t-test.

3.2 *Two cross-sectional surveys to assess the resuscitation preferences and identify predictors influencing decision-making within the general Swiss population and healthcare professionals*

3.2.1 "Do-not-resuscitate" preferences of the general Swiss population: Results from a national survey

Study setting and population: A nationwide web-based survey was conducted in Switzerland on a representative sample of the general adult population (18–99 years) provided by LINK Zurich, a commercial polling firm. Data was collected across all language regions of Switzerland and every Swiss inhabitant with a mobile or landline phone in his/her household (relates to >98% of Swiss

households according to Swiss Federal Statistical Office, bfs.admin.ch) had the same likelihood of being recruited. In this way, the greatest possible generalisability of the data was achieved.

Data collection: Participants were invited to complete a web-based questionnaire and received a monetary compensation with local custom expense allowance from LINK.

Outcome measures: Primary endpoint was the reported rejection rate of resuscitation (Do-not-resuscitate Code Status, DNR) versus wish for cardiopulmonary resuscitation (CPR Code Status) in a clinical case vignette of a 70-year-old patient suffering an out-of-hospital cardiac arrest with a no-flow time (time from collapse to start of CPR)(Adnet et al., 2017) of 10 minutes:

> *Imagine being 70 years old. You have high blood pressure and diabetes. During a walk, you suddenly suffer a cardiac arrest. You lose consciousness and fall to the ground. You don't breathe anymore, and your heart has also stopped beating. A passerby notices your distress and immediately calls an ambulance, but the person is overwhelmed by the situation and doesn't take any measures. After 10 minutes, the emergency medical service arrives. Would you want to be resuscitated in this specific situation?*

The secondary endpoint was the respondents' own personal DNR preference, independent of the case vignette. The questionnaire included possible predictors

- Population characteristics
- How long after cardiac arrest should resuscitation not be attempted anymore
- The wish for or against mechanical ventilation in the case of severe illness
- Preferences for end-of-life care (prioritizing either the prolonging life or alleviation of pain)
- Preferred location in case of imminent death
- Estimate of survival rates with independence in activities of daily living after an out-of-hospital or in-hospital cardiac arrest that were later on compared with IHCA and OHCA survival data, which shows a survival rate until hospital discharge with independence in activities of daily life of approximately 18.0% for IHCA and 8.5% for OHCA(Virani et al., 2021)
- Existence of an advance directive
- Religious beliefs
- Individual beliefs about an afterlife
- Previous admission to intensive care
- Previous admission of a relative to intensive care
- Having witnessed cardiopulmonary resuscitation in the past
- History of cardiac arrest
- Medical and psychiatric comorbidities
- Perceived self-rating of health measured by the validated EQVAS visual analog scale from 0-100(Cheng, Tan, & Luo, 2021)
- Symptoms of anxiety measured by the validated German version of the Generalised Anxiety Disorder-2 questionnaire (GAD-2)(Wild et al., 2014)
- Symptoms of depression measured by the validated German version of the Patient Health Questionnaire-2 (PHQ-2)(Löwe, Kroenke, & Gräfe, 2005).

Regarding resuscitation and mechanical ventilation, participants were asked to choose between four options (yes, probably yes, probably no, no), which were later dichotomised.

Statistical analysis: Baseline parameters and survey questions were stratified according to primary and secondary endpoints. Moreover, the following analyses were performed: i) Logistic regression to evaluate associations between the above factors and the endpoints; ii) Multivariate linear and logistic regression models adjusted for age and sex to control for population characteristics; iii) Calculations of a final overall model including all parameters associated in univariate analysis with the primary and secondary endpoints; and iv) Univariate subgroup analyses of age categories, as well as anxiety and depression scores.

3.2.2 Misconceptions and do-not-resuscitate preferences of healthcare professionals commonly involved in cardiopulmonary resuscitations: Results from a national survey

Study setting and population: A nationwide web-based survey was conducted in Switzerland among HCPs regularly involved in the care of in- and out-of-hospital cardiac arrest patients (Paramedics and prehospital emergency physicians, emergency nurses and emergency physicians, intensive care nurses and intensive care physicians, nurse anaesthetists and anaesthesiologists) and compared to a representative general population cohort from a recently published study.(Gross et al., 2023)

Data collection: National Societies of the respective subspecialties, the anaesthesia departments of four large Swiss tertiary care centres (University Hospital Zurich, University Hospital Basel, Cantonal Hospital St. Gallen, and Cantonal Hospital Aarau) and six large emergency services were contacted and asked to participate in the survey. The emails were only sent once without a reminder, and the number of emails sent was registered to calculate the response rate.

Outcome measures: Primary endpoint was the reported rate of DNR Code Status in the case vignette described above. Accordingly, the second endpoint was respondents' own personal DNR preference, independent of the case vignette. In addition to the predictors described above, which were also used for this survey, we gathered profession-related information: profession, specialty and subspecialty, highest educational degree, years of work experience since degree, living conditions, number of children, type of emergency service.

Statistical analysis: Baseline characteristics and outcomes of healthcare professionals were compared with the general population sample using two-tailed Student's t-test. Among healthcare professionals, multivariate linear and logistic regression models were performed to assess potential predictors for primary and secondary outcomes. The association of different professions with baseline characteristics and outcomes was evaluated using multivariable linear and logistic regression. Multivariate models adjusted for age and sex were set up to control for population characteristics.

4 Summary of the results

4.1 Three ancillary analyses of the randomised controlled BEDSIDE-OUTSIDE trial

4.1.1 Perception of physicians and nursing staff members regarding outside versus bedside ward rounds: ancillary analysis of the randomised BEDSIDE-OUTSIDE trial

Between July 2017 and October 2019, we received 891 responses from HCPs (nurses: 138 [15.6%], residents 237 [26.8%], attending physicians 261 [29.6%], consultants 69 [7.8%] and chief physicians 178 [20.2%] from a total of 76 nurses, 88 residents, 45 attending physicians, 26 consultants and 9 chief physicians). There were a total of 486 reports of bedside and 405 outside the room ward rounds. Baseline characteristics between groups were comparable with a mean age of 38 years, average professional experience of 12 years, and 51% of the staff being female.

Primary endpoint: Univariate regression analyses revealed that mean ± standard deviation (SD) satisfaction of staff members was higher with outside the room than with bedside ward rounds (78.03 ± 16.96 versus 68.25 ± 21.10; difference –10.11, 95% CI –12.36 to –7.85; p<0.001). These results stayed significant in multivariable analyses adjusted for age, gender and centre (adjusted difference –10.46, 95% CI –12.73 to –8.19; p<0.001). Subgroup analysis of the primary endpoint within professions revealed mean ± SD satisfaction of nurses to be higher with bedside ward rounds (69.20 ± 20.32 versus 65.32 ± 20.92; adjusted difference 4.35, 95% CI –1.79 to 10.51; p<0.001) and satisfaction of attending physicians to be higher with outside the room ward rounds (66.59 ± 21.82 versus 82.63 ± 13.87; adjusted difference –16.51, 95% CI –20.29 to –12.72; p=0.002).

Secondary endpoints: Staff perception of time management during ward rounds as well as staff perception of addressing sensitive topics during ward rounds were lower for bedside presentation. Staff discomfort during ward rounds was higher in the bedside group than the outside group. Attending physicians preferred outside the room presentations in all aspects and nursing staff preferred bedside presentation in terms of being more informative for patients.

Qualitative analysis: Overall, there were 306 free text comments. It revealed that the main concerns of attending physicians and nurses included patients' confusion due to medical jargon at the bedside ward round. Nurses also stated perceived lack of interprofessional communication by the patients during ward rounds. All physicians, but especially consultants, commented on their reluctance to address sensitive topics (e.g., lack of treatment adherence, substance abuse) at the bedside ward round because of potential negative reactions from patients or to avoid violation of confidentiality in multi-bedrooms.

4.1.2 Preference for Participation in Medical Decision-Making: Secondary Analysis of the BEDSIDE-OUTSIDE Trial

Of the 919 patients enrolled in the original trial, 158 had missing information regarding their DCP and were excluded from this analysis. Baseline characteristics of the remaining 761 patients were comparable between groups with a mean age of 64.5 years and 39% being female. Overall, 62.2% of

patients had a collaborative DCP, and 22.4% preferred a passive and 15.4% an active role, regarding medical decision-making.

Primary endpoint: Patients with a passive DCP reported a similar subjective knowledge (mean, 81.3 ± 19.4) compared to patients with a collaborative DCP (mean, 78.7 ± 20.3) and active DCP (mean, 81.3 ± 21.5, p=0.25). There was no significant difference between passive DCP and collaborative DCP (adjusted difference −2.52, 95%CI −6.06 to 1.03; p=0.164) as well as between passive DCP and active DCP (adjusted difference −0.04 points, 95% CI −4.81 to 4.73; p=0.986). An additional model adjusted for age, gender, and education showed similar results.

Secondary Endpoints: Objective knowledge was similar between patients reporting a passive, collaborative, and active DCP (mean 70.2 ± 25.4, 72.4 ± 24.2, and 72.6 ± 25 respectively, p=0.59). There was a significant correlation between patients' subjective and objective knowledge (Spearman's rho, 0.22; p<0.001). Regarding patients' trust in physicians and nurses, we found that patients with an active versus passive DCP reported significantly less trust in physicians (adjusted difference −5.08, 95%CI −8.69 to −1.48; p=0.006) and in nurses (adjusted difference −3.41, 95% CI −6.51 to −0.31; p=0.031). Also, patients with an active versus passive DCP were significantly less satisfied with their hospital stay (adjusted difference −7.17, 95% CI −11.01 to −3.34; p<0.001). Duration of ward rounds per patient was on average 1.5 min shorter in patients reporting a passive DCP compared to active DCP (adjusted difference 1.66 min, 95% CI 0.46 to 2.86; p=0.007). Sensitive topics were less often addressed in patients with passive DCP compared to patients with active DCP (OR 1.92, 95%CI 1.10 to 3.37; p=0.022).

4.1.3 The occurrence of sensitive topics during ward round: An ancillary analysis of the BEDSIDE-OUTSIDE Trial

Overall, 474 (51.6%) patients had at least one sensitive topic needing discussion during the ward round. In total, 791 sensitive topics emerged during ward round discussions, including: medical uncertainty (n=251), psychiatric comorbidities (n=161), tumour diagnosis (n=137), social issues (n=125), non-adherence (n=43), previous conflicts between patient and treating team (n=38), and treatment failure (n=36). The mean age was 65 years ± 15.9 years (SD). Patients with and without sensitive topics were of comparable age. Overall, 39.3% (n=361) of patients were female with no differences regarding the occurrence of sensitive topics to that of males. Patients' number of children, family status, citizenship, level of education, and occupation were not associated with the presence of sensitive topics. Individuals with psychiatric comorbidities, however, were more likely to have sensitive topics present (73/474 [15.4%] versus 31/445 [7.0%], p<0.001; adjusted OR 1.97, 95% CI 1.21 to 3.2; p=0.006). Quality of life regarding mobility, self-care, usual activities, pain / discomfort, and anxiety / depression was perceived lower by patients with sensitive topics; consequently, resulting in a lower EQ-5D quality of life index score.

Primary endpoint: Patients with sensitive topics reported lower overall satisfaction (87.7 ± 14.6 versus 90.2 ± 12.1, p=0.006; adjusted difference -2.5, 95%CI -4.28 to -0.72; p=0.006).

Secondary Endpoints: Sensitive topics were associated with less subjective knowledge (77.8 ± 22 versus 81.2 ± 19; adjusted difference -3.86, 95% CI -6.57 to -1.15; p=0.005) and objective knowledge (68.7 ± 25.8 versus 72.6 ± 24.9; adjusted difference -3.83, 95% CI -7.18 to -0.48; p=0.025). Duration of outside the room discussions, bedside discussions, and debriefings was longer in patients with sensitive topics. Mean (±SD) duration (min) of ward round per patient was 14.5 ± 5.6 versus 11.3 ± 4.6; adjusted difference 3.13, 95% CI 2.47 to 3.79; p<0.001. Compared to patients without sensitive topics, patients with sensitive topics felt more uncomfortable (4.5 ± 15.6 versus 8.2 ± 21.6; adjusted difference 3.2, 95%CI 0.64 to 5.76; p=0.014) and unsettled (4.4 ± 15.9 versus 7.2 ± 19.9; adjusted difference 2.84, 95%CI 0.22 to 5.45; p=0.034) during the ward round, and discussions causing them to worry (6.6 ± 25.7 versus 11.7 ± 24.8; adjusted difference 4.82, 95% CI 1.4 to 8.24; p=0.006). They also felt less confident with the physician team (91.9 ±14.4 versus 89.5 ± 16.8; adjusted difference -2.52, 95%CI -4.65 to -0.4; p=0.02), whereas there were no significant differences in confidence with the nursing team.

In a subgroup analysis among patients with sensitive topics, risk factors for low satisfaction included several parameters concerning patient-physician interaction such as disagreements during ward rounds (mean [SD] 14/212 [6.6%] versus 41/254 [16.1%]; adjusted OR 2.78, 95%CI 1.47 to 5.27; p=0.002).

4.2 *Two cross-sectional surveys to assess the resuscitation preferences and identify predictors influencing decision-making within the general Swiss population and healthcare professionals*

4.2.1 "Do-not-resuscitate" preferences of the general Swiss population: Results from a national survey

Of 4935 panellists asked to participate in the web-based survey, 1044 subjects were included in the final analysis (21.2% response rate). Regarding the case vignette (primary endpoint), 59.5% (n=621/1044) of the subjects, preferred CPR Code Status versus 40.5% (n=423/1044) that preferred DNR Code Status. Among the 1030 participants that reported preferences about their own personal code status, 20.3% (n=209) preferred a DNR Code Status. This frequency was higher among participants that preferred a DNR code status in the case vignette (44/617 [7.1%] versus 165/413 [40.0%]; OR 2.44, 95% CI 1.67 to 3.55; p<0.001). The mean age of participants was 45 years ± 16 years (SD). Participants with preference for DNR Code Status were significantly older than participants with no preference for DNR Code Status (mean [SD] 48 years ± 16 years versus 43 years ± 16 years; OR per decile increase 1.12; 95%CI 1.07 to 1.17; p<0.001). Overall, 49.4% (n=516) of respondents were female, and there was no difference in the primary endpoint between male and females. Professions differed significantly between groups (p=0.007), and unemployment was a predictor of opposition to DNR Code Status.

Primary endpoint: The strongest predictors in the overall model were estimated cardiac arrest survival (adjusted OR per decile increase 0.91, 95% CI 0.84 to 0.99; p=0.022, preferred own DNR Code Status (adjusted OR 2.44, 95% CI 1.67 to 3.55; p<0.001), time-period (minutes) after which own

resuscitation should not be attempted, and preference against being intubated (adjusted OR 1.95, 95% CI 1.2 to 3.18; p=0.007).

Secondary Endpoint: The most important predictors in the overall model were: residence in the French-speaking region of Switzerland (adjusted OR 0.41, 95% CI 0.24 to 0.7; p=0.001), estimated survival following cardiac arrest (adjusted OR increase per decile 0.89, 95% CI 0.83 to 0.96; p=0.002), time-period (minutes) after which resuscitation should not be attempted, and preference against being intubated (adjusted OR 1.64, 95% CI 1.02 to 2.64; p=0.041). Univariate subgroup analysis of age categories (divided by quartiles) showed young age (40 years) to be negatively associated with DNR Code Status in the case vignette, and middle age (41–60 years) to be positively associated with a DNR Code Status. Having witnessed a cardiopulmonary resuscitation was positively associated with a DNR Code Status. Showing symptoms of an anxiety disorder indicated by the GAD-2 questionnaire (11.6% of participants) and was negatively associated with a DNR Code Status.

4.2.2 Misconceptions and do-not-resuscitate preferences of healthcare professionals commonly involved in cardiopulmonary resuscitations: Results from a national survey

Overall, 6876 HCPs were contacted via email. Of these, 1822 responded (26.5% response rate) and 1803 were included in the final analysis. Of the 1722 HCPs giving information about their profession, 815 (47.2%) identified themselves as paramedics, 580 (33.7%) as physicians, and 330 participants (19.2%) as nurses. Our cohort expressed a long-standing professional experience (mean professional experience 14.2 years ± 10.4 years [SD]), resulting in 67.7% of participants with a substantial CPR experience of 21 to 50 cases.

Primary endpoint: Regarding the case vignette, 85% (n=1532) of the 1803 subjects preferred DNR Code Status. The primary predictor for a DNR Code Status in the case vignette was the OHCA survival estimate whereas lower OHCA survival estimates (mean ± SD 12.3 ± 11.8 versus 14.7 ± 12.8; adjusted OR 0.98, 95% CI 0.97 to 0.99; p=0.001) were negatively associated with a DNR Code Status in the case vignette. However, estimated IHCA survival did not correlate with DNR Code Status. Preferring a DNR Code Status for their own (secondary endpoint) was also predictive for a DNR Code Status in the case vignette (896 [58.5%] versus 87 [32.1%]; adjusted OR 2.97, 95% CI 2.25 to 3.92; p<0.001). Further predictors for a DNR Code Status in the case vignette included a shorter no-flow time after which resuscitation should not be attempted anymore, not wanting to be mechanically ventilated, not believing in an afterlife, no symptoms of anxiety, lower perceived quality of life and having an advance directive.

Secondary Endpoint: Regarding their personal resuscitation preference, 53.2% (n=932) of HCPs preferred DNR Code Status independent of the circumstances. Main predictors for own DNR Code Status included lower estimated IHCA survival (mean ± SD 26.3 ± 19.5 versus 29.0 ± 20.9; adjusted OR 0.99, 95% CI 0.99 to 1; p=0.001) and OHCA survival (mean ± SD 11.4 ± 10.6 versus 14.0 ± 13.1; adjusted OR 0.98, 95% CI 0.97 to 0.99; p<0.001). Preferring a DNR Code Status in the case vignette (primary endpoint) also predicted the own DNR Code Status preference. Further predictors for the own DNR Code Status preference included a shorter no-flow time after which resuscitation should not be

attempted anymore, not wanting to be mechanically ventilated, not believing in an afterlife, not having children, having an advance directive, and having more professional experience.

Interprofessional differences: 57.5% of HCPs (n=1005) correctly estimated survival with independence in activities of daily living after an OHCA. In contrast, only 25.3% of HCPs (n=443) correctly estimated survival with independence in activities of daily living after an IHCA. Physicians and paramedics had the highest proportion of correct estimations regarding OHCA outcomes (61.7% [physicians/paramedics] versus 38.2% [nurses], p<0.001). When looking at IHCA outcomes, physicians expressed the highest proportion of correct answers (31.7% [physicians] versus 14.5% [nurses] & 26.6% [paramedics], p<0.001). Compared to physicians, nurses gave higher IHCA and OHCA survival estimations. However, there was no difference when comparing physicians and paramedics. Regarding the primary outcome, in physicians, nurses, and paramedics the rate of DNR orders was comparable. However, regarding the secondary outcome, physicians more often chose a DNR order than nurses and paramedics. Also, physicians were less likely to refuse mechanical ventilation than nurses and paramedics.

Differences between the Swiss general population and healthcare professionals: The mean age of HCPs was slightly lower than the mean age of the Swiss general population (41 years ± 11 years versus 45.4 ± 16.3 years, p<0.001). Gender distribution was comparable between populations (528 [50.6%] versus 975 [54.3%], p=0.056 were male, for the Swiss general population and HCPs, respectively). Compared to the Swiss general population, HCPs reported lower IHCA- (mean ±SD 41.6 ± 25.5 versus 27.7 ± 20.6, p<0.001) and OHCA survival estimates (mean ± SD 62.9 ± 25.1 versus 12.7 ± 12.1, p<0.001). The majority of the general Swiss population overestimated IHCA and OHCA survival chances. 57.6% (n=1038) of HCPs estimated OHCA survival correctly (±5%), whereas 12.5% (n=225) underestimated and 30% (n=540) overestimated it. IHCA survival was correctly (±5%) estimated by 25.2% (n=455), underestimated by 27.2% (n=491), and overestimated by 47.5% of subjects. Further, compared to the Swiss general population, HCPs were less religious, reported fewer symptoms of anxiety and depression, reported a higher quality of life, and more often had an advance directive.

5 Discussion

This dissertation showed that in a broad medical inpatient setting, HCPs are less satisfied with bedside ward rounds compared to ward rounds conducted outside the patient room, especially when it comes to the discussion of sensitive topics. In patients, sensitive topic discussions were associated with lower satisfaction compared to patients without sensitive topics. Also, patients who preferred to actively decide on medical decisions themselves, had lower trust in the HCPs and lower overall satisfaction despite similar perceived medical knowledge. Further, a nationwide survey among the Swiss general population and HCPs regularly involved in cardiopulmonary resuscitation demonstrated that the own beliefs about survival chances after cardiac arrest are predictive for the personal resuscitation preference. Survival chances were highly overrated by the general population and slightly overrated by HCPs.

5.1 Three ancillary analyses of the randomised controlled BEDSIDE-OUTSIDE trial

5.1.2 Perception of physicians and nursing staff members regarding outside versus bedside ward rounds: ancillary analysis of the randomised BEDSIDE-OUTSIDE trial

In this ancillary analysis, HCPs satisfaction with bedside and outside the room ward rounds was evaluated. Results suggested overall higher satisfaction with outside the room ward rounds. This was also true for the secondary outcomes, where higher ratings were found in the outside the room group for HCPs perception of time management, discussion of sensitive topics and discomfort during ward rounds. Importantly, we also found a marked difference between physicians and nurses, with nursing staff members preferring bedside presentation.

First, the differences between nurses and physicians in satisfaction might be due to nurses having less opportunity to join the more academical and education-focused discussions outside the room. Accordingly, literature previously described that nurses' contribution during ward rounds is underrepresented and that most interprofessional communication between physicians and nurses occurs at the bedside compared to outside the room.(Stickrath et al., 2013; Weber et al., 2007) This may be a potential deficiency since nurses see patients performing in daily activities in ward rounds.(Roter & Larson, 2002) In line with this, our qualitative analysis revealed that for nurses perceive outside the room discussions as too long and teaching of residents making up a large part of it, leading to long waiting periods in which nurses are being left out.

Second, physicians reporting lower satisfaction with bedside presentation in this trial is lines up with existing contradictory data.(Chauke & Pattinson, 2006; Seo et al., 2000) Gonzalo et al. (2009) suggests an ongoing transitioning from bedside to the hallway and conference rooms despite learners' beliefs that bedside learning is important for professional development and suggest the necessity to re-examine current teaching methods in internal medicine services.(Gonzalo et al., 2009)

Third, previous literature and the qualitative analysis of this trial suggest two major motivations of physicians for preferring outside the room presentations: the difficulty of discussing sensitive topics and the chance to avoid patient confusion.(Chauke & Pattinson, 2006; Seo et al., 2000) That bedside

presentations may lead to patient confusion was indeed a finding of our initial report of this trial.(C. Becker et al., 2021) However, despite confusion in patients presented similar medical knowledge, making bedside rounds feasible. Although we do not have specific information why sensitive topics were avoided, our data call for efforts to further study how to best address sensitive topics during ward rounds and how to train physicians in this regard.

5.1.2 Preference for Participation in Medical Decision-Making: Secondary Analysis of the BEDSIDE-OUTSIDE Trial

In this ancillary analysis 3 in 4 patients preferred to participate in medical decision-making actively or collaboratively and only a minority preferred a passive role. DCP was not associated with patients' subjective and objective knowledge regarding their medical care and although knowledge was similar between groups, patients with an active DCP were significantly more critical regarding their medical care with lower trust in the healthcare team and lower satisfaction with their overall hospital stay.

First, this analysis closes a knowledge gap and now confirms that DCP has little influence on patients' knowledge and may thus not be used as an indicator regarding best place for conducting ward rounds. While DCP has been investigated in different specific patient populations (e.g., patients with cancer), there has been little evidence in unselected medical inpatients. Herein, our analysis provides important new insights in a large sample of patients with different main diagnoses.

Second, in line with previous research, we found that DCP appears to be closely related to patients' perception regarding their care received.(Phipatanapanit, Pongthavornkamol, Wattakitkrileart, Viwatwongkasem, & Vathesatogkit, 2019; Ruhnke et al., 2020) In our analysis, patients with an active DCP were significantly less satisfied with their hospital stay and had significantly less trust in the physician and nursing team compared to patients with a passive DCP than patients with a passive DCP. Although the significant differences might appear small, literature has shown that ratings of patient-related experience measures often show ceiling effects with little or no difference.(Badejo et al., 2022) Moreover, we found consistent associations of patients' DCP with patients' trust in the healthcare team and satisfaction with hospital stay as two different measures of perceived quality of care, suggesting that our finding is clinically relevant. Regardless of the mechanism, patient satisfaction is increasingly seen as a critical quality indicator in healthcare.(Cleary & McNeil, 1988; Lyu, Wick, Housman, Freischlag, & Makary, 2013; Mehta, 2015) Thus, early identification of patients' DCP and the use of a more personalised approach may be needed. Consequently, future studies should evaluate whether interventions specifically designed to patients' DCP may improve patient-reported experience measures.

Third, our results suggest that patients with a passive DCP appear to be less involved in their medical care with shorter ward round duration and less sensitive topics being discussed compared to patients with a collaborative and active DCP. Although this might be in accordance with patients' preferred role in medical decision-making at a first glance, an Australian trial found that most physicians responded to passive patients by talking most of the time, after outlining their own agendas.(Rhonda F Brown et al., 2002) Thus, physicians should make sure that these patients and their needs are not neglected. Regardless of patients' DCP, literature suggests that actual patient involvement may improve various

aspects of quality care such as patient satisfaction(Birkeland, Bismark, Barry, & Möller, 2022) or adherence to treatment regimen(Rachmani, Levi, Slavachevski, Avin, & Ravid, 2002) and may decrease healthcare utilization(Bertakis & Azari, 2011) and charges of malpractice.(Birkeland, Bismark, Barry, & Möller, 2021; Finset, 2011)

5.1.3 The occurrence of sensitive topics during ward round: An ancillary analysis of the BEDSIDE-OUTSIDE Trial

This ancillary analysis showed that more than half of patients reported at least one specific sensitive topic during medical ward round with medical uncertainty being the most frequent discussed issue. The presence of sensitive topics in patients was associated with being less satisfied overall with medical care. Moreover, risk factors for low satisfaction among patients with sensitive topics included several parameters regarding patient-physician interaction during the ward round (various disagreements) - highlighting the importance of patient-centred communication.

First, medical uncertainty was the most frequent sensitive topic and has previously shown to negatively affect patients' and physicians' satisfaction.(Bovier & Perneger, 2007; Guan, Santacroce, Chen, & Song, 2020) Guidance on how best to deal with medical uncertainty and how to address it in the patient's presence is warranted to ensure both physician well-being and patient-centred care. Specific communication skills training may help achieve these aims.

Second, in contrast to previous literature in outpatient settings our study found lower satisfaction in patients with sensitive topics compared to patients without sensitive topics.(Brahmania et al., 2015; Jonathan D Brown & Lawrence S Wissow, 2009) This may be due to several factors including lack of privacy, time constraints, lack of training and standards how to best address sensitive topics among others. However, patients did not state that their privacy was violated and mostly stated that the time was perceived sufficient. It would be important to study the effect of addressing sensitive topics in the inpatient population regarding satisfaction with care in an interventional study.

Third, over the last decades, medicine has shifted from a paternalistic to a participatory, patient-involving model. This may contain potential for conflict, as *study II* showed that patients with active decisional preference are less satisfied with their care and have less trust in the healthcare team compared to patients preferring less involvement in medical decisions. This is in line with the present findings, suggesting that disagreements are a risk factor for low satisfaction. A patient's wish for participation is therefore relevant, and a more personalised approach may improve the patient-physician relationship and increase patients' satisfaction with medical care.

5.2 *Two cross-sectional surveys to assess the resuscitation preferences and identify predictors influencing decision-making within the general Swiss population and healthcare professionals*

5.2.2 "Do-not-resuscitate" preferences of the general Swiss population: Results from a national survey

Within this representative sample of the Swiss population, approximately 40% of individuals preferred a DNR Code Status in the hypothetical case vignette. In line with previous literature, when considering

DNR status for themselves in case of cardiac arrest, the rate dropped to 20%.(Bernacki et al., 2020; Dunlay, Swetz, Redfield, Mueller, & Roger, 2014) Key predictors for DNR preference were personal preferences and the overestimation of good neurological outcome after cardiac arrest.

First, besides key predictors our study revealed older age, cultural background (i.e. residence in the German-speaking part of Switzerland), and fewer religious beliefs to be strong predictors for the preference of a DNR Code Status in the case vignette which is in line with previous research.(Christoph Becker et al., 2021; Freitas & Zhang, 2019) Physicians should thus avoid assumptions about affiliations of spiritual/religious beliefs and decisions regarding resuscitation. Symptoms of anxiety (but not depression) were negatively associated with a preference of DNR Code Status in the clinical case vignette. One might hypothesise that higher levels of anxiety increase the fear of dying, which in turn may influence Code Status preferences. In fact, a trial including 200 psychiatric patients found anxiety surrounding death to be a strong predictor of psychopathology, including depression and anxiety.(Menzies, Sharpe, & Dar-Nimrod, 2019)

Second, when looking at the secondary endpoint, only 20% of participants preferred DNR for themselves. At first, the lower proportion of DNR Code Status compared to the case vignette seems counterintuitive. However, difference might be partly explained when younger and presumably healthier individuals than the case vignette put themselves into the place of a 70-year-old OHCA patient with significant comorbidities and a no-flow time of 10 min.

Third, mean survival the effectiveness of CPR was largely overestimated for both, OHCA and IHCA by participants in our study. These unrealistic beliefs and misconceptions concerning the success of CPR are in line with previous research in the field (Marco & Larkin, 2008; Nava et al., 2008) and may be influenced by misinformation through television, movies and other media.(Cindy C Bitter, Neej Patel, & Leslie Hinyard, 2021; Diem et al., 1996; Nava et al., 2008) Moreover, even though CPR results in mechanical ventilation in two third of cases, 50% of participants choosing CPR Code Status in the case vignette were against it resulting in a clinical dilemma with the potential of disrespecting the participants' wishes.(Andersen et al., 2017)

This study has several implications for research and clinical practice: i) clinicians should be aware of patients' possible misconceptions and clinically conflicting preferences and must addressed these when conducting Code Status discussions. A multicentre trial using a checklist guided shared decision-making process for medical inpatients is currently being conducted by our research group in Switzerland (https://clinicaltrials.gov/ct2/show/NCT03872154). ii) improved education of the public could change opinions and increase preference for DNR. iii) future public informational programs should thus educate the general population and specific patient groups on the possible choices and outcomes of CPR, as in Wales via the "Talk CPR" project for individuals affected by life limiting illnesses.(Taubert, Norris, Edwards, Snow, & Finlay, 2018)

5.2.3 *Misconceptions and do-not-resuscitate preferences of healthcare professionals commonly involved in cardiopulmonary resuscitations: Results from a national survey*

In this multicentre study of HCPs commonly involved in cardiopulmonary resuscitation, a preference for DNR Code Status was found in 85% in the clinical case vignette described above. When making a general personal decision, more than half of the HCPs preferred a DNR Code Status for themselves. Over- and underestimation of survival rates and refusal of mechanical ventilation were predictive for a DNR Code Status in the case vignette and when HCPs were making a personal decision for themselves.

First, the proportion of DNR Code Status was significantly higher among HCPs than among the general population. This is in line with comparable research in the field and might result from the frequent confrontation of the surveyed HCPs with bad outcomes after cardiac arrest.(Marik, Varon, Lisbon, & Reich, 1999) Moreover, there is pre-existing evidence that there might be substantial discrepancies between what HCPs assume to be a reasonable treatment for themselves and what is considered reasonable for their patients when making clinical decisions involving invasive and burdensome treatments.(Anstey et al., 2021; Fumis, Schettino, Rogovschi, & Corrêa, 2019) Such ethical dilemmas between own beliefs, expectations and patient preferences especially when providing perceived futile treatments might cause moral distress for intensive care practitioners, potentially resulting in symptoms of burnout and a change of profession.(Azoulay et al., 2009; Papazian, Sylvestre, & Herridge, 2018; St Ledger et al., 2021) Also, clinicians should keep in mind that many of the functional states (e.g., bowel and bladder incontinence or confinement in bed) commonly observed after critical illness are considered worse than death by a significant number of patients.(Rubin, Buehler, & Halpern, 2016)

Second, in accordance with survey within the Swiss general population described above, HCPs over- and underestimated the survival rate with independence in activities of daily living after cardiac arrest, albeit to a lesser extent. Although HCPs had a high exposure towards CPR, they substantially overestimated the no-flow time, after which resuscitation should not be attempted anymore. It is well known that a no-flow time of around 10 minutes is associated with a <2% chance of survival without neurological sequelae depending on the low-flow time.(Adnet et al., 2017)

Third, although intensivists and critical care societies advocate completing an advance directive, only 32.4% of HCPs in our survey possessed an advance directive.(Preamble, 2015) Notably, possessing an advance directive was predictive for a DNR Code Status, which might indicate previous personal engagement with this topic.

The present study has several implications for clinical practice, personal reflections, and future research: i) HCPs should be well aware of their prejudices, choices, and ethical values towards resuscitation when counselling patients regarding DNR and end-of-life decisions, as poor prognostic estimation, lack of communication skills, and physicians' attitudes toward death have been shown to interfere with modern end-of-life care.(Visser, Deliens, & Houttekier, 2014) This might potentially influence their counselling and shared decision-making. ii) HCPs should be aware that a reasonable number of professionals wrongly estimated survival with independence in activities of daily living and

overestimated the duration of a reasonable no-flow interval. Thus, we advocate that HCPs commonly counselling patients regarding Code Status and deciding about termination of CPR are aware of realistic outcome data and time intervals.

5.3 Synthesis of the present findings

Studies IV and *V* suggest that the estimation of survival with good neurological outcome is strongly associated with the decision for or against resuscitation measures in case of a cardiac arrest. Generally, a favourable outcome after cardiac arrest is overestimated. In order to make an informed decision whether or not patients prefer to be resuscitated, patients need to be properly informed about the prognosis and therapeutic options in case of cardiac arrest. Importantly, clinicians should be aware of the patients' possible misconceptions and address it in the code status discussion. Furthermore, considering the finding of *study III* which indicated that the majority of medical inpatients prefer a collaborative shared decision-making, it becomes evident that including discussions about prognosis and the patient's current health status is warranted in these cases.

As argued by *study I*, HCPs may feel uncomfortable when discussing sensitive topics directly with the patient. It is therefore important that HCPs are equipped with adequate communication skills as suggested by *studies I* and *III*. Moreover, this is also true considering the fact that *study III* found sensitive topics to be associated with low patient satisfaction. Future studies need to address this important topic by developing and implementing communication strategies in this regard.

5.4 Strengths and Limitations

Several strengths and limitations of this dissertation need further discussion. First, in *study IV*, the participants represent a large Swiss-nationwide sample, and collaboration with a polling-firm guaranteed high quality data and a low dropout rate (7%) representing another strength. Second, all trials used large samples with a minimum of 761 a maximum of 1822 participants included in the final analysis, representing major strength of this dissertation.

There are limitations to this dissertation. First, due to few pre-existing studies in areas of investigation, the focus was directed towards hypothesis-generating designs and several exploratory approaches were used. Causality, however, needs be assessed by future interventional studies. Second, there are limitations concerning generalizability: in *studies I, II,* and *III* we included only Swiss teaching hospitals. The surveys in s*tudies IV* and *V* were performed in Switzerland. Thus, results may not be applicable to other cultures or regions of the world. Third, the questionnaires used in the present trials were customised to accurately capture the exact aim of investigation and were, despite the use of several validated tools (e.g., EuroQol EQ-5D-3L, GAD-2, PHQ-2), not thoroughly validated. However, in *studies IV* and *V*, the questionnaire was developed in a three-step procedure involving experts from several disciplines and the public to maximise both, clinical relevance and comprehensibility.

6 Conclusion

The present dissertation synthesises several secondary analyses of randomised trials, as well as observational data highlighting situations where communication is a crucial factor directly influencing

satisfaction and outcomes of patients. This paves the way towards well-informed future interventions on professional patient-physician communication. These results stress the importance of teaching HCPs on how to communicate in clinical practice, particularly to address sensitive topics during ward rounds. Also, considering the patient's individual participation preferences during ward rounds is important and can lead to a more personalized approach in decision-making. Moreover, regarding DNR, HCPs should provide in-depth discussions with patients regarding resuscitation preferences to prevent misconceptions.

7 References

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8 Appendix

a. Study I

b. Study II

c. Study III

d. Study IV

e. Study V

f. The Control Preference Scale

g. Curriculum vitae

Appendix A

Study I

Gross S, Beck K, Becker C, Gamp M, Mueller J, Loretz N, Amacher SA, Bohren C, Gaab J, Schuetz P, Mueller B, Fux CA, Leuppi JD, Schaefert R, Langewitz W, Trendelenburg M, Breidthardt T, Eckstein J, Osthoff M, Bassetti S, Hunziker S. Perception of physicians and nursing staff members regarding outside versus bedside ward rounds: ancillary analysis of the randomised BEDSIDE-OUTSIDE trial. Swiss Med Wkly. 2022 Jan 19;152:w30112. doi: 10.4414/smw.2022.w30112. PMID: 35072414.

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Perception of physicians and nursing staff members regarding outside versus bedside ward rounds: ancillary analysis of the randomised BEDSIDE-OUTSIDE trial

Sebastian Gross[a], Katharina Beck[a], Christoph Becker[ab], Martina Gamp[a], Jonas Mueller[a], Nina Loretz[a], Simon A. Amacher[ac], Chantal Bohren[a], Jens Gaab[d], Philipp Schuetz[ef], Beat Mueller[ef], Christoph A. Fux[ef], Jörg D. Leuppi[eg], Rainer Schaefert[ae], Wolf Langewitz[ae], Marten Trendelenburg[eh], Tobias Breidthardt[eh], Jens Eckstein[eh], Michael Osthoff[eh], Stefano Bassetti[eh], Sabina Hunziker[ae]

[a] Medical Communication, Department of Psychosomatic Medicine, University Hospital Basel, Switzerland
[b] Emergency Department, University Hospital Basel, Switzerland
[c] Intensive Care, University Hospital Basel, Switzerland
[d] Division of Clinical Psychology and Psychotherapy, Faculty of Psychology, University of Basel, Switzerland
[e] Faculty of Medicine, University of Basel, Switzerland
[f] Division of Internal Medicine, Kantonsspital Aarau, Switzerland
[g] University Clinic of Medicine, Kantonsspital Baselland, Liestal, Switzerland
[h] Division of Internal Medicine, University Hospital Basel, Switzerland

Summary

BACKGROUND: We recently compared the effects of bedside and outside the room ward rounds on patients' knowledge about their medical care. Here, we report preferences of medical and nursing staff members regarding outside versus bedside ward rounds.

METHODS: Within this ancillary project of a large multicentre randomised controlled trial, we prospectively conducted a survey of medical and nursing staff members participating in the weekly consultant ward rounds in the internal medicine division of three Swiss teaching hospitals between July 2017 and October 2019. Participants were asked about their preferences on outside versus bedside ward rounds. The primary endpoint was satisfaction of healthcare workers with the ward round measured with a visual analogue scale from 0 to 100.

RESULTS: Between July 2017 and October 2019, 919 patients were included in the trial, and we received 891 survey responses (nurses 15.6%, residents 26.8%, attending physicians 29.6%, consultants 7.8% and chief physicians 20.2%. In the overall analysis, mean (± standard deviation) satisfaction of healthcare workers was higher with outside the room than bedside ward rounds (78.03 ± 16.96 versus 68.25 ± 21.10 respectively; age-, gender- and centre-adjusted difference of –10.46, 95% confidence interval [CI] –12.73 to –8.19; p <0.001). Healthcare workers reported better time management, more discussion of sensitive topics and less discomfort when case presentations were conducted outside the room. A stratified subgroup analysis considering the profession, however, showed strong differences, with nurses being more satisfied with bedside rounds (69.20 ± 20.32 versus 65.32 ± 20.92, respectively; adjusted difference 4.35, 95% CI –1.79 to 10.51; p <0.001), whereas attending physicians showed higher satisfaction with outside the room rounds (82.63 ± 13.87 versus 66.59 ± 21.82; adjusted difference –16.51, 95% CI –20.29 to –12.72; p = 0.002).

CONCLUSIONS: While bedside ward rounds are considered more patient centred and are preferred by the nursing staff, physicians prefer outside the room presentation of patients during ward rounds because of the perceived better discussion of sensitive topics, better time management and less staff discomfort. Continuous training including medical communication techniques may help to increase satisfaction of physicians with bedside ward rounds.

Trial registration: https://clinicaltrials.gov/ct2/show/NCT03210987

Correspondence:
Prof. Sabina Hunziker, MD, MPH
University Hospital Basel
Petersgraben 4
CH-4031 Basel
sabina.hunziker[at]usb.ch

Background

Patient involvement during medical ward rounds is important for patient-centred medicine, since it ensures the direct participation of patients in medical discussions and the decision-making process [1–4]. One element of ward rounds is the exchange of patient-related knowledge among professionals. This exchange can take place at the patients' bedside or outside the room. As both are currently used in medical practice, depending on the preference of the

medical team, a better understanding of patients', physicians' and nursing teams' perceptions and preferences is needed. A systematic literature search and meta-analysis including five randomised controlled trials and 655 participants found no differences between groups regarding patients' satisfaction and understanding of disease [5]. However, overall trial quality was moderate, and trial sequential analysis indicated power to be low. Recently, our research team conducted a large, randomised controlled trial in three Swiss teaching hospitals to compare effects of presentations at the bedside or outside the room regarding patients' average knowledge of three dimensions of their medical care: understanding of their disease, the therapeutic approach being used, and plans for future care [6]. Our data indicated that, compared with outside the room case presentation, bedside presentation was shorter and resulted in similar patient knowledge, but sensitive topics were more often avoided and patient confusion was higher. However, similarly to previous studies, we primarily focused on patient outcomes in our initial report. What was lacking, however, was a description of healthcare workers' perceptions and preferences. This might be an important aspect, since the satisfaction and well-being of physicians have been linked to delivery of higher quality care [7]. One study revealed that nursing staff prefer outside the room over bedside presentations [8]. Further, there are controversial findings about residents' and attending physicians' preferences [8–11]. However, these studies had limited sample sizes. Also, there are no studies from recent years.

Here, as an ancillary project of the BEDSIDE-OUTSIDE trial, we systematically compared satisfaction and preferences of physician and nursing staff concerning bedside versus outside the room ward rounds.

Material and methods

Study setting

We conducted an ancillary project to the BEDSIDE-OUTSIDE trial [6] looking at physicians' and nurses' satisfaction with ward rounds, when comparing beside case discussions with outside the room case discussions. In brief, the initial study was a pragmatic, investigator-initiated, open-label, non-commercial, multicentre randomised controlled trial conducted in the general internal medicine departments of three Swiss teaching hospitals (University Hospital Basel, Cantonal Hospital Aarau and Cantonal Hospital Basel-Land) between July 2017 and October 2019. The study was pre-registered at clinicaltrials.gov (https://clinicaltrials.gov/ct2/show/NCT03210987) and approved by the local Ethics Committee (Northwest and Central Switzerland, EKNZ, project ID: 2017-00991).

Ward round structure

The work-flow of the routine ward rounds was similar in the participating hospitals and comparable to most Swiss and many European hospitals. In addition to daily morning rounds by a resident, and then supervised by an attending physician, "consultant ward rounds" are conducted once a week. Here, a consultant (e.g., the head of service or one of his/her deputies) joins the morning round together with the medical team and the responsible nurse. Patients' cases are presented to the team by the resident followed by a detailed discussion including diagnostic and therapeutic measures complemented by further plans of care. In our main trial we specifically investigated a patient's first consultant ward round, which also sets the framework for this ancillary project.

Study population of the original study

We included consecutive adult patients newly admitted to medical wards for inpatient care who had their first once-a-week consultant ward round. Of all eligible patients only one per room was randomly selected for study inclusion. We excluded patients with cognitive or hearing impairment, patients who were unable to understand the local language(s) and patients who had previously been included in the study. All included patients provided written informed consent.

Study design and data collection

Patients were randomly assigned to the "bedside group" or the "outside the room group" in a 1:1 ratio stratified for the trial site. In both groups the ward round followed the usual practice in each participating hospital.

In the bedside presentation group, case presentations, discussions and clinical examination took place at the bedside in front of the patient. In the outside the room group, patient case presentation and discussions were primarily held in the hallway, without the patient being present. Afterwards, the team entered the room, the patient was given a short summary of the discussion outside the room, then completed the gathering of medical information, examined the patient as needed, answered questions and discussed the next steps.

Every weekly internal medicine consultant ward round was accompanied by a member of the investigation team collecting the email addresses of all participating healthcare workers. The data collection was implemented using LimeSurvey. Healthcare workers were informed about receiving a link to a survey via email after the ward round assessing their satisfaction, perception and preferences regarding the ward round. We sent individual reminders to participants who did not reply to the survey. There was no detailed description of the purpose of this study to avoid bias.

Patients, study coordinators and treating clinicians were not blinded to allocation. However, study investigators who were involved in a patient's outcome assessment were blinded to the patient's trial allocation.

Outcome measures of the current study

The primary endpoint was staff mean satisfaction with the ward round measured on a visual analogue scale (VAS) of 0–100 with 0 indicating lowest and 100 highest possible satisfaction.

Secondary endpoints included further outcomes regarding satisfaction (i.e. satisfaction with time management, staff team interaction and team-patient interaction), perception of time management during ward round (i.e. sufficient time, being rushed, ward round as planned, ward round terminated on time), perception of how sensitive topics

were addressed during ward round (i.e. discussion of sensitive topics, all important matters discussed) and discomfort during ward round (i.e. feeling insecure, feeling uncomfortable, affected, unpleasant incidents), each rated on a VAS 0–100 with 0 indicating lowest and 100 highest possible expression. Further secondary endpoints were preferences within different professions in terms of six ward round related aspects (i.e. being informative for patients, being instructive for staff, economical, efficient, patient comfort, healthcare workers' comfort) each rated on a VAS 0–100 with 0 indicating bedside preference and 100 outside the room preference.

Additionally, within the survey there was the opportunity to provide qualitative feedback using free text remarks within the survey.

Statistical analysis

For primary and secondary analyses, staff satisfaction with the ward round was compared between randomisation arms using Student's t-test. We also calculated multivariable hierarchical models adjusted for age, gender and centre. As some physicians and nurses completed several questionnaires, we used hierarchical regression models to control for participants as a random effect.

We further conducted subgroup analyses within the different professions. We used STATA 15.0 (Stata Corp., College Station, TX, USA) for all statistical analyses.

Results

Between July 2017 and October 2019, 919 patients were included in the trial and we received 891 responses (nurses: 138 [15.6%], residents 237 [26.8%], attending physicians 261 [29.6%], consultants 69 [7.8%] and chief physicians 178 [20.2%] from a total of 76 nurses, 88 residents, 45 attending physicians, 26 consultants and 9 chief physicians). There were a total of 486 reports of bedside and 405 outside the room ward rounds. Baseline characteristics were similar between groups (table 1). Mean age was 38 years, 35 years among nursing staff, 31 years among residents, 37 among attending physicians, 52 among consultants and 47 among chief physicians. The average professional experience was 12 years, and 51% of the staff were female.

Univariable regression analyses revealed that mean ± standard deviation (SD)satisfaction of staff members was higher with outside the room than with bedside ward rounds (78.03 ± 16.96 versus 68.25 ± 21.10; difference –10.11, 95% confidence interval [CI] –12.36 to –7.85; p <0.001). These results stayed significant in multivariable analyses adjusted for age, gender and center (adjusted difference of –10.46, 95% CI –12.73 to –8.19; p <0.001) (table 2).

Subgroup analyses by profession revealed mean ± SD satisfaction of nurses to be higher with bedside ward rounds (69.20 ± 20.32 versus 65.32 ± 20.92; adjusted difference 4.35, 95% CI –1.79 to 10.51; p <0.001) and satisfaction of attending physicians to be higher with outside the room ward rounds (66.59 ± 21.82 versus 82.63 ± 13.87; adjusted difference –16.51, 95% CI –20.29 to –12.72; p = 0.002) (fig. 1). Further subgroup analyses for secondary outcomes are provided as supplementary data in the appendix.

Regarding secondary endpoints, staff perception of time management during ward rounds as well as staff perception of addressing sensitive topics during ward rounds were lower for bedside presentation. Staff discomfort during ward rounds was higher in the bedside group than the outside group (table 2).

Figure 2 shows mean preferences within different professions in terms of six ward round-related aspects. We found that attending physicians preferred outside the room presentations in all aspects and nursing staff prefer bedside presentation in terms of being more informative for patients.

Table 3 presents selected comments of the qualitative remarks of the healthcare workers. Overall, there were 306

Table 1:
Characteristics of the participants stratified by location of ward rounds.

		n	All	Outside the room	Bedside	p-value
			n = 891	n = 405	n = 486	
Work-related factors	**Reports on ward rounds, n (%)**	883				
	Nurses		138 (15.6%)	60 (15.0%)	78 (16.2%)	0.76
	Residents		237 (26.8%)	112 (27.9%)	125 (25.9%)	
	Attending physicians		261 (29.6%)	118 (29.4%)	143 (29.7%)	
	Consultants		69 (7.8%)	35 (8.7%)	34 (7.1%)	
	Chief physicians		178 (20.2%)	76 (19.0%)	102 (21.2%)	
Professional experience (years) mean ± SD		884	11.6 ± 9.1	11.6 ± 9.2	11.6 ± 9.0	0.91
Socio-demographic factors	**Age all (years) mean ± SD**	872	38.36 ± 9.75	38.30 ± 9.75	38.41 ± 9.77	0.87
	Age nurses	138	35.35 ± 12.08	35.25 ± 12.08	35.42 ± 12.16	0.93
	Age residents	234	30.61 ± 2.98	30.76 ± 3.03	30.48 ± 2.94	0.48
	Age attending physicians	255	37.21 ± 5.27	37.05 ± 5.07	37.34 ± 5.45	0.66
	Age consultants	69	51.68 ± 3.83	51.63 ± 3.69	51.74 ± 4.02	0.91
	Age chief physicians	176	46.86 ± 5.26	46.99 ± 5.04	46.77 ± 5.44	0.79
Gender, n (%)		881				0.53
	Female		451 (51.2%)	197 (49.1%)	254 (52.9%)	
	Male		419 (47.6%)	199 (49.6%)	220 (45.8%)	
	No answer		11 (1.2%)	5 (1.2%)	6 (1.3%)	

SD: standard deviation

Descriptive statistics of the sample where n refers to the cumulative number of questionnaires returned.

comments reported. It revealed that the main concerns of attending physicians and nurses included patients' confusion due to medical jargon at the bedside ward round. Nurses also stated perceived lack of interprofessional communication by the patients during ward rounds. All physicians, but especially consultants, commented on their reluctance to address sensitive topics (e.g., lack of treatment adherence, substance abuse) at the bedside ward round because of potential negative reactions from patients or to avoid violation of confidentiality in multi-bedrooms.

Discussion

In this ancillary project within a multicentre randomised controlled trial, we evaluated staff satisfaction with bedside and outside the room ward rounds. Results suggested overall higher satisfaction with outside the room ward rounds. This was also true for the secondary outcomes, where higher ratings were found in the outside the room group for staff perception of time management, discussion of sensitive topics and discomfort during ward rounds. Importantly, we also found a marked difference between physicians and nurses, with nursing staff members preferring bedside presentation. Several points of this survey provide important information.

First, there are several explanations for differences between nurses and physicians in satisfaction with the two types of ward round. Outside the room case discussions may be more theoretical and academic, they focus on education demands of residents and less on practical aspects of patient care. Thus, nurses may have less opportunity to join discussions outside the room, whereas at the bedside nurses may be more involved in patient-centred discussions. The finding that nurses' contribution is underrepresented in ward rounds has previously been described. Weber and Stöckli [12] described the content of patient-physician-nurse interactions during 90 internal medicine ward rounds by analysing audio recordings using a validated coding system for medical interactions [13]. They found that nurses contributed significantly less to the ward round than patients and physicians. The authors concluded that this is a potential deficiency since nurses see patients performing in daily activities. In addition, an American cross-

Table 2:
Primary and secondary outcomes.

Staff satisfaction with ward round (VAS 0–100)	n all	All (n = 891)	Outside the room (n = 405)	Bedside (n = 486)	p-value	Univariable regression coefficient (95% CI)	p-value	Multivariable regression coefficient (95% CI), *adjusted for age, gender, centre*	p-value
Primary endpoint: Staff satisfaction with ward round (VAS 0100)									
Satisfaction with ward round, mean (SD)	891	72.69 ± 19.92	78.03 ± 16.96	68.25 ± 21.10	<0.001	–10.11 (–12.36, –7.85)	<0.001	–10.46 (–12.73, –8.19)	<0.001
Secondary endpoints									
Satisfaction with time management of the ward round, mean ± SD)	889	70.03 ± 24.54	73.19 ± 23.23	67.39 ± 25.32	<0.001	–6.16 (–9.06, –3.27)	<0.001	–6.51 (–9.45, –3.58)	<0.001
Satisfaction with staff team interaction during ward round, mean ± SD)	888	73.65 ± 23.74	80.48 ± 19.93	67.93 ± 25.15	<0.001	–13.05 (–15.69, –10.41)	<0.001	–13.52 (–16.18, –10.86)	<0.001
Satisfaction with patient interaction during ward round, mean ± SD)	886	74.46 ± 22.34	78.31 ± 19.66	71.27 ± 23.90	<0.001	–7.17 (–9.87, –4.47)	<0.001	–7.49 (–10.22, –4.76)	<0.001
Staff perception of time management during ward round (VAS 0–100)									
Having sufficient time for ward round, mean ± SD)	865	78.09 ± 22.33	81.00 ± 21.25	75.66 ± 22.94	<0.001	–5.44 (–7.96, –2.91)	<0.001	–5.76 (–8.31, –3.22)	<0.001
Feeling of being rushed during ward round, mean ± SD)	866	25.27 ± 27.92	22.34 ± 27.15	27.72 ± 28.34	0.005	5.42 (2.29, 8.55)	0.001	5.47 (2.34, 8.60)	0.001
Being able to carry out ward round as planned, mean ± SD)	866	77.61 ± 24.45	80.94 ± 23.57	74.82 ± 24.84	<0.001	–6.02 (–8.79, –3.26)	<0.001	–6.22 (–9.03, –3.40)	<0.001
Being able to end ward round on time, mean ± SD)	866	70.66 ± 28.44	72.39 ± 28.17	69.22 ± 28.60	0.10	–3.62 (–6.99, –0.26)	0.035	–3.88 (–7.31, –0.46)	0.026
Staff perception of sensitive topics during ward round (VAS 0–100)									
Being able to discuss sensitive topics during ward round, mean ± SD)	855	70.68 ± 29.21)	84.26 ± 20.85)	59.34 ± 30.36)	<0.001	–25.29 (–28.48, –22.10)	<0.001	–25.67 (–28.87, –22.47)	<0.001
Being able to openly discuss all important matters during ward round, mean ± SD)	855	77.96 ± 26.02	87.55 ± 19.01	69.95 ± 28.29	<0.001	–17.77 (–20.72, –14.81)	<0.001	–18.01 (–20.99, –15.02)	<0.001
Staff discomfort during ward round (VAS 0–100)									
Feeling insecure during ward round, mean ± SD)	846	24.34 ± 26.81	18.92 ± 25.05	28.84 ± 27.41	<0.001	9.76 (6.58, 12.94)	<0.001	9.84 (6.63, 13.05)	<0.001
Feeling uncomfortable during ward round, mean ± SD)	846	18.38 ± 24.60	13.68 ± 21.06	22.28 ± 26.60	<0.001	8.55 (5.69, 11.41)	<0.001	8.45 (5.59, 11.30)	<0.001
Being affected during conversation with patients, mean ± SD)	846	27.42 ± 30.00	27.09 ± 30.76	27.70 ± 29.37	0.77	1.18 (–1.91, 4.26)	0.455	1.30 (–1.81, 4.41)	0.412
Incidence of unpleasant situations with patients during ward round, mean ± SD)	846	19.98 ± 25.45	15.21 ± 22.57	23.94 ± 27.01	<0.001	9.01 (5.93, 12.10)	<0.001	9.59 (6.51, 12.68)	<0.001

All differences calculated with linear regression models for continuous data; CI: confidence interval; VAS: visual analogue scale; SD: standard deviation

sectional study of 90 internal medicine ward rounds found that 64.9% of interprofessional communication between nurses and physicians during ward rounds took place at the bedside, whereas only 35.1% occurred in other locations (including conference rooms, hallways and doorways) [14]. In line with this, our qualitative analysis revealed that for nurses, ward rounds pre-discussed outside the room are less useful. For example, one nurse commented that hallway discussion takes far too long and teaching of residents makes up a large part of it, leading to long waiting periods in which nurses are being left out (table 3).

Second, although results of the overall trial indicate that bedside presentation is more time efficient and results in similar knowledge by patients, in this survey physicians reported lower satisfaction with bedside presentation. There are few data about physicians' perceptions of ward round preferences. In one trial examining the effect of 56 bedside and non-bedside presentations on Japanese residents by structured interviews, 95% of the residents preferred non-bedside patient case presentation, claiming that freedom of discussion and patients' comfort was ensured only in the absence of the patient [9]. Chauke et al. (2006) allocated 74 ward rounds in a South African academic hospital either to bedside or a conference room without patient visits, and afterwards conducted structured interviews with students, attending physicians and consultants to ascertain their preferences with regard to the types of rounds [10]. All physicians preferred bedside ward rounds, claiming that physical signs could be missed when conducting conference room ward rounds; 27% of students preferred the conference room, with arguments including freedom of discussion and not upsetting the patient with academic activities. Gonzalo et al. (2009) highlights the impact of ward rounds transitioning from bedside to the hallway and conference rooms [11]. In a cross-sectional, web-based survey 102 medical students and 51 residents were asked about their experiences and attitudes toward ward rounds. Gonzalo et al. concluded that time spent at the bedside is waning de-

Figure 1: Satisfaction with ward rounds in different subgroups. All differences calculated with multivariate linear regression models for continuous data.

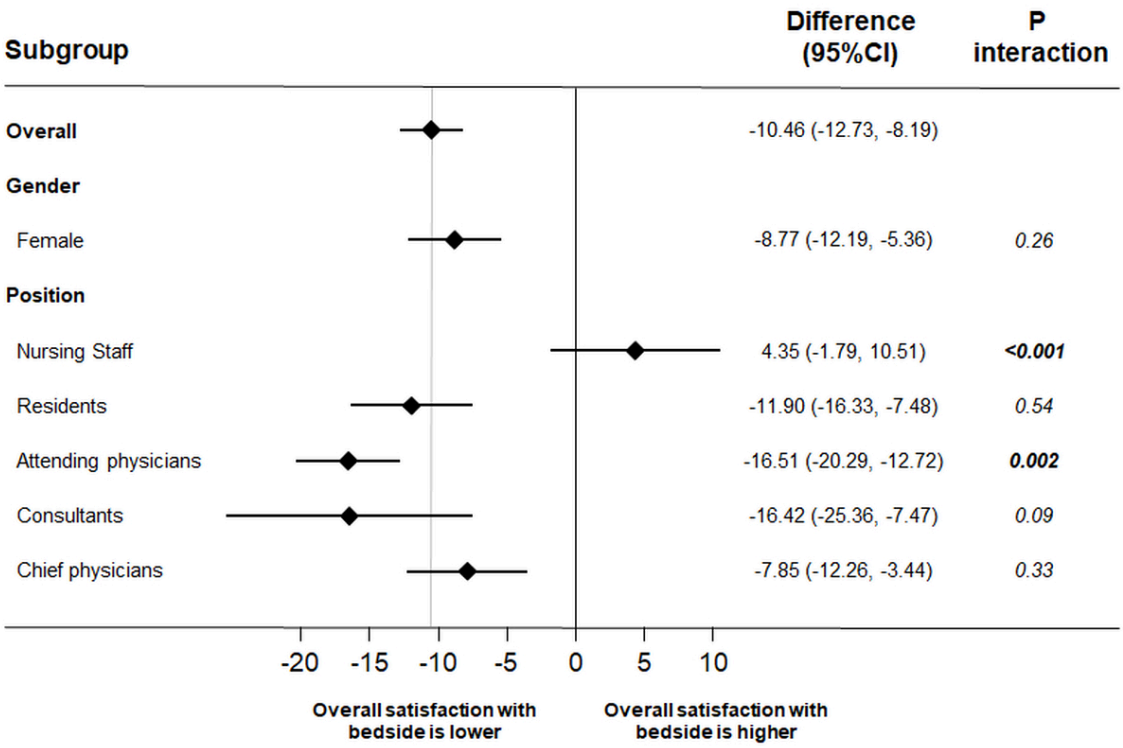
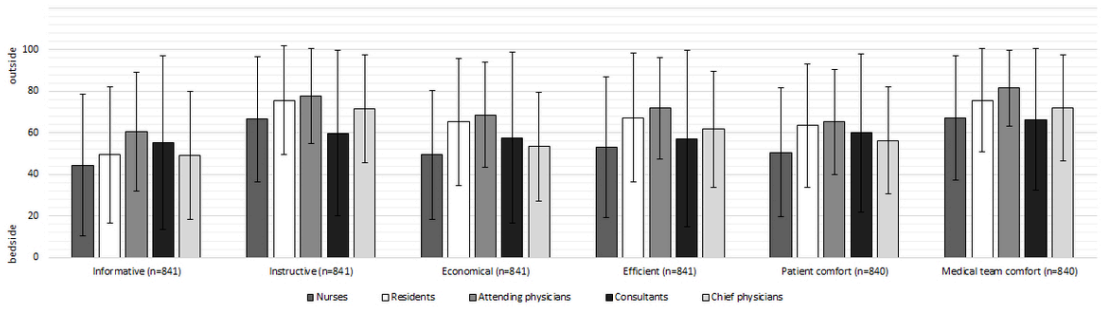


Figure 2: Healthcare workers mean preferences concerning different ward round related aspects. Means of preferences by profession measured on a visual analogue scale (0 [bedside] to 100 [outside]).



spite learners' beliefs that bedside learning is important for professional development and suggest the necessity to re-examine current teaching methods in internal medicine services.

Table 3:
Examples of healthcare workers' comments on ward rounds.

Profession	Category of comment	Comment	Condition
Chief physicians	Sensitive topics	We did not address patient's lack of adherence as other patients were present during the ward round.	Bedside
		We did not bring up patient's alcohol abuse since we did not want to embarrass him in front of another patient.	Bedside
	Patient confusion	We did not discuss that the patient's diagnosis was unclear as we did not want to upset him.	Bedside
		I did not want to correct my colleagues' therapeutic approach in front of the patient, undermining the patient's trust.	Bedside
Consutants	Sensitive topics	Other patients in the room were listening closely when the patient's addiction issues were discussed.	Bedside
		We avoided addressing the patient's secondary gain and potential differential diagnoses due to time constraints and language barriers. Further, other patients were present during the ward round.	Bedside
		During the patient case presentation the patient passively lay in bed. We did not talk with but about the patient.	Bedside
Attending physicians	Sensitive topics	I was uncomfortable with talking about the issue that the patient was ready for discharge but did not want to leave the hospital.	Bedside
		We could not openly discuss the reason for referring the patient to a hospice because it would have been too disturbing. A patient case presentation outside the room would have been better.	Bedside
	Patient confusion	The team members of the ward round turned their back on the patient during case presentation. The patient might have picked up some medical terminology without any explanation.	Bedside
		Differential diagnoses were not clearly vocalised to avoid patient's confusion.	Bedside
		I prefer outside the room case presentation. You should not discuss the whole medical history in front of the patient – that makes him even sicker and more confused.	Bedside
		When having eye contact with the patient, I repeatedly observed confusion.	Bedside
	Time management	Hasty discussion, patient's questions were not answered.	Bedside
		Therapeutic approach was explained too swiftly.	Bedside
Residents	Sensitive topics	Social and addiction issues were not addressed as other patients were present.	Bedside
		In general I think the patient case presentation should take place at the bedside. However, certain sensitive topics should be predis-cussed in the hallway.	Outside
	Patient confusion	The decision for the treatment was made at the bedside which was disturbing for the patient.	Bedside
	Time management	Doctors were rushing through the whole medical history.	Bedside
	Patient-physician communication	The team should make sure that the patient is also involved in the case presentation during bedside rounds.	Bedside
	Interprofessional communication	Interdisciplinary discussions are impeded if nurses do not know the patient well or if they are not properly prepared for the ward round.	Bedside
	Disclosure of bad news	Tumour disease was not mentioned at the bedside as the diagnosis had not been disclosed with the patient yet.	Bedside
Nurses	Sensitive topics	Lack of treatment adherence was not addressed as it appeared un-pleasant for us to criticise the patient.	Bedside
	Patient confusion	Inexperienced residents are noticeably overwhelmed and often look for backup. This might affect patients' trust negatively.	Bedside
		I prefer outside the room case presentation as medical terminology is confusing for patients.	Outside
		I got the impression that the older generation is intimidated and many elderly do not comprehend the medical information.	Bedside
	Time management	During outside the room case presentation the medical history was discussed more extensively. Although this it is important and interest-ing to me, it is also time consuming and meanwhile I cannot pursue my other duties and responsibilities as I might have to answer any questions.	Outside
		Hallway discussions take far too long and teaching of residents makes up a large part of it, leading to long waiting periods in which nurses are being left out.	Outside
	Patient-physician communication	Patient was given little opportunity to express his own issues.	Bedside
	Interprofessional communication	I, as a nurse, felt ignored. I had to impose my requests. I did not get the impression that I was heard as my concerns were not addressed.	Bedside
		There was no place for my topics.	Bedside
		Ward rounds often take place between doctors and nurses are being left out. It's difficult to actively participate as a nurse.	Outside

Third, despite methodical limitations such as the small sample size, the currently available evidence suggests two major motivations of physicians for preferring outside the room presentations: the possibility to discuss sensitive topics and the chance to avoid patient confusion [9, 10]. In line with this, in our trial several physicians commented on these aspects (table 3). Notably, attending physicians' main concern was possible confusion of patients and thus less knowledge. In our initial report of this trial, we suggested that patients have similar knowledge of their medical care, regardless of whether rounds were conducted exclusively at the bedside or pre-discussed outside the room [6]. This was true both when measured subjectively through patients' self-reporting and objectively when comparing patient recall of information with information retrieved from medical charts. However, team discussions at the bedside led to more confusion and uncertainty in some patients, particularly when younger patients were confronted with medical jargon [6]. Thus, physicians' concerns about patients' confusion shown in this analysis are partly justified, specifically in younger patients – but the similar knowledge of patients reassures that bedside rounds are feasible. Our previous analysis suggested that in the bedside presentation group, sensitive topics were less frequently discussed. This ancillary analysis confirms physicians' concerns about not being able to address sensitive topics at the bedside. Here, two things must be considered. On the one hand the qualitative feedback suggests that the number of patients per bedroom might be crucial and negatively affect physicians in addressing sensitive topics. On the other hand, the special situation of the consultant ward round must be taken into account. Unlike daily ward rounds, it represents a challenging situation for residents who need to perform under supervision of both the attending and the chief physician. Thus, the team may choose to address sensitive topics with the patient on another, more private, occasion. Although we do not have specific information why sensitive topics were avoided, our data call for efforts to further study how to best address sensitive topics during ward rounds and how to train physicians in this regard. Further, our previous trial [6] showed that bedside presentation was more efficient and duration was about 2.5 minutes shorter compared with outside the room. However, this was perceived differently by the healthcare workers reporting lower satisfaction with time management of the bedside ward round.

There are several limitations to this secondary analysis of a randomised trial. First, we included only Swiss teaching hospitals, limiting generalisability of the findings. Second, using a pragmatic approach, ward rounds in the three participating hospitals were not standardised, in order to reflect clinical practice and ensure external validity. Consequently, this might reduce the internal validity. Third, to assess the healthcare workers' perceptions we created a customised questionnaire that has, however, not been validated. Specifically, the main outcome – satisfaction with the ward round – was assessed on a VAS and has not been validated previously for this specific purpose. Fourth, due to the data collection via a mailed online survey, there was a limited response rate causing selection bias. Fifth, healthcare workers were not blinded which causes bias regarding the outcomes in question.

Conclusion

While bedside ward rounds are considered more patient centred and preferred by the nursing staff, physicians prefer outside the room presentation of patients during ward rounds due to the perceived better discussion of sensitive topics, subjectively better time management and less discomfort. Future studies need to further evaluate the underlying reasons for physicians' and nurses' different preferences regarding outside the room and bedside ward rounds. Moreover, our trial suggests a need to evaluate how to better involve nursing staff in outside the room ward round discussions in the future. Further, our trial brings into question how to best teach on addressing sensitive topics with the patient. Improving experience, continuous training including medical as well as interprofessional communication techniques may help to increase the satisfaction of physicians with bedside ward rounds.

Data availability

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Conflicts of interest

All authors have completed and submitted the International Committee of Medical Journal Editors form for disclosure of potential conflicts of interest. No potential conflict of interest was disclosed.

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Appendix

Figure S1: "Having sufficient time for ward round" in different subgroups**.** All differences calculated with multivariate linear regression models for continuous data.

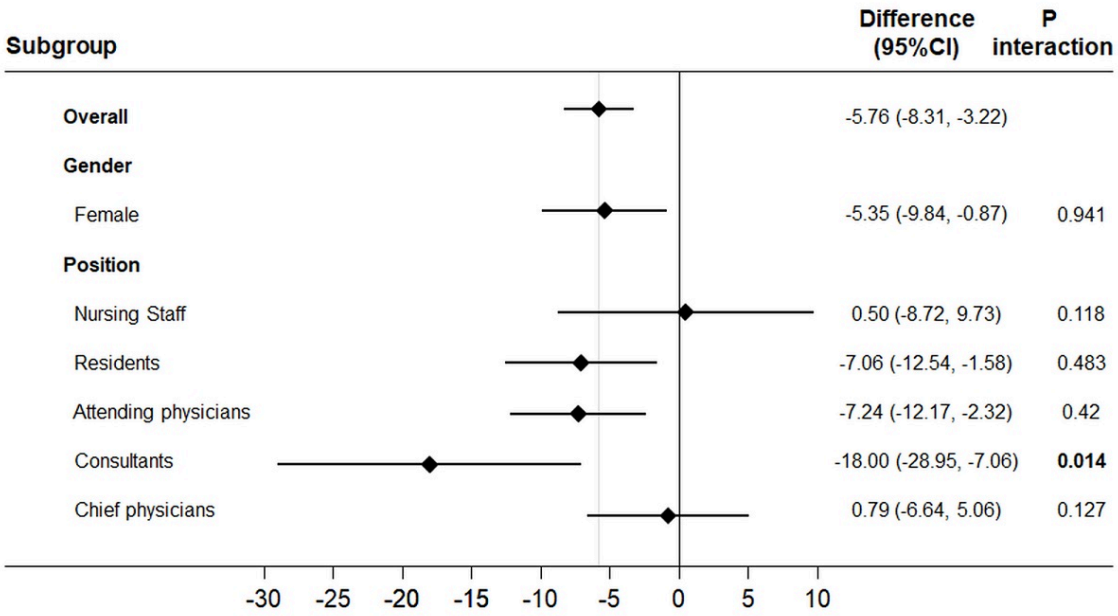

Figure S2: "Being able to discuss sensitive topics" in different subgroups**.** All differences calculated with multivariate linear regression models for continuous data.

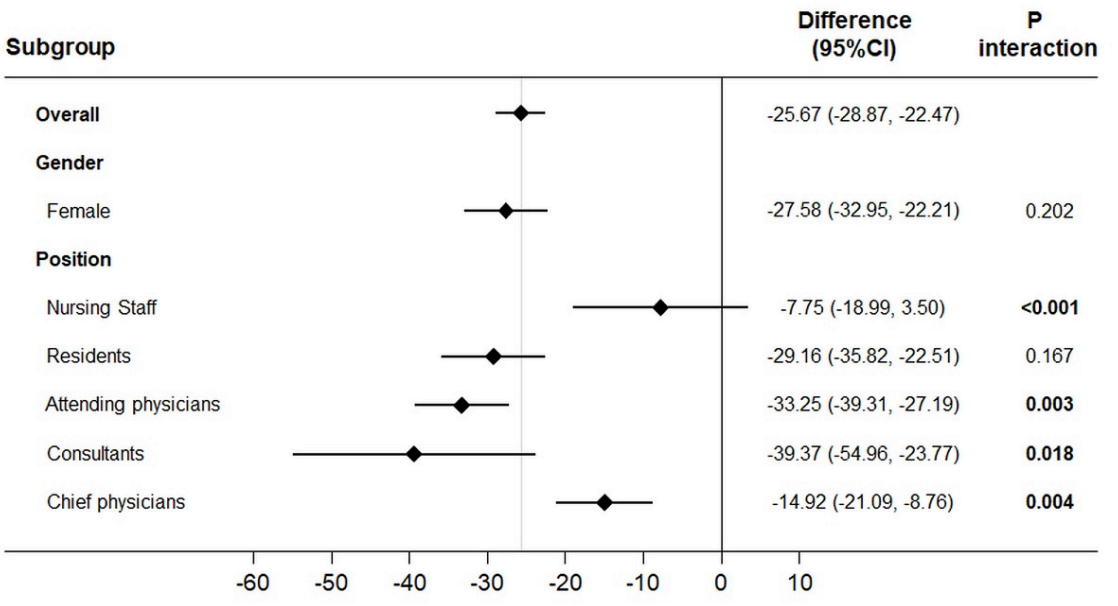

Figure S3: "Feeling insecure during ward round" in different subgroups. All differences calculated with multivariate linear regression models for continuous data.

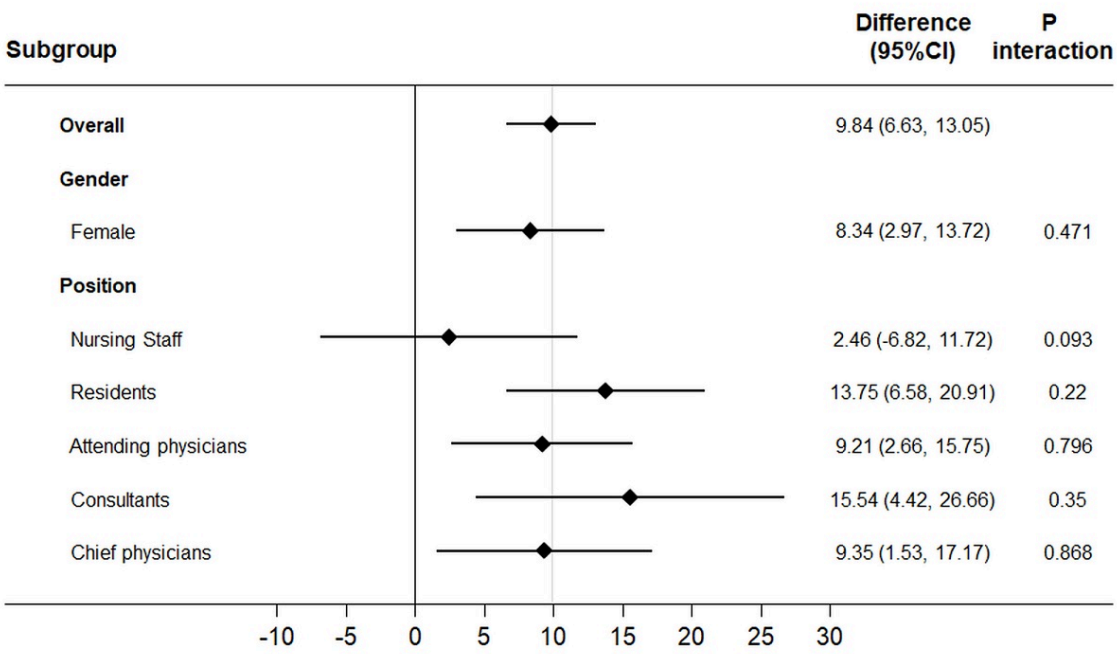

Table S1:
Staff survey.

Personal details				
Age	Years			
Gender	female			
	male			
	not specified			
Your job position in the hospital?	Nurse			
	Resident			
	Attending physician			
	Consultant			
	Chief physician			
How many years of clinical work experience do you have?	I have _ years clinical of work experience			
Questions on the ward rounds				
Today I joined _ [number] of bedside case presentations				
Today I joined _ [number] of case presentations outside the room				
Today I joined _ [number] of case presentation that were not part of the study				
Please reply to each of the following questions separately for the ward rounds with bedside case presentation and ward rounds with outside the room case presentation. Enter a number from 0 to 100, depending on how much you agree or disagree with statements.				
	bedside case presentations		outside the room case presentations	
	0 not at all satisfied	100 very satisfied	0 not at all satisfied	100 very satisfied
How satisfied were you with todays ward round?	_ [0-100]		_ [0-100]	
How satisfied were you with the time management of the ward round?	_ [0-100]		_ [0-100]	
How satisfied were you with the medical team interaction during ward round?	_ [0-100]		_ [0-100]	
How satisfied were you with the patient interaction during the ward round?	_ [0-100]		_ [0-100]	
	bedside case presentations		outside the room case presentations	
	0 strongly disagree	100 strongly agree	0 strongly disagree	100 strongly agree
I had sufficient time for ward round	_ [0-100]		_ [0-100]	
I felt rushed during ward round	_ [0-100]		_ [0-100]	
I was able to carry out ward round as planned	_ [0-100]		_ [0-100]	
I was able to end ward round on time	_ [0-100]		_ [0-100]	
	bedside case presentations		outside the room case presentations	
	0 strongly disagree	100 strongly agree	0 strongly disagree	100 strongly agree
I was able to discuss sensitive topics during ward round	_ [0-100]		_ [0-100]	
I was able to openly discuss all important matters during ward round	_ [0-100]		_ [0-100]	
↳ If <= 50: Which topics could not be discussed openly? For what reason?				
	bedside case presentations		outside the room case presentations	
	0 strongly disagree	100 strongly agree	0 strongly disagree	100 strongly agree
Feeling insecure during ward round, mean (SD)	_ [0-100]		_ [0-100]	
Feeling uncomfortable during ward round, mean (SD)	_ [0-100]		_ [0-100]	
Being affected during conversation with patients, mean (SD)	_ [0-100]		_ [0-100]	
Incidence of unpleasant situations with patients during ward round, mean (SD)	_ [0-100]		_ [0-100]	
Enter a number from 0 to 100, depending on how much you agree or disagree with statements.				
Ward rounds are…	0 …bedside		100 …outside the room	
… more informative for patients when patient case presentation conducted…	_ [0-100]			
… more instructive for the team when patient case presentation conducted…	_ [0-100]			
… more economical when patient case presentation conducted…	_ [0-100]			
… more efficient when patient case presentation conducted…	_ [0-100]			
… more comfortable for patients when patient case presentation conducted ...	_ [0-100]			
… more comfortable for the team when patient case presentation conducted ...	_ [0-100]			

Appendix B

Study II

Becker C, Gross S, Gamp M, Beck K, Amacher SA, Mueller J, Bohren C, Blatter R, Schaefert R, Schuetz P, Leuppi J, Bassetti S, Hunziker S. Patients' Preference for Participation in Medical Decision-Making: Secondary Analysis of the BEDSIDE-OUTSIDE Trial. J Gen Intern Med. 2023 Apr;38(5):1180-1189. doi: 10.1007/s11606-022-07775-z. Epub 2022 Sep 9. PMID: 36085211; PMCID: PMC10110786.

Patients' Preference for Participation in Medical Decision-Making: *Secondary Analysis of the BEDSIDE-OUTSIDE Trial*

Christoph Becker, MD[1,2], Sebastian Gross, MSc[1], Martina Gamp, PhD[1], Katharina Beck, PhD[1], Simon A. Amacher, MD[1,3], Jonas Mueller, MD[1], Chantal Bohren, MD[1], René Blatter, MD[1], Rainer Schaefert, MD[1,4], Philipp Schuetz, MD MPH[4,5], Joerg Leuppi, MD[4,6], Stefano Bassetti, MD[4,7], and Sabina Hunziker, MD MPH[1,4]

[1]Medical Communication, Department of Psychosomatic Medicine, University Hospital Basel, Petersgraben 4, Basel, CH, Switzerland; [2]Emergency Department, University Hospital Basel, Basel, Switzerland; [3]Intensive Care Unit, University Hospital Basel, Basel, Switzerland; [4]Faculty of Medicine, University of Basel, Basel, Switzerland; [5]Division of Internal Medicine, Kantonsspital Aarau, Aarau, Switzerland; [6]Division of Internal Medicine, Kantonsspital Baselland, Liestal, Switzerland; [7]Division of Internal Medicine, University Hospital Basel, Basel, Switzerland.

BACKGROUND: Patients may prefer different levels of involvement in decision-making regarding their medical care which may influence their medical knowledge.

OBJECTIVE: We investigated associations of patients' decisional control preference (DCP) with their medical knowledge, ward round performance measures (e.g., duration, occurrence of sensitive topics), and perceived quality of care measures (e.g., trust in the healthcare team, satisfaction with hospital stay).

DESIGN: This is a secondary analysis of a randomized controlled multicenter trial conducted between 2017 and 2019 at 3 Swiss teaching hospitals.

PARTICIPANTS: Adult patients that were hospitalized for inpatient care.

MAIN MEASURES: The primary outcome was patients' subjective average knowledge of their medical care (rated on a visual analog scale from 0 to 100). We classified patients as active, collaborative, and passive according to the Control Preference Scale. Data collection was performed before, during, and after the ward round.

KEY RESULTS: Among the 761 included patients, those with a passive DCP had a similar subjective average (mean ± SD) knowledge (81.3 ± 19.4 points) compared to patients with a collaborative DCP (78.7 ± 20.3 points) and active DCP (81.3 ± 21.5 points), $p = 0.25$. Regarding patients' trust in physicians and nurses, we found that patients with an active vs. passive DCP reported significantly less trust in physicians (adjusted difference, − 5.08 [95% CI, − 8.69 to − 1.48 points], $p = 0.006$) and in nurses (adjusted difference, − 3.41 [95% CI, − 6.51 to − 0.31 points], $p = 0.031$). Also, patients with an active vs. passive DCP were significantly less satisfied with their hospital stay (adjusted difference, − 7.17 [95% CI, − 11.01 to − 3.34 points], $p < 0.001$).

CONCLUSION: Patients with active DCP have lower trust in the healthcare team and lower overall satisfaction despite similar perceived medical knowledge. The knowledge of a patient's DCP may help to individualize patient-centered care. A personalized approach may improve the patient-physician relationship and increase patients' satisfaction with medical care.

TRIAL REGISTRATION: ClinicalTrials.gov (NCT03210987).

KEY WORDS: decisional control preference; decision-making; hospital medicine; satisfaction; quality of care.

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INTRODUCTION

During hospitalization, decision-making regarding patient management and further steps regularly occurs during ward rounds.[1] Ward rounds not only provide the opportunity to inform patients regarding their current condition and treatment but also ensure that these treatments are in alignment with patients' preferences and needs.[2,3] Patients' involvement in decision-making contributes to a better quality of care and is therefore an important priority during ward rounds.[3–7]

However, there may be differences among patients regarding their preferences in active involvement. In fact, some patients may differ regarding their preferred role in medical decision-making, a construct which is described as decisional control preference (DCP).[8] Several years ago, Degner et al. introduced the control preference scale, an instrument to assess the degree of control an individual patient prefers during healthcare decision-making.[9] Especially in the context of decision-making in oncology and palliative care, knowledge about a patient's DCPs has become an important focus of care in the recent years and may help to individualize treatment

according to patients' preferences. However, in clinical practice, a patient's DCP is often unknown and physicians may fail to actively involve those who would prefer participation in decision-making and vice versa.[10] Moreover, Hamann et al. suggested that DCPs vary not only between patients but also across different diseases and circumstances.[8]

Degner distinguished between patients that indicate that they prefer to leave decisions up to the healthcare specialist (passive DCP), patients that prefer to choose between treatment options independently (active DCP), and patients that wish to make a shared decision with their healthcare specialists (collaborative DCP).[9] Research has found passive DCP to be associated with low education, older age, and ethnic minority.[11] In contrast, patients with active or collaborative DCP are often younger, have a higher education, and demand more detailed medical information to participate in the decision process.[11–13] Also, previous studies suggest that patients' preferences may influence patient-related experience measures.[14,15]

Until today, most of the studies on DCP have focused on well-defined and homogenous patient populations such as patients with cancer or end-of life settings. Research in general medical populations is scarce. Previous literature suggest that physicians may provide passive patients with fewer medical information.[16] Thus, these patients may be passed over and as a result have less knowledge regarding their illness.

Therefore, we investigated the association between patients' DCP, their medical knowledge, and different aspects of perceived quality of care among patients hospitalized on general medical wards. Patients had been recruited in a prior multicenter randomized controlled trial (RCT), the BEDSIDE-OUTSIDE Trial.[17]

METHODS

Study Setting and Population

This is a secondary analysis of the BEDSIDE-OUTSIDE Study, a multicenter RCT with the aim to assess the effects of bedside case presentation during ward rounds on patients' medical knowledge. The design, statistical analysis, and primary results have been published elsewhere.[17]

In brief, patients hospitalized in the medical divisions of three Swiss tertiary care hospitals (University Hospital Basel, Kantonsspital Aarau, and Kantonsspital Baselland) between July 2017 and October 2019 were eligible to participate in the trial.

Consecutive adult patients newly admitted to medical wards for inpatient care who had their first weekly consultant ward round during hospitalization were recruited and randomized to the "bedside case-presentation group" or the "outside-the-room case-presentation group" in a 1:1 ratio.

During a consultant ward round, the team, which oversees the patients' treatment (attending physician, resident, nurse, pharmacist, and medical students), is accompanied by a consultant, e.g., the head of service or one of their deputies. As the consultant does not know the patient in advance, a resident presents the patient to the healthcare team. Afterwards, the team discusses the patient's case in more detail considering patient history and current laboratory findings as well as potential diagnostic and therapeutic approaches.

Patients with cognitive impairment (e.g., dementia/delirium) or severe hearing impairment and patients who did not have the proficiency of the local language(s) (German or French) or who had previously participated in the study were excluded. All patients were aware about the study purpose and provided written informed consent.

The study was approved by the local Ethics Committee (Northwest and Central Switzerland, EKNZ, 2017-00991) and registered at clinicaltrials.gov (NCT03210987).

This study adheres to the CONSORT guidelines.[18]

Data Collection

Data collection occurred at different timepoints: one day before the ward round, during the ward round, and in the afternoon after the ward round.

One day before the ward round, a member of the study team gathered baseline patient data including socio-demographics, patients' conditions leading to hospitalization, ongoing medical investigations, and therapeutic treatments as well as patients' comorbidities extracted from the electronic patient chart. Also, we calculated the Charlson Comorbidity Index[19] based on these data. Further, we assessed patients' perceived health status using the three-level version of EuroQol-5-Dimension questionnaire (EQ-5D-3L),[20] which includes five dimensions covering mobility, self-care, daily-life activities, and pain as well as anxiety or depression. Finally, we assessed patients' preferences for participation in clinical decision-making through the Control Preference Scale[21] before the ward round. The Control Preference Scale asks patients how much control in decision-making regarding their own care they would like to take. Patients' responses can be allocated to five categories: active, active-shared, collaborative, passive-shared, and passive control preference. We collapsed these options into the categories active (combining active and active-shared), collaborative, and passive (combining passive-shared and passive) control preference, as suggested in previous research.[10]

A member of the research team joined the ward round to audiotape the ward round on an iPad (Apple®). The audiotapes were later analyzed for the duration of the ward round for each patient and the occurrence of sensitive topics.

After the ward round, a different blinded member of the research team interviewed patients through a face-to-face interview with a structured questionnaire to assess patients' subjective average knowledge of their medical care (primary endpoint) as well as patients' perception regarding participation during ward round (e.g., patients' estimation of participation during ward round), patients' discomfort during ward round

(e.g., confusion due to medical terms used during ward round), and patients' perception regarding quality of care (e.g., trust in the healthcare team, satisfaction with hospital stay).

All data were directly entered into an electronic data file (SecuTrial®)

Outcome Measures

Primary Endpoint. In line with the main study, the primary endpoint of our secondary analysis was patients' average subjective knowledge regarding their medical care across the different dimensions "understanding of their disease" and "understanding of the therapeutic approach" as well as "understanding of further plans of care." All dimensions were rated by the patient on a visual analog scale from 0 to 100 (0 "I have no knowledge about the situation" to 100 "I have the best possible knowledge about the situation").

Secondary Endpoints. In accordance with the primary endpoint, we rated patients' objective knowledge within the three dimensions, i.e., understanding of the disease, therapeutic approach, and further plans of care. After the ward rounds, we asked patients to recall the current main diagnoses, therapeutic measures, and further plans of care. A blinded study member then compared the responses with the medical information from the medical chart and rated them on a predefined scale from 0 to 100.

We also assessed different aspects of perceived quality of care such as satisfaction with hospital stay or patients' trust in the healthcare team, all rated on a visual analog scale from 0 to 100.

Finally, we analyzed the audio recordings to assess timeliness of the ward rounds per patient and whether sensitive topics (e.g., nonadherence, treatment failure, social issues) were discussed on a nominal 3-point scale (1 = yes, 2 = no, 3 = not applicable).

More detailed information regarding definition and assessments of primary and secondary outcomes are given in the supplement.

Statistical Analysis

We used descriptive statistics such as frequencies as well as means and standard deviations to describe characteristics of the study population. To compare primary and secondary outcomes between patients with a passive, collaborative, and active DCP, we performed one-way ANOVA.

Additionally, to evaluate differences between patients with passive and collaborative as well as passive and active DCP regarding primary and secondary outcomes, we conducted linear and logistic regression analyses. Further, we calculated linear and logistic regression models adjusted for study center and randomization. In an additional exploratory analysis, we also adjusted the model for age, gender, and education (presented in the supplement).

Finally, we performed subgroup analyses for the different DCP categories stratified by study intervention for patients' subjective knowledge and occurrence of sensitive topics as well as duration of ward round and calculated interaction terms. All analyses were performed using the intention-to-treat analysis sample of the original trial. A p value of < 0.05 (two-tailed) was considered statistically significant. We used STATA 15.0 (Stata Corp., College Station, TX, USA) for all statistical analyses.

RESULTS

A total of 919 patients were enrolled in the original trial (see eFigure 1). Of these patients, 158 had missing information regarding patients' DCP and were excluded from this analysis.

Baseline characteristics of the remaining 761 patients, stratified among the 3 groups of patients' control preference, are shown in Table 1. Overall, 62.2% of patients had a collaborative DCP, and 22.4% preferred a passive and 15.4% an active role, regarding medical decision-making. Patients were on average 64.5 years old and 39% were female.

Primary Endpoint: Patients' Subjective Knowledge

Patients with a passive DCP reported a similar subjective knowledge (points) (mean, 81.3 ± 19.4) compared to patients with a collaborative DCP (mean, 78.7 ± 20.3) and active DCP (mean, 81.3 ± 21.5), $p = 0.25$ (Table 2 and supplement). There was no significant difference between passive DCP and collaborative DCP (adjusted difference, − 2.52 [95% CI, − 6.06 to 1.03 points]; $p = 0.164$) as well as between passive DCP and active DCP (adjusted difference, − 0.04 points [95% CI, − 4.81 to 4.73 points]; $p = 0.986$).

An additional model adjusted for age, gender, and education showed similar results (supplement).

Secondary Endpoints

Objective knowledge (points) was similar between patients reporting a passive, collaborative, and active DCP (mean, 70.2 ± 25.4), (72.4 ± 24.2), and (72.6 ± 25) respectively, $p = 0.59$. Regression analyses showed no significant differences between passive DCP and collaborative DCP (adjusted difference, 2.11 points [95% CI, − 2.2 to 6.42 points]; $p = 0.336$) as well as between passive DCP and active DCP (adjusted difference, 2.43 points [95% CI, − 3.37 to 8.22 points]; $p = 0.411$).

There was a significant correlation between patients' subjective and objective knowledge (Spearman's rho, 0.22; $p < 0.001$)

Regarding trust in the physician team, the mean (± SD) did significantly differ between patients reporting a passive, collaborative, and active DCP (93.3 ± 11.9 vs. 90.4 ± 15.0 vs. 88.2 ± 19.3; $p = 0.016$). Compared to patients with passive DCP, patients with active DCP reported significantly less trust

Table 1 Characteristics of Patients at Trial Entry Stratified for Intervention Arms

	n	All	DCP = passive	DCP = SDM	DCP = active	*p*
		n = 761	*n* = 171	*n* = 473	*n* = 117	
Socio-demographic factors						
Age, years (mean, SD)	760	64.4 (15.8)	65.3 (15.9)	64.6 (15.4)	62.5 (17.0)	0.31
Age categories, years (n, %)	760					
18–25		22 (2.9%)	6 (3.5%)	11 (2.3%)	5 (4.3%)	0.30
26–50		110 (14.5%)	23 (13.5%)	64 (13.6%)	23 (19.7%)	
51–75		426 (56.1%)	90 (52.6%)	278 (58.9%)	58 (49.6%)	
76–95		202 (26.6%)	52 (30.4%)	119 (25.2%)	31 (26.5%)	
Female gender (n, %)	755	294 (38.9%)	55 (32.2%)	193 (40.8%)	48 (41.0%)	0.12
Number of children (mean, SD)	753	2.0 (6.3)	2.8 (10.6)	2.5 (9.0)	1.4 (1.4)	0.42
Citizenship	754					
Switzerland		649 (86.1%)	146 (85.4%)	409 (86.5%)	99 (84.6%)	0.009
Germany		48 (6.4%)	9 (5.3%)	25 (5.3%)	15 (12.8%)	
Other		57 (7.6%)	16 (9.4%)	39 (8.2%)	3 (2.6%)	
Highest level of education	760					
High school		131 (17.2%)	30 (17.5%)	83 (17.5%)	18 (16.2%)	0.95
Apprenticeship		534 (70.2%)	119 (69.6%)	334 (70.6%)	81 (69.2%)	
College/university		95 (12.5%)	22 (12.9%)	56 (11.8%)	17 (14.5%)	
Health-related factors						
Main admission diagnosis (n, %)	761					
Coronary heart disease		77 (10.1%)	24 (14.0%)	41 (8.7%)	12 (10.3%)	0.27
Congestive heart failure		67 (8.8%)	23 (13.5%)	37 (7.8%)	7 (6.0%)	
Other cardiovascular diseases		79 (10.4%)	13 (7.6%)	55 (11.6%)	11 (9.4%)	
Infections		175 (23.0%)	39 (22.8%)	105 (22.2%)	31 (26.5%)	
Gastro-intestinal diseases		51 (6.7%)	11 (6.4%)	31 (6.6%)	9 (7.7%)	
Metabolism		42 (5.5%)	12 (7.0%)	25 (5.3%)	5 (4.3%)	
Malignant neoplasm		63 (8.3%)	13 (7.6%)	41 (8.7%)	9 (7.7%)	
Other		207 (27.2%)	36 (21.1%)	138 (29.2%)	33 (28.2%)	
Comorbidities						
Charlson Comorbidity Index (mean, SD)	761	4.38 (2.90)	4.19 (2.65)	4.42 (2.85)	4.45 (3.44)	0.64
Quality of life (Euroqol)						
EQ-5D	744	57.1 (22.6)	58.2 (21.5)	56.4 (22.9)	58.0 (23.0)	0.63
EQ-VAS	721	0.7 (0.3)	0.8 (0.3)	0.7 (0.3)	0.7 (0.3)	0.26

To estimate quality of life, we used the EQ-5D index (values range between − 0.205 and 1, with higher values indicating better quality of life) and EQ-5D VAS (values range between 0 and 100, with higher values indicating better self-perceived health status)
DCP decisional control preference, SD standard deviation, EQ-5D European Quality of Life 5 Dimensions, VAS visual analog scale

in physicians (adjusted difference, − 5.08 [95% CI, − 8.69 to − 1.48 points]; $p = 0.006$). Overall, mean (± SD) trust in the nursing team was similar between patients reporting a passive, collaborative, and active DCP (94.7 ± 9.2 vs. 92.2 ± 13.3 vs. 91.2 ± 16.3; $p = 0.055$). Compared to patients with passive DCP, patients with collaborative DCP (adjusted difference, − 2.42 points [95% CI, − 4.72 to − 0.13 points]; $p = 0.039$) and active DCP (adjusted difference, − 3.41 points [95% CI, − 6.51 to − 0.31 points]; $p = 0.031$) reported lower trust in the nursing team. Further, regarding satisfaction with hospital stay, there was a significant difference in mean (±SD) satisfaction between patients reporting a passive, collaborative, and active DCP (91.2 ± 13.4 vs. 88.2 ± 16.7 vs. 83.9 ± 19.5; $p = 0.001$). Compared to passive patients, active patients (adjusted difference, − 7.17 points [95% CI, − 11.01 to − 3.34 points]; $p < 0.001$) and collaborative patients (adjusted difference, − 3.01 points [95% CI, − 5.86 to − 0.16 points], $p = 0.038$) were significantly less satisfied with their hospital stay.

Duration of ward rounds (mean (± SD) minutes) did significantly differ between patients reporting a passive, collaborative, and active DCP (12.32 ± 5.02 vs. 12.69 ± 5.30 vs. 13.96 ± 6.08; $p = 0.032$). Duration per patient was on average 1.5 min shorter in patients reporting a passive DCP compared to active DCP (adjusted difference 1.66 min [95% CI, 0.46 to 2.86 points]; $p = 0.007$).

Sensitive topics were less often addressed in patients with passive DCP compared to patients with active DCP (OR, 1.92 [95% CI, 1.10, to 3.37], $p = 0.022$). Still, patients with passive, collaborative, and active DCP estimated their participation similarly during ward rounds. Regression analyses showed no significant differences between passive DCP and collaborative DCP (adjusted difference 1.68 points [95% CI, − 4.65 to 8.01 points]; $p = 0.603$) as well as between passive DCP and active DCP (1.38 points [95% CI, − 7.09 to 9.86 points]; $p = 0.749$).

Subgroup Analyses According to Randomization Groups (Bedside Vs. Outside-the-Room Case Presentation)

Regarding subjective knowledge, there were no significant differences between groups for patients with either a passive DCP, collaborative DCP, or active DCP (Table 3 and Fig. 1a–c).

In patients with a collaborative DCP, sensitive topics were significantly less often addressed during bedside compared to outside-the-room case presentation (63.5% vs. 77.1%; OR 0.52 [95% CI, 0.35 to 0.78 points], $p = 0.008$). However, in patients with a passive DCP, sensitive topics occurred more frequently if the case presentation was conducted at the

Table 2 Primary and Secondary Outcomes

Outcome measures	*n*	All	DCP = passive	DCP = SDM	DCP = active	*p*	Adjusted difference or OR (95% CI), *p* passive vs SDM Model 1*	*p*	Adjusted difference or OR (95% CI) passive vs active Model 1*	*p*
Primary endpoint, mean (SD)										
Subjective overall knowledge about their medical care (VAS 0–100)	761	79.7 (20.3)	81.3 (19.4)	78.7 (20.3)	81.3 (21.5)	0.25	− 2.52 (− 6.06, 1.03)	0.164	− 0.04 (− 4.81, 4.73)	0.986
Secondary endpoints, mean (SD)										
Objective overall knowledge about their medical care (rated by study team)	761	71.9 (24.6)	70.2 (25.4)	72.4 (24.2)	72.6 (25.0)	0.59	2.11 (− 2.2, 6.42)	0.336	2.43 (− 3.37, 8.22)	0.411
Participation during the ward round, mean (SD) or *n* (%)										
Total duration of ward round per patient (min)	761	12.86 (5.33)	12.32 (5.02)	12.69 (5.30)	13.96 (6.08)	**0.032**	0.49 (− 0.40, 1.38)	0.28	1.66 (0.46, 2.86)	**0.007**
I was encouraged to address personal topics (VAS 0–100)	550	85.4 (29.6)	85.4 (29.6)	83.5 (31.3)	93.5 (19.6)	**0.018**	− 1.89 (− 8.24, 4.46)	0.56	7.82 (− 0.52, 16.15)	0.066
Estimation of my participation during the ward round (VAS 0–100)	736	62.6 (35.5)	61.3 (31.5)	63.0 (37.5)	62.5 (33.1)	0.87	1.68 (− 4.65, 8.01)	0.603	1.38 (− 7.09, 9.86)	0.749
Time spent with physicians was sufficient (VAS 0–100)	691	89.7 (18.9)	91.4 (16.7)	89.1 (19.3)	89.9 (20.4)	0.44	− 2.28 (− 5.78, 1.22)	0.201	− 1.49 (− 6.19, 3.21)	0.534
All my questions were answered (VAS 0–100)	647	91.5 (17.9)	92.2 (17.8)	90.5 (19.0)	94.7 (12.8)	0.084	− 1.74 (− 5.16, 1.67)	0.317	2.52 (− 1.96, 6.99)	0.27
Occurrence of sensitive topic during the ward round	760	536 (70.5%)	114 (66.7%)	330 (69.8%)	92 (79.3%)	0.059	1.17 (0.8, 1.71)	0.428	1.92 (1.1, 3.37)	**0.022**
Patient perception regarding discomfort during the ward round										
Medical terms used during ward round were confusing (VAS 0–100)	735	16.7 (28.2)	15.4 (27.0)	16.7 (28.1)	18.7 (30.0)	0.63	1.23 (− 3.74, 6.19)	0.628	3.5 (− 3.22, 10.22)	0.307
I felt discomfort due to the interactions during the ward round (VAS 0–100)	753	6.0 (18.0)	4.0 (14.5)	6.3 (18.6)	7.6 (19.9)	0.21	2.44 (− 0.7, 5.59)	0.128	3.66 (− 0.56, 7.89)	0.089
Discussion within healthcare team caused upset (VAS 0–100)	651	5.6 (17.5)	5.6 (18.5)	5.4 (16.8)	6.5 (18.7)	0.87	− 0.15 (− 3.45, 3.15)	0.929	0.82 (− 3.72, 5.36)	0.723
Patients' perception regarding quality of care (VAS 0–100)										
I felt "in good hands" in this hospital	756	90.3 (15.0)	92.2 (13.4)	90.0 (15.1)	88.9 (16.7)	0.15	− 2.23 (− 4.85, 0.39)	0.096	− 3.27 (− 6.8, 0.25)	0.069
I have trust in the physician team	751	90.7 (15.2)	93.3 (11.9)	90.4 (15.0)	88.2 (19.3)	**0.016**	− 2.95 (− 5.62, − 0.28)	**0.03**	− 5.08 (− 8.69, − 1.48)	**0.006**
I have trust in the nursing team	750	92.6 (13.1)	94.7 (9.2)	92.2 (13.3)	91.2 (16.3)	0.055	− 2.42 (− 4.72, − 0.13)	**0.039**	− 3.41 (− 6.51, − 0.31)	**0.031**
There is good collaboration of physicians and nurses	697	90.6 (14.1)	92.2 (11.6)	90.4 (14.3)	88.8 (16.2)	0.14	− 1.78 (− 4.36, 0.8)	0.175	− 3.43 (− 6.88, 0.02)	0.051
I feel physicians have high competence to treat the current illness	725	91.3 (34.4)	92.1 (15.2)	89.8 (16.4)	96.1 (78.8)	0.21	− 2.34 (− 8.47, 3.8)	0.455	4.03 (− 4.2, 12.26)	0.337
I feel nurses have high competence to treat the current illness	729	92.1 (20.7)	95.4 (34.2)	91.2 (13.9)	90.7 (16.2)	0.058	− 4.25 (− 7.94, − 0.56)	**0.024**	− 4.71 (− 9.64, 0.23)	0.062
Overall satisfaction with hospital stay	758	88.2 (16.6)	91.2 (13.4)	88.2 (16.7)	83.9 (19.5)	**0.001**	− 3.01 (− 5.86, − 0.16)	**0.038**	− 7.17 (− 11.01, − 3.34)	< **0.001**

DCP decisional control preference, OR odds ratio, SD standard deviation, CI confidence interval, VAS visual analog scale
**Model 1 adjusted for study center and randomization*

Table 3 Primary and Secondary Outcomes Stratified by Randomization Group

Subgroups	*n*	Bedside (mean, SD)	Outside (mean, SD)	Difference or OR (95% CI)	*p*	*p* of interaction
		406	355			
Patients' subjective overall knowledge about their medical care (VAS 0–100)						
Passive	171	80.5 (18.1)	82.1 (20.8)	− 1.59 (− 7.47, 4.3)	0.428	0.664
Collaborative	473	79.5 (19.8)	77.9 (21.0)	1.55 (− 2.13, 5.24)	0.413	
Active	117	81.3 (22.0)	81.3 (21.2)	0.01 (− 7.90, 7.93)	0.867	
Patients' objective overall knowledge about their medical care (VAS 0–100)						
Passive	171	74.0 (24.0)	66.1 (26.5)	7.89 (0.27, 15.52)	0.077	0.262
Collaborative	473	72.3 (24.3)	72.5 (24.2)	− 0.23 (− 4.62, 4.16)	0.106	
Active	117	73.9 (24.4)	71.3 (25.9)	2.60 (− 6.60, 11.81)	0.896	
Occurrence of sensitive topics (*n*, %)						
Passive (*n* = 90)	171	64 (71%)	50 (62%)	1.53 (0.81, 2.89)	**0.008**	0.106
Collaborative	473	162 (63.5%)	168 (77.1%)	0.52 (0.35, 0.78)	**0.008**	
Active	116	47 (78%)	45 (80%)	0.88 (0.36, 2.18)	0.647	
Duration of ward round (min)						
Passive	166	11.26 (4.46)	13.5 (5.35)	− 2.24 (− 3.72, − 0.76)	0.747	0.256
Collaborative	458	11.38 (4.62)	14.42 (5.59)	− 3.04 (− 3.96, − 2.11)	0.051	
Active	111	13.75 (5.46)	14.19 (6.14)	− 0.44 (− 2.56, 1.68)	**0.022**	
Overall satisfaction with hospital stay						
Passive	171	90.1 (13.7)	92.4 (13.0)	− 2.25 (− 6.3, 1.8)	0.307	0.09
Collaborative	470	88.0 (17.2)	88.4 (16.2)	− 0.38 (− 3.42, 2.67)	0.683	
Active	117	86.2 (19.9)	81.4 (18.9)	4.78 (− 2.33, 11.9)	0.088	
I have trust in the physician team, mean (SD)						
Passive	169	92.3 (12.8)	94.4 (10.6)	− 2.1 (− 5.7, 1.51)	0.281	0.14
Collaborative	468	90.4 (15.1)	90.3 (14.9)	0.06 (− 2.68, 2.8)	0.932	
Active	114	89.9 (17.8)	86.5 (20.8)	3.43 (− 3.75, 10.61)	0.199	
I have trust in the nursing team, mean (SD)						
Passive	170	94.2 (9.3)	95.2 (9.1)	− 1.01 (− 3.8, 1.78)	0.719	0.544
Collaborative	466	92.0 (14.2)	92.5 (12.2)	− 0.5 (− 2.94, 1.93)	0.857	
Active	114	91.7 (17.7)	90.7 (14.8)	1.04 (− 5.05, 7.12)	0.526	
I feel physicians have high competence to treat the current illness, mean (SD)						
Passive	166	91.8 (17.4)	92.4 (12.3)	− 0.56 (− 5.24, 4.11)	0.672	0.787
Collaborative	446	89.4 (17.6)	90.4 (14.8)	− 1.02 (− 4.09, 2.05)	0.212	
Active	113	89.3 (19.7)	88.5 (19.6)	3.70 (− 6.54, 8.14)	0.609	
I feel nurses have high competence to treat the current illness, mean (SD)						
Passive	166	92.2 (14.1)	99.1 (47.5)	− 6.91 (− 17.4, 3.58)	0.055	0.076
Collaborative	449	91.1 (14.3)	91.3 (13.4)	− 0.25 (− 2.84, 2.34)	0.319	
Active	114	91.5 (17.5)	90.0 (14.9)	1.47 (− 4.57, 7.51)	0.401	

SD standard deviation, OR odds ratio, CI confidence interval

bedside (71% vs. 62%; OR 1.53 [95% CI, 0.81 to 2.89 points], $p = 0.008$, p of interaction = 0.106).

While bedside case presentation resulted in shorter ward rounds in patients with a passive and collaborative DCP, durations of ward rounds in patients with active DCP were similar between bedside and outside-the-room case presentation.

DISCUSSION

Results of this secondary analysis of a large multicenter trial investigating differences in medical knowledge and perceived quality of care during hospitalization in patients according to their DCP are threefold. First, we found that most patients (i.e., 3 in 4 patients) prefer to participate in medical decision-making actively or collaboratively and only a minority has a passive DCP. Second, DCP is not associated with patients' subjective and objective knowledge regarding their medical care. Third, although knowledge was similar between groups, patients with an active DCP were significantly more critical regarding their medical care with lower trust in the healthcare team and lower satisfaction with their overall hospital stay. Several points of this ancillary project are worth mentioning.

Results of our main trial indicated that patients have similar subjective and objective knowledge regardless of patient case presentations being conducted at the bedside or outside the

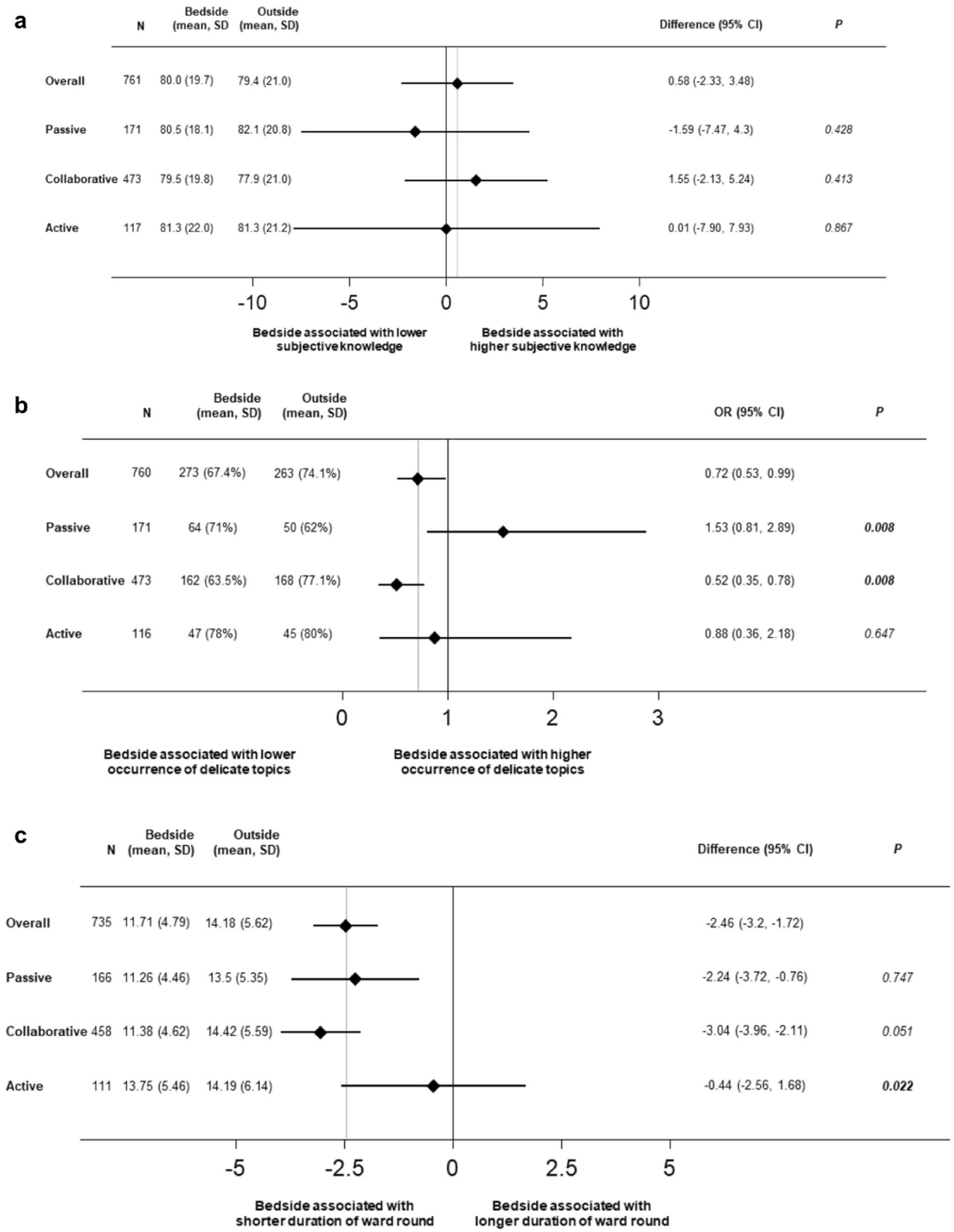

Figure 1 a Patients' subjective knowledge regarding their medical care according to patients' DCP stratified for study intervention. Legend: DCP, decisional control preference; SD, standard deviation; CI, confidence interval. b Occurrence of sensitive topics according to patients' DCP stratified for study intervention. Legend: DCP, decisional control preference; OR, odds ratio; CI, confidence interval. c Duration of ward round according to patients' DCP stratified for study intervention. Legend: DCP, decisional control preference; SD, standard deviation; CI, confidence interval

room.[22] However, it remained unclear whether this finding is true for all patients, or whether there are differences according to a patient's DCP. This ancillary analysis now confirms that DCP has little influence on patients' knowledge and may not be used as an indicator regarding best place for conducting ward rounds.

While DCP has been investigated in different specific patient populations (e.g., patients with cancer), there has been little evidence in unselected medical inpatients. Herein, our analysis provides important new insights in a large sample of patients with different main diagnoses. There are few studies looking specifically at associations between patients' control preference and their medical knowledge. An older study from Germany found a weak correlation between preferences and knowledge in a cohort of patients with multiple sclerosis (MS).[23] Patients with an active DCP had a slightly higher knowledge regarding their disease and medication. However, in the MS cohort, approximately 40% of patients showed an active DCP compared to 15.4% in our trial. Since patients may prefer more involvement in scenarios with chronic conditions or quality-of-life issues,[24] the results may not be applicable to a broader population. Researchers have concluded that patient knowledge facilitates participation in the decision-making process.[25] Patients with an active preference for participation may be more active in obtaining information regarding their disease. However, previous studies suggest that even if physicians have the impression that their patients received sufficient information to be able to decide on their treatment, only a small number of patients agreed.[26] Thus, healthcare professionals should not overestimate patients' medical knowledge but reconsider to provide more and better information.

Also, in line with previous research, we found that DCP appears to be closely related to patients' perception regarding their care received. In our analysis, patients with an active DCP were significantly less satisfied with their hospital stay than patients with a passive DCP. Further, we found that patients with an active as well with a collaborative DCP had significantly less trust in the physician and nursing team compared to patients with a passive DCP. A recent study from Thailand, which recruited patients with heart failure, reported similar findings and participants with a collaborative DCP were more dissatisfied with their care compared to patients with a passive DCP.[27] Also, in a recent study from the USA,[15] Ruhnke et al. assessed medical inpatients and found that patients who wished to delegate medical decisions to healthcare professionals were more satisfied with their care and had higher trust in the physicians that provided treatment. While these results were based on a mostly African American cohort, in which a large proportion of patients were dependent on Medicaid, our patients came from a more diverse background, suggesting that the association between preference for participation and dissatisfaction is independent from ethnicity and socioeconomic status.

Although we cannot estimate the effect of our findings and the differences in trust and satisfaction appear to be small, we believe our findings are clinically relevant.

There might be different explanations for these associations. Ruhnke et al. suggested that patients with a stronger desire to participate in decision-making might have higher expectations of care and communication or that patients have had previous suboptimal interactions which could possibly impact patients' DCP and perceived quality of care.[15] As we found that patients with an active DCP had less trust in their healthcare team, we hypothesize that a lack of trust in the healthcare team might increase patients' desire to be involved in the decision-making process regarding their own care.

The significant differences in trust in the healthcare team and satisfaction in our study might appear to be small. However, literature has shown that ratings of patient-related experience measures often show ceiling effects with little or no difference.[28] Still, in our study, we found consistent associations of patients' DCP with patients' trust in the healthcare team and satisfaction with hospital stay as two different measures of perceived quality of care, suggesting that our finding is clinically relevant.

Regardless of the mechanism, patient satisfaction is increasingly seen as a critical quality indicator in healthcare and patient-related experience measurements influence hospital reimbursements for care provided.[29–31] Thus, early identification of active and collaborative patients and use of a more personalized approach may be needed. Consequently, future studies should evaluate whether interventions specifically designed to patients' DCP may improve patient-reported experience measures.

Further, our results suggest that patients with a passive DCP appear to be less involved in their medical care than patients with a collaborative and active DCP. Ward rounds in patients with a passive DCP were significantly shorter, and sensitive topics were less frequently addressed. At a first glance, this might be in accordance with patients' preferred role in medical decision-making. However, an Australian trial investigating strategies to adequately respond to patients with different DCPs found that most physicians responded to passive patients by talking most of the time, after outlining their own agendas.[32] Only few physicians directly addressed patients' lack of responses, and many did not elicit treatment preferences in passive patients.[32] Thus, physicians should make sure that these patients are not neglected and that medical decisions taken meet patients' values and preferences. Regardless of patients' DCP, literature suggests that actual patient involvement may improve various aspects of quality care such as patient satisfaction[33] or adherence to treatment regimen[34] and may decrease healthcare utilization[35] and charges of malpractice.[36,37] Interestingly, while our main trial suggested that sensitive topics were less frequently addressed during ward rounds when case presentations were held at the bedside compared to outside the room, in this ancillary analysis, we found that in patients with a passive DCP, sensitive

topics were more often addressed at the bedside. This finding suggests that bedside case presentations during ward rounds might be helpful to address personal topics and to facilitate patient-centered care in passive patients.

This study has some limitations. First, this trial took place exclusively in Swiss hospitals, which limits the generalizability of our findings to other countries and cultures. Second, we assessed patients' knowledge and perceptions regarding the quality of care using a survey developed for this study, which has not been externally validated. Third, as the purpose of the original trial was to assess the effect of bedside and outside-the-room patient case presentation during ward rounds on patient knowledge and other patient-relevant outcomes, we only assessed patients' preference for participation but not actual participation. Fourth, in our main trial, we did not assess the duration of patients' hospitalization upon recruitment. However, all participants were only recruited within their first week of hospitalization. Finally, DCP is a self-measure. We may have little knowledge about if patients' self-declared preference for involvement reflects their real preference and whether patients declaring themselves as "passive" are more satisfied in courses of health care with little involvement than in courses with greater involvement.

CONCLUSIONS

In conclusion, our results indicate that a patient's DCP is predictive of his satisfaction with the care provided and trust in the healthcare team. In fact, trust in the healthcare team and overall satisfaction is lower in patients with active DCP despite similar medical knowledge. Moreover, patients with an active DCP had longer ward rounds and sensitive topics were more frequently addressed. Patients with active DCP may need a more personalized approach. Further studies should evaluate whether interventions adapted to patients' DCP may improve patient-reported experience measures.

Corresponding Author: *Sabina Hunziker, MD MPH; Faculty of Medicine, University of Basel, Basel, Switzerland (e-mail: sabina.hunziker@usb.ch).*

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Author Contribution *Concept and design: Becker, Gross, Gamp, Hunziker*
Acquisition, analysis, or interpretation of data: Becker, Gross, Hunziker
Drafting of the manuscript: Becker, Gross, Hunziker
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Data Availability *All data will be made available upon request.*

Declarations:

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Appendix C

Study III

Gross S, Becker C, Beck K, Memma V, Gaab J, Schuetz P, Leuppi J, Schaefert R, Langewitz W, Trendelenburg M, Breidthardt T, Eckstein J, Osthoff M, Bassetti S, Hunziker S. The occurrence of sensitive topics during ward round: An ancillary analysis of the BEDSIDE-OUTSIDE Trial. August 2023, in press

The occurrence of sensitive topics during ward round: An ancillary analysis of the BEDSIDE-OUTSIDE Trial

Sebastian Gross, MSc[1], Christoph Becker, MD[1,2], Katharina Beck, Ph.D.[1], Valentina Memma, MSc[1], Jens Gaab, Ph.D.[4], Philipp Schuetz, MD[3,5], Joerg D. Leuppi, MD[3,6], Rainer Schaefert, MD[1,3,8], Wolf Langewitz, MD[1,3], Marten Trendelenburg, MD[3,7], Tobias Breidthardt, MD[3,7], Jens Eckstein, MD[3,7], Michael Osthoff, MD[3,7], Stefano Bassetti, MD[3,7] and Sabina Hunziker, MD[1,7]

[1]Medical Communication, Department of Psychosomatic Medicine, University Hospital Basel, Basel, Switzerland

[2]Emergency Department, University Hospital Basel, Basel, Switzerland

[3]Faculty of Medicine, University of Basel, Switzerland

[4] Division of Clinical Psychology and Psychotherapy, Faculty of Psychology, University of Basel, Basel, Switzerland

[5]Division of Internal Medicine, Kantonsspital Aarau, Aarau, Switzerland

[6]University Center of Internal Medicine, Kantonsspital Baselland, Liestal, Switzerland

[7]Division of Internal Medicine, University Hospital Basel, Basel, Switzerland

[8]Department of Psychosomatics and Psychiatry, Bethesda Hospital, Basel, Switzerland

Corresponding author:

Prof. Dr. med. Sabina Hunziker, MD, MPH

University Hospital Basel

Petersgraben 4

CH - 4031 Basel

Switzerland

Email: sabina.hunziker@usb.ch

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Abstract

Objective: Discussing sensitive topics (e.g., medical uncertainty, social issues, non-adherence) during ward rounds is challenging and may negatively impact patient satisfaction with the health care they are receiving. In the previous multicentre randomised BEDSIDE-OUTSIDE trial focusing on communication during ward rounds, we investigated the interplay between sensitive topics and low reported satisfaction with care.

Design: Pre-planned secondary analysis of a randomised controlled trial. For this analysis data of the original trial was pooled across intervention groups.

Setting: Three Swiss teaching hospitals

Participants: Adult patients hospitalized for medical care

Interventions: We analysed predefined sensitive health topics and specific elements of communication from audiotapes recorded during ward rounds, for both patients dealing with and without sensitive topics.

Primary and secondary outcome measures: The primary endpoint was overall patient satisfaction with care; measured on a visual analogue scale from 0 to 100. Secondary endpoints included duration of ward rounds and further satisfaction outcomes.

Results: Of the 919 included patients, 474 had at least one sensitive topic including medical uncertainty (n=251), mental comorbidities (n=137), tumour diagnosis (n=137), and social issues (n= 125). Compared to patients without sensitive topics, patients with sensitive topics reported lower satisfaction with care (mean (SD), 87.7 [±14.6] versus 90.2 [±12.1], adjusted difference -2.5 [95%CI -4.28 to -0.72], p=0.006. Among patients with sensitive topics, risk factors for low satisfaction included several

parameters concerning patient-physician interaction such as disagreements during ward rounds (mean (SD), 14/212 [6.6%] versus 41/254 [16.1%], adjusted OR 2.78 [95%CI 1.47 to 5.27], p=0.002).

Conclusions: A large proportion of medical inpatients must deal with sensitive health topics. This is associated with lower satisfaction with care, particularly if the patient perceives the interaction with doctors during ward rounds as unsatisfactory. Educating physicians on specific communication techniques may help improve care for these patients.

Trial registration: clinicaltrials.gov; NCT03210987

Strengths and limitations

- We investigated a large sample of a broad general medicine population from multiple centres.
- Only Swiss teaching hospitals were included, which might cause selection bias and limit the generalisability of the findings.
- Ward rounds of clinical practice procedures in the three participating hospitals were not standardised to ensure external validity – which may therefore reduce the internal validity.
- The questionnaire used to assess patients' perceptions has not yet been validated.
- As there is no universal definition for sensitive topics, different pre-defined sensitive topics have been pooled into a combined variable, which is a limitation of this study.

Introduction

Life threatening disease, conflict with patients, patient non-adherence, psychiatric comorbidities, substance abuse, medical uncertainty among others are often considered to be sensitive topics. However, most research in this regard was mainly qualitative.[1] There is important work about the experiences of patients regarding bedside shift suggesting that asking patient consent, discussing potential critical issues and the degree of involvement preferred at hospital admission is strongly recommended.[2] Also, one quantitative analysis of mixed pediatric and adult patients including 622 ward round discussions found that social issues were addressed in 52%.[3] Thus further research is needed to understand frequency and implications of discussing sensitive topics during ward rounds in clinical practice. Sensitive topics may be important to address as they could affect the patient's well-being and include relevant health care information. On the other hand, the sharing of personal and sensitive information during clinical ward rounds in a non-private setting could potentially offend patients who interpret this as a breach of doctor-patient confidentiality.[4] Physicians may avoid addressing sensitive topics e.g. by terminating problematic conversations, withholding frank responses, downplaying the patient's expressed emotions, or inadequately acknowledging the sentiment underlying the patient's statements.[5, 6]

A previous multicentre randomised trial including 919 internal medicine patients (BEDSIDE-OUTSIDE trial) aimed to compare the impact of patient case presentation during ward rounds on patients' medical knowledge. Patient case presentations were either conducted at the bedside or outside the patient room.[6] Compared with outside the room case presentation, bedside case presentation was shorter and

resulted in similar patient knowledge, but importantly, sensitive topics were more often avoided and patient confusion was higher. Moreover, an ancillary analysis of the BEDSIDE-OUTSIDE trial focusing on staff satisfaction showed that physicians prefer to discuss sensitive topics outside the room than at the patient's bedside.[7] Despite concerns about addressing sensitive topics with patients, evidence in outpatient settings indicates that discussing these topics may be associated with high satisfaction, positive perceptions of health care, reduced worry, and increased patient participation in treatment decisions in the outpatient setting.[8, 9]

The current study aimed to quantitatively and qualitatively analyse audio tapes from internal medicine ward rounds of patients included in the BEDSIDE-OUTSIDE trial and to determine if discussing sensitive topics in clinical practice is associated with patient satisfaction.

Material and methods

Study setting

The current study is a pre-planned secondary analysis of the BEDSIDE-OUTSIDE trial[6] - a pragmatic, investigator-initiated, open-label, multicentre randomised trial conducted in the general medical divisions of three Swiss teaching hospitals (University Hospital Basel, Kantonsspital Aarau, and Kantonsspital Baselland) between July 2017 and October 2019. This report adheres to the CONSORT guidelines[10].

This analysis studied potential risk factors associated with sensitive topics, the association of sensitive topics with different outcomes, and potential risk factors for low or high levels of patient satisfaction with care. We also provided a qualitative overview of sensitive topic discussions during ward rounds. Because, to our knowledge, there is no well accepted definition of sensitive topics, we defined "sensitive topics" based on the clinical experience of the physician–researcher team and by reviewing previous literature. Sensitive topics were coded prospectively as a situation where at least one of the follow topics was discussed with the patient during the ward round: medical uncertainty, psychiatric comorbidities, tumour diagnosis, social issues, non-adherence, previous conflicts between patient and treating team, and treatment failure.

Original study population

Newly admitted adult inpatients on medical wards expecting their first weekly ward round consultation were approached by a member of the study team regarding inclusion. Only one patient per room was eligible and we excluded individuals with cognitive or hearing impairment, those unable to understand the local language, and patients who had previously been included in the study. All provided written informed consent.

Study design, randomisation, and intervention of the original study

Patients were randomised to either the "bedside group" or the "outside the room group" in a 1:1 ratio. In line with current practice, ward rounds for both groups followed the standard practices of each participating hospital.

Details of the study intervention and a detailed description of the ward round procedure have been reported earlier.[6] In brief, for the purpose of standardization and in line with current practice in Switzerland, the ward round followed the routine medical ward round procedures in both groups, with defined roles of physicians and nurses per usual practice in each participating hospital. In the bedside presentation group, case presentations and discussions occurred only at the bedside in front of the patient, including clinical examination as appropriate, with no discussions beforehand. In the outside the room group, case presentation and discussions were primarily held in the hallway outside the room without the patient present. Afterwards, the team entered the room and gave the patient a short summary of the medical situation, completed the gathering of medical information, examined the patient as needed, and discussed the next steps. Patients, study coordinators, and treating clinicians were not blinded to the allocation. However, study investigators involved in a patient's outcome assessment were blinded to trial allocation.

Data collection

Data collection was conducted at different points in time. Baseline patient data was collected before the ward round. During the ward rounds, which were conducted between 9 and 11 a.m., an observer from the research team was present to document timing (i.e., the duration of the ward round allocated per patient). All visits were recorded with an Apple iPad with the device-internal 'Voice Memo' software and rated afterwards by the research team. This approach allowed for the coding of various predefined sensitive topics and elements of communication. After the ward rounds, a second blinded member of the research team interviewed participating

patients using a standardised questionnaire. All case report forms and items have been described in the original trial.[6]

Patient and public involvement

A total of 25 patients hospitalised on the medical wards of the University Hospital of Basel, as well as 15 healthcare providers (physicians and nurses) with experience in daily medical practice and specially in medical ward rounds were involved in the design of the study and intervention of the main paper[6]. To design the trial, patients and healthcare providers helped us in prioritisation and selection of outcomes. Patients were asked for priority focus of this study. To design the intervention for the main trial, input was sought from patients and healthcare providers.

Outcome measures

Baseline factors and predictors

We assessed patient baseline characteristics including age, sex, number of children, family status, citizenship, level of education, occupation, main diagnosis, and comorbidities. Predictors for the occurrence of sensitive topics included patients' quality of life assessed with the validated EuroQuol EQ-5D questionnaire[11], patient's Decisional Control Preference[12, 13], application of specific patient-centred communication techniques (WEMS: waiting, echoing, mirroring, summarising; NURSE: naming, understanding, respecting, supporting and exploring [14, 15], as well as the following general communication factors rated by the study team: information given regarding diagnosis, symptoms, treatment steps, social issues; talking "about" instead of "with" the patient; communicating at cross purposes. Furthermore, moments were identified, when raters had the impression that a patient

did not understand information but did not ask more questions; instances when the physician explicitly disagreed with or corrected a patient; when a patient disagreed with / corrected a physician; occurrence of Current Unvoiced Elements [*cue*s] and concerns; addressing *cue* and concerns; and replying by providing information instead of exploration. *Cues* and concerns were defined as proposed by previous research.[16] In short, a *cue* or concern included a verbally or non-verbally expressed hint expressed by the patient that might have a certain subjective importance and a negative emotional impact.

Primary and secondary endpoints

The primary endpoint for this analysis was patients' overall satisfaction, defined by the mean of several satisfaction measures (see secondary endpoints) and measured on a visual analogue scale (VAS) of 0-100, with 0 indicating the lowest and 100 the highest possible satisfaction. For the purpose of this study, patient satisfaction below the median were defined as low satisfaction. Secondary endpoints included satisfaction outcomes for: ward rounds, hospital stay, medical care, physician communication, and nursing team communication, measured on the same a visual analogue scale (VAS) from 0-100.

We also assessed three elements of patients' subjective and objective knowledge of their own medical situation: the understanding of the disease, therapeutic approach, and further plans for care. Each dimension was rated by the patient on a visual analogue scale from 0 to 100 (0 "no knowledge about the situation" to 100 "best possible knowledge about the situation"). Subjective knowledge was defined as patient's self-assessment of being informed and was rated during a structured interview in the afternoon after the ward round. The study team rated objective

knowledge by comparing patients' recall of information about their main disease with medical information from the chart.

Ward round duration was measured in minutes and included: total time during the ward round, individual outside the room discussions or bedside discussions, and debriefing outside the room.

Further secondary endpoints included multiple items relating to patients' perception of: time spent on the ward round, patients' discomfort during the ward round, physician behaviour during the ward round, and general quality of care (**Supplement Tables**). All were rated in the structured interview after the ward round and measured on a visual analogue scale from 0 to 100.

Statistical analysis

Baseline parameters and outcomes were stratified among patients with and without sensitive topics. Logistic regression analyses were conducted to evaluate factors associated with sensitive topics. Furthermore, univariable linear and logistic regression models were conducted to investigate associations of sensitive topics with primary and secondary endpoints. We additionally calculated multivariable models adjusted for study centre and randomisation arm (bedside or hallway). In the subgroup of patients with sensitive topics, potential risk factors for low satisfaction compared to high satisfaction were assessed using Student's t-test. We used STATA 15.0 (Stata Corp., College Station, TX, USA) for all statistical analyses. A p-value of <0.05 (two-tailed) was considered statistically significant. STATA 15.0 (Stata Corp., College Station, TX, USA) was used for all analyses.

Results

Study flow of the original trial

Of 1441 patients approached for inclusion in the original trial, 1092 patients agreed and gave written informed consent. After exclusions, 919 patients were included in the final analysis.[6]

Baseline characteristics (Table 1 and Supplement Table 1)

A total of 474 (51.6%) patients had at least one sensitive topic needing discussion during the ward round. In total, 791 sensitive topics emerged during ward round discussions, including: medical uncertainty (n = 251), psychiatric comorbidities (n = 161), tumour diagnosis (n = 137), social issues (n = 125), non-adherence (n = 43), previous conflicts between patient and treating team (n = 38), and treatment failure (n = 36) (**Figure 1**).

Table 1. Associations of patient characteristics with sensitive topics

	n	All	No sensitive topics	Sensitive topics	*p-value*	OR (95%CI)*	*p-value*
n			445	474			
Sociodemographic factors							
Age, years; mean (SD)	919	65.0 (15.9)	65.7 (15.9)	64.3 (15.9)	*0.16*	1 (0.99, 1)	*0.304*
Female sex, n (%)	919	361 (39.3%)	173 (38.9%)	188 (39.7%)	*0.81*	1.05 (0.8, 1.37)	*0.741*
Number of children, mean (SD)	919	2.5 (9.2)	2.1 (6.7)	2.8 (11.0)	*0.26*	1.01 (0.99, 1.02)	*0.365*
Family status	919						
Single, relationship, married, registered partnership, n (%)		648 (70.5%)	317 (71.2%)	331 (69.8%)	*0.84*		
Separated, divorced, n (%)		147 (16.0%)	68 (15.3%)	79 (16.7%)		1.05 (0.73, 1.52)	*0.787*
Widowed, n (%)		124 (13.5%)	60 (13.5%)	64 (13.5%)		1.07 (0.72, 1.59)	*0.738*
Citizenship	919						
Switzerland, n (%)		789 (85.9%)	386 (86.7%)	403 (85.0%)	*0.71*		
Germany, n (%)		55 (6.0%)	26 (5.8%)	29 (6.1%)		0.97 (0.55, 1.68)	*0.904*
Other, n (%)		75 (8.2%)	33 (7.4%)	42 (8.9%)		1.22 (0.75, 1.98)	*0.421*
Occupation	919						
Employed / working + IV, n (%)		259 (28.2%)	129 (29.0%)	130 (27.4%)	***0.041***		
Unemployed / homemaker, n (%)		39 (4.2%)	13 (2.9%)	26 (5.5%)		2 (0.97, 4.09)	*0.059*
Retired / IV support, n (%)		605 (65.8%)	296 (66.5%)	309 (65.2%)		1.05 (0.78, 1.42)	*0.735*
In education, n (%)		6 (0.7%)	5 (1.1%)	1 (0.2%)		0.19 (0.02, 1.63)	*0.128*
Other, n (%)		10 (1.1%)	2 (0.4%)	8 (1.7%)		3.41 (0.7, 16.56)	*0.128*
Comorbidities	919						
Charlson Comorbidity Index, mean (SD)		4.45 (2.88)	4.4 (2.8)	4.5 (3.0)	*0.54*	0.76 (0.59, 1)	***0.048***
Cardiology, n (%)		485 (52.8%)	248 (55.7%)	237 (50.0%)	*0.082*	0.86 (0.65, 1.13)	*0.273*
Neurology, n (%)		193 (21.0%)	80 (18.0%)	113 (23.8%)	***0.029***	1.01 (0.77, 1.33)	*0.941*
Rheumatology/Immunology, n (%)		143 (15.6%)	68 (15.3%)	75 (15.8%)	*0.82*	1.03 (0.78, 1.37)	*0.819*
Gastrointestinal, n (%)		254 (27.6%)	118 (26.5%)	136 (28.7%)	*0.46*	1.18 (0.85, 1.65)	*0.325*

Endocrinology, n (%)		352 (38.3%)	185 (41.6%)	167 (35.2%)	***0.048***	1.21 (0.86, 1.71)	*0.264*
Respiratory, n (%)		315 (34.3%)	152 (34.2%)	163 (34.4%)	*0.94*	1.07 (0.81, 1.4)	*0.627*
Infectious diseases, n (%)		171 (18.6%)	77 (17.3%)	94 (19.8%)	*0.33*	1.12 (0.85, 1.48)	*0.416*
Renal, n (%)		317 (34.5%)	150 (33.7%)	167 (35.2%)	*0.63*	0.25 (0.07, 0.91)	***0.035***
Gynecology, n (%)		14 (1.5%)	11 (2.5%)	3 (0.6%)	***0.023***	0.26 (0.07, 0.94)	***0.04***
Urology, n (%)		93 (10.1%)	43 (9.7%)	50 (10.5%)	*0.66*	1.24 (0.8, 1.93)	*0.338*
Oncology, n (%)		287 (31.2%)	145 (32.6%)	142 (30.0%)	*0.39*	1.81 (1.13, 2.9)	***0.014***
Psychiatry, n (%)		104 (11.3%)	31 (7.0%)	73 (15.4%)	***<0.001***	1.97 (1.21, 3.2)	***0.006***
Depression, n (%)		82 (8.9%)	29 (6.5%)	53 (11.2%)	***0.013***	0.89 (0.68, 1.15)	*0.364*
Other, n (%)		498 (54.2%)	248 (55.7%)	250 (52.7%)	*0.36*	0.95 (0.73, 1.25)	*0.734*
Health self-rating VAS [0-100], mean (SD)	856	56.9 (23.0)	58.7 (22.5)	55.1 (23.3)	***0.021***	0.99 (0.99, 1)	***0.018***
Quality of life (EQ-5D) Index, mean (SD)	889		0.749 (0.278)	0.671 (0.301)	***<0.001***	0.42 (0.26, 0.67)	***<0.001***

**adjusted for study centre, intervention. Odds ratios were calculated with logistic regression models. Abbreviations: OR, odds ratio; SD, standard deviation; CI, confidence interval; n, number; IV, Swiss disability insurance*

The mean age was 65 years ± 15.9 years (SD). Patients with and without sensitive topics were of comparable age. Overall, 39.3% (n = 361) of patients were female with no differences regarding the occurrence of sensitive topics to that of males. Patients' number of children, family status, citizenship, level of education, and occupation were not associated with the presence of sensitive topics. Individuals with psychiatric comorbidities, however, were more likely to have sensitive topics present (73/474 [15.4%] versus 31/445 [7.0%], $p < 0.001$; adjusted OR 1.97, 95% CI 1.21 to 3.2; $p = 0.006$). Quality of life regarding mobility, self-care, usual activities, pain / discomfort, and anxiety / depression was perceived lower by patients with sensitive topics; consequently resulting in a lower EQ-5D quality of life index score.

Communication-related factors (Table 2)

Patients with sensitive health topics provided more *cue*s (79/474 [16.7%] versus 32/445 [7.2%], $p < 0.001$; adjusted OR 2.36, 95%CI 1.52 to 3.66; $p < 0.001$) and *cue*s were more often addressed by physicians in patients with sensitive topics (40/474 [8.4%] versus 19/445 [4.3%], $p = 0.01$, adjusted OR 1.83, 95% CI 1.03 to 3.24; $p = 0.039$). In the subgroup of patients who mentioned emotions, physicians applied patient-centred communication techniques (i.e., NURSE, WEMS) similarly among individuals with and without sensitive topics (**Supplement Table 2**).

Table 2. Associations of communication factors with sensitive topics

	n	No sensitive topics	Sensitive topics	*p-value*	Adjusted OR (95%CI)*	*p-value*
		445	474			
Communication factors	919					
Visible evidence of emotion, n (%)		48 (10.8%)	70 (14.8%)	*0.071*	1.35 (0.9, 2.01)	*0.144*
Medical staff talks to patient about diagnosis, n (%)		215 (48.3%)	271 (57.2%)	***0.007***	1.59 (1.21, 2.09)	***0.001***
Medical staff talks to patient about symptoms, n (%)		399 (89.7%)	443 (93.5%)	***0.038***	1.66 (1.02, 2.69)	***0.041***
Medical staff talks to patient about treatment, n (%)		334 (75.1%)	383 (80.8%)	***0.036***	1.38 (1, 1.9)	***0.049***
Medical staff talks to patient about next steps, n (%)		344 (77.3%)	431 (90.9%)	***<0.001***	2.8 (1.89, 4.13)	***<0.001***
Medical staff talks to patient about social issues, n (%)		272 (61.1%)	320 (67.5%)	***0.043***	1.43 (1.08, 1.9)	***0.013***
Medical staff talks about patient instead of with patient after case discussion, n (%)		329 (73.9%)	351 (74.1%)	*0.97*	1.19 (0.87, 1.62)	*0.282*
Physician and patient talk at cross purposes, n (%)		17 (3.8%)	35 (7.4%)	***0.019***	2.29 (1.24, 4.25)	***0.008***
Patient seems not to understand something, but does not ask, n (%)		6 (1.3%)	17 (3.6%)	***0.030***	4.15 (1.55, 11.08)	***0.005***
Physician disagrees with / corrects patient, n (%)		30 (6.7%)	57 (12.0%)	***0.006***	2.05 (1.28, 3.3)	***0.003***
Patient disagrees with / corrects physician, n (%)		27 (6.1%)	53 (11.2%)	***0.006***	2.12 (1.29, 3.48)	***0.003***
Occurrence of "*cue"*, n (%)		32 (7.2%)	79 (16.7%)	***<0.001***	2.36 (1.52, 3.66)	***<0.001***
Addressing "*cue"* concern, n (%)		19 (4.3%)	40 (8.4%)	***0.010***	1.83 (1.03, 3.24)	***0.039***
Reacts by providing information instead of exploration, n (%)		19 (4.3%)	33 (7.0%)	*0.077*	1.59 (0.88, 2.87)	*0.122*

**adjusted for study centre, intervention. Odds ratios were calculated with logistic regression models. Abbreviations: OR, odds ratio; CI, confidence interval; n, number; cue, current unvoiced element*

Primary and secondary outcomes (Table 3)

Patients with sensitive topics reported lower overall satisfaction (87.7 ± 14.6 versus 90.2 ± 12.1, p = 0.006; adjusted difference -2.5, 95%CI -4.28 to -0.72; p = 0.006). Sensitive topics were associated with less subjective knowledge (77.8 ± 22 versus 81.2 ± 19, p = 0.013; adjusted difference -3.86, 95% CI -6.57 to -1.15; p = 0.005) as well as objective knowledge (68.7 ± 25.8 versus 72.6 ± 24.9, p = 0.021; adjusted difference -3.83, 95% CI -7.18 to -0.48; p = 0.025).

Table 3. Association of sensitive topics with various outcomes

	n	No sensitive topics	Sensitive topics	*p-value*	Adjusted difference or OR (95%CI)*	*p-value*
Primary endpoint		445	474			
Overall satisfaction (VAS 0-100), mean (SD)	906	90.2 (12.1)	87.7 (14.6)	***0.006***	-2.5 (-4.28, -0.72)	***0.006***
Patient knowledge about medical care						
Average subjective knowledge about their medical care, mean (SD)	919	81.2 (19.0)	77.8 (22.0)	***0.013***	-3.86 (-6.57, -1.15)	***0.005***
Average objective knowledge about their medical care, mean (SD)	919	72.6 (24.9)	68.7 (25.8)	***0.021***	-3.83 (-7.18, -0.48)	***0.025***
Measured timeliness of ward round						
Duration of outside the room discussions (min), mean (SD)	919	2.8 (3.6)	4.9 (5.0)	***<0.001***	1.41 (1.02, 1.81)	***<0.001***
Duration of bedside discussions (min), mean (SD)	919	8.2 (4.2)	9.0 (5.0)	***0.005***	1.56 (1.03, 2.09)	***<0.001***
Duration of debriefing outside the room (min), mean (SD)	919	0.4 (1.1)	0.5 (1.1)	*0.063*	0.16 (0.01, 0.31)	***0.038***
Total duration of ward round per patient (min), mean (SD)	919	11.3 (4.6)	14.5 (5.6)	***<0.001***	3.13 (2.47, 3.79)	***<0.001***
Patient perception regarding discomfort during the ward round						
Medical terms used during ward round were confusing (VAS 0-100), mean (SD)	853	15.9 (28.2)	19.2 (30.4)	*0.099*	3.89 (-0.07, 7.85)	*0.054*
Ward round discussions made me worry (VAS 0-100), mean (SD)	871	6.6 (25.7)	11.7 (24.8)	***0.003***	4.82 (1.4, 8.24)	***0.006***
I felt uncomfortable during ward round (VAS 0-100), mean (SD)	870	4.5 (15.6)	8.2 (21.6)	***0.005***	3.2 (0.64, 5.76)	***0.014***
Ward round discussions unsettled me (VAS 0-100), mean (SD)	752	4.4 (15.9)	7.2 (19.9)	***0.033***	2.84 (0.22, 5.45)	***0.034***
Patient perception regarding physician`s behaviour during the ward round						
Physicians treated me with respect (VAS 0-100), mean (SD)	867	97.4 (8.8)	95.5 (13.1)	***0.011***	-2.05 (-3.57, -0.53)	***0.008***
I was taken seriously (VAS 0-100), mean (SD)	861	96.1 (10.9)	94.0 (15.6)	***0.021***	-2.17 (-4.01, -0.32)	***0.021***
Physicians respected my privacy (VAS 0-100), mean (SD)	794	89.7 (24.8)	91.1 (20.9)	*0.38*	1.41 (-1.85, 4.66)	*0.396*
Physicians showed compassion (VAS 0-100), mean (SD)	693	81.0 (28.4)	75.2 (33.5)	***0.014***	-5.56 (-10.33, -0.8)	***0.022***
My issues were dealt with discreetly (VAS 0-100), mean (SD)	764	88.3 (23.7)	89.2 (21.1)	*0.55*	1.33 (-1.91, 4.57)	*0.42*
Some topics during ward round communication caused inconvenience (VAS 0-100), mean (SD)	853	4.0 (15.4)	7.6 (21.8)	***0.005***	3.58 (0.99, 6.17)	***0.007***

**adjusted for study centre, intervention. All differences calculated with linear regression models for continuous data. Odds ratios were calculated with logistic regression models. Abbreviations: OR, odds ratio; SD, standard deviation; CI, confidence interval; VAS, visual analogue scale; min, minutes*

Duration of outside the room discussions, bedside discussions, and debriefings was longer in patients with sensitive topics. Mean (±SD) duration (min) of ward round per patient was 14.5 ± 5.6 versus 11.3 ± 4.6, p < 0.001; adjusted difference 3.13, 95% CI 2.47 to 3.79; p < 0.001. Compared to patients without sensitive topics, patients with sensitive topics felt more uncomfortable (4.5 ± 15.6 versus 8.2 ± 21.6, p = 0.005; adjusted difference 3.2, 95%CI 0.64 to 5.76; p = 0.014) and unsettled (4.4 ± 15.9 versus 7.2 ± 19.9, p = 0.033; adjusted difference 2.84, 95%CI 0.22 to 5.45; p = 0.034) during the ward round, and discussions causing them to worry (6.6 ± 25.7 versus 11.7 ± 24.8, p = 0.003; adjusted difference 4.82, 95% CI 1.4 to 8.24; p = 0.006). They also felt less confident with the physician team (91.9 ±14.4 versus 89.5 ± 16.8, p = 0.02; adjusted difference -2.52, 95%CI -4.65 to -0.4; p = 0.02), whereas there were no significant differences in confidence with the nursing team (**Supplement Table 3**).

Patients with sensitive topics perceived physicians less compassionate and also felt less respected, taken seriously, and more uneasy (**Table 3**).

Risk factors for low satisfaction among patients with sensitive topics (Table 4)

In a further step, we investigated factors associated with low satisfaction among patients with sensitive topics **(Table 4).** Several factors were associated with low satisfaction, such as parameters regarding the patient-physician interaction during ward rounds such as physicians disagreeing with patients (14/212 [6.6%] versus 41/254 [16.1%], adjusted OR 2.78,95%CI 1.47 to 5.27; p=0.002), and patients disagreeing with physicians (14/212 [6.6%] versus 37/254 [14.6%], adjusted OR 2.42, 95%CI 1.27 to 4.61; p=0.007). Further factors were a patient's lack of knowledge about their own medical care (both subjective and objective knowledge),

an overall longer duration of the ward round, reduced capacity to understand the main disease, the implemented therapeutic measure and further plans of care, as well as other physician-patient interactions (e.g., respectful treatment, physician compassion, observing privacy), see also **Supplement Table 4**.

Table 4. Risk factors for low satisfaction among patients with sensitive topics

	n	high satisfaction	low satisfaction	*p-value*	adjusted difference or OR (95%CI)*	*p-value*
		212	254			
Other communication factors	466					
Physician disagrees with/corrects patient, n (%)		14 (6.6%)	41 (16.1%)	***0.001***	*2.78 (1.47, 5.27)*	***0.002***
Patient disagrees with/corrects physician, n (%)		14 (6.6%)	37 (14.6%)	***0.006***	*2.42 (1.27, 4.61)*	***0.007***
Patient knowledge about medical care	466					
Average subjective knowledge about their medical care, mean (SD)		87.0 (16.2)	70.7 (22.9)	***<0.001***	0.95 (0.94, 0.97)	***<0.001***
Average objective knowledge about their medical care, mean (SD)		71.7 (25.3)	66.2 (26.0)	***0.023***	0.99 (0.98, 1)	***0.027***
Measured timeliness of ward round	466					
Total duration of ward round per patient (min), mean (SD)		13.9 (5.6)	15.1 (5.6)	***0.019***	1.05 (1.01, 1.08)	***0.01***
Patient perception regarding time spent on ward round	466					
Overall duration of ward round was sufficient (VAS 0-100), mean (SD)		95.78 (15.38)	83.81 (24.55)	***<0.001***	0.96 (0.95, 0.98)	***<0.001***
Time spent with physicians was sufficient (VAS 0-100), mean (SD)		96.71 (10.02)	80.66 (22.53)	***<0.001***	0.92 (0.9, 0.94)	***<0.001***
Patient estimation of time spent with patient on ward round (min), mean (SD)		12.18 (7.18)	11.26 (6.58)	*0.15*	0.98 (0.96, 1.01)	*0.176*
Patient estimation of time spent per day with patient case overall (min), mean (SD)		82.09 (86.72)	66.73 (66.44)	***0.031***	1 (0.99, 1)	***0.035***
The ward round was helpful for better						
- understanding the main illness (VAS 0-100), mean (SD)		75.03 (32.91)	54.64 (33.95)	***<0.001***	0.98 (0.98, 0.99)	***<0.001***
- further therapeutic measures (VAS 0-100), mean (SD)		74.14 (32.45)	53.03 (33.52)	***<0.001***	0.98 (0.97, 0.99)	***<0.001***
- further plans of care (VAS 0-100), mean (SD)		83.33 (69.99)	62.12 (52.73)	***<0.001***	0.99 (0.98, 0.99)	***<0.001***
All my questions were answered (VAS 0-100), mean (SD)		97.05 (8.55)	82.10 (24.16)	***<0.001***	0.92 (0.9, 0.94)	***<0.001***
I was able to understand all answers to my questions (VAS 0-100), mean (SD)		96.84 (10.74)	85.85 (20.14)	***<0.001***	0.93 (0.91, 0.95)	***<0.001***
Information during visit has been adequate, n(%)		197 (92.9%)	176 (69.3%)	***<0.001***	0.17 (0.1, 0.31)	***<0.001***
Patient did not understand something during the round, n(%)		13 (6.1%)	36 (14.2%)	***0.005***	2.58 (1.32, 5.02)	***0.005***
Estimation of my participation in the discussion (VAS 0-100), mean (SD)		67.80 (30.61)	51.78 (29.76)	***<0.001***	0.98 (0.98, 0.99)	***<0.001***
Disease was explained in an understandable way (VAS 0-100), mean (SD)		91.95 (19.46)	76.61 (27.1)	***<0.001***	0.97 (0.96, 0.98)	***<0.001***
Treatment was explained in an understandable way (VAS 0-100), mean (SD)		91.32 (20.51)	69.49 (31.19)	***<0.001***	0.96 (0.95, 0.97)	***<0.001***
Upcoming examinations were explained in an understandable way (VAS 0-100), mean (SD)		91.64 (19.12)	74.34 (28.26)	***<0.001***	0.96 (0.95, 0.97)	***<0.001***
The information given during the visit was clear and understandable (VAS 0-100), mean (SD)		97.86 (9.04)	82.92 (22.92)	***<0.001***	0.9 (0.88, 0.93)	***<0.001***
Patient perception regarding discomfort during the ward round	466					
Medical terms used during ward round were confusing (VAS 0-100), mean (SD)		14.1 (27.87)	23.13 (30.42)	***0.003***	1.01 (1, 1.02)	***0.003***
Ward round discussions made me worry (VAS 0-100), mean (SD)		7.93 (22.02)	15.86 (25.73)	***<0.001***	1.02 (1.01, 1.02)	***0.001***

I felt uncomfortable during ward round (VAS 0-100), mean (SD)		3.8 (14.88)	11.98 (24.44)	***<0.001***	1.02 (1.01, 1.04)	***<0.001***
Ward round discussions unsettled me (VAS 0-100), mean (SD)		2.23 (9.31)	12.01 (22.3)	***<0.001***	1.06 (1.03, 1.08)	***<0.001***
Patient perception regarding physician`s behaviour during the ward round						
Physicians treated me with respect (VAS 0-100), mean (SD)	466	99.31 (3.02)	91.87 (16.37)	***<0.001***	0.85 (0.8, 0.9)	***<0.001***
I was taken seriously (VAS 0-100), mean (SD)	466	98.82 (4.97)	88.87 (19.54)	***<0.001***	0.89 (0.85, 0.92)	***<0.001***
Physicians respected my privacy (VAS 0-100), mean (SD)	466	95.83 (14.64)	86.64 (21.55)	***<0.001***	0.96 (0.94, 0.98)	***<0.001***
Physicians showed compassion (VAS 0-100), mean (SD)	466	83.98 (27.57)	66.79 (30.85)	***<0.001***	0.98 (0.97, 0.99)	***<0.001***
My issues were dealt with discreetly (VAS 0-100), mean (SD)	466	95.01 (14.75)	83.95 (21.16)	***<0.001***	0.95 (0.94, 0.97)	***<0.001***
Some topics during ward round communication caused inconvenience (VAS 0-100), mean (SD)	466	3.66 (15.99)	10.88 (23.80)	***<0.001***	1.02 (1.01, 1.03)	***0.001***
I was encouraged to address personal topics (VAS 0-100), mean (SD)	466	90.57 (21.35)	76.54 (27.65)	***<0.001***	0.97 (0.96, 0.98)	***<0.001***
My privacy was violated (VAS 0-100), mean (SD)	466	0.88 (5.30)	5.19 (15.55)	***<0.001***	1.07 (1.02, 1.12)	***0.003***
Teaching took place during ward round (yes, %)	466	61 (28.8%)	65 (25.6%)	*0.44*	0.87 (0.57, 1.33)	*0.51*
- if yes , teaching was perceived as disruptive, (VAS 0-100) mean (SD)	125	0.8 (6.4)	10.3 (29.3)	***0.015***	1.04 (1, 1.08)	*0.07*
Patients' perception regarding quality of care (VAS 0-100)	466					
I felt "in good hands" in this hospital, mean (SD)		96.19 (9.28)	83.57 (17.04)	***<0.001***	0.9 (0.88, 0.93)	***<0.001***
I felt there were contradicting statements from physicians and nursing team, mean (SD)		7.58 (20.90)	18.87 (28.23)	***<0.001***	1.02 (1.01, 1.03)	***<0.001***
I feel confident with the physician team, mean (SD)		95.88 (11.54)	83.79 (18.07)	***<0.001***	0.92 (0.9, 0.94)	***<0.001***
I feel confident with the nursing team, mean (SD)		97.45 (6.46)	86.91 (15.65)	***<0.001***	0.89 (0.87, 0.92)	***<0.001***
Physicians and nurses collaborate well, mean (SD)		95.68 (9.14)	84.25 (15.8)	***<0.001***	0.91 (0.89, 0.93)	***<0.001***
I feel physicians are highly competent to treat the current illness, mean (SD)		96.35 (9.71)	82.84 (18.49)	***<0.001***	0.9 (0.88, 0.93)	***<0.001***
I feel nurses are highly competent to treat the current illness, mean (SD)		96.51 (9.16)	86.39 (31.79)	***<0.001***	0.93 (0.91, 0.95)	***<0.001***

**adjusted for centrum, intervention. All differences calculated with linear regression models for continuous data. Odds ratios were calculated with logistic regression models. Abbreviations: OR, odds ratio; SD, standard deviation; CI, confidence interval; VAS, visual analogue scale*

Qualitative analysis

Examples of conversations extracted from audiotapes are provided in **Supplement Table 5**.

Discussion

We report several key findings of this ancillary project from a multicentre randomised controlled trial that investigated sensitive topics and specific elements recorded during ward round communication: i) Sensitive topics arose frequently during ward rounds, with more than half of patients reporting at least one specific issue. Participants reporting a sensitive topic were more complex in their treatment and required more attention from medical staff, making ward rounds longer and more demanding compared to individuals without a sensitive topic; ii) Medical uncertainty was the most frequent sensitive topic; iii) The presence of sensitive topics in patients was associated with being less satisfied overall with their care; iv) Risk factors for low satisfaction among patients with sensitive topics included several parameters regarding patient-physician interaction during the ward round (various disagreements) - highlighting the importance of patient-centred communication.

Several results of the analysis provide important information and are worth further discussion. Many issues could benefit from special attention, but often take time and may not fit into the ward round time-schedule. However, it is important to address them, as patients may feel unheard and dissatisfied if these topics are not discussed (see an example of a social issue from qualitative analysis in **Box 1**).

Patient: I planned to move in with my partner after my hospital stay. She's a former nurse, but now a relative of hers has died.

Chief physician: Oh dear.

Patient (tearful): When she heard what could happen to me, she said no. I mean, over the last years I've burdened her with my illness. But now I am really down.

Chief physician: Yes, that is… I can understand that.

Patient: Now I had to agree with her and promised to look for assisted accommodation.

Chief physician: Yes, we can discuss this with our case management team. Or have you already found something?

Patient: No, because I expected to move in with her. But now her relative has passed away and it is all so complicated…

Chief physician: Yeah, I understand! But unfortunately, we don't have much time during the ward round so we'll have to discuss your further care on another occasion.

Patient: Okay, yes, thank you.

***Box 1:** Example of a patient-physician discussion about social burden*

Another frequently encountered sensitive topic concerned tumour diagnosis. Previous literature has shown an association between physicians' communicative competence and its effect on quality of life in cancer patients.[17] As quality of life was also lower in patients with sensitive topics in our study, this again underlines the importance of communication skills when talking about tumour diagnoses.

Psychiatric comorbidities and psychological issues are also perceived as sensitive topics and may be directly linked to physical disease. Physicians often hesitate to address mental health issues during the ward round because of a lack of privacy.[7] However, our results suggest that patients do not feel violated in their privacy when sensitive topics are addressed (see **Supplement Table 3**). Also, previous research has shown that 63% of patients prefer to discuss mental health issues in general, at least in the primary care setting.[18] However, similar data for the inpatient setting with less privacy is currently lacking.

Recent studies highlight that medical uncertainty remains a significant factor in medicine despite the advances in diagnostic possibilities particularly in patients reporting various unspecific symptoms.[19] Thus, during ward rounds, the treating team often discusses possible differential diagnoses leaving the patient potentially with remaining uncertainty about the specific disease. This is in line with our results where medical uncertainty was reported as the most common sensitive topic. Medical uncertainty has been shown to negatively affect patients' physical, and mental, well-

being.[20] Moreover, dealing with medical uncertainty may also cause anxiety in physicians, negatively affect their work-related satisfaction, and result in substandard care.[21] Guidance on how best to deal with medical uncertainty and how to address it in the patient's presence is warranted to ensure both physician well-being and patient-centred care. Specific communication skills training may help achieve these aims.[19, 22]

Importantly, our study found lower satisfaction in patients with sensitive topics compared to patients without sensitive topics. This may be due to confounding because patients with sensitive topics are often more complex and have different medical needs. Interestingly, previous literature in outpatient settings suggests that adequately addressing sensitive topics is associated with higher satisfaction[8, 9]. Santelli et al. (2019) reported higher levels of confidentiality during the conversation when sensitive topic were discussed.[23] We did not have information about the extend sensitive topics were discussed with patients in our study. The restricted opportunity for confidentiality during ward rounds may provide some barriers here – even though patients did not expressly state that their privacy was violated. Limited time with the physician may be another contributor to the discrepancy in satisfaction between out- and inpatient settings. Especially time constraints during ward rounds might be a challenge to effectively address sensitive topics, compromising patient satisfaction. However, most patients stated that the time was sufficient, and the duration of ward rounds was significantly longer in patients with sensitive topics. Also, we also found the duration of ward rounds to be associated with lower satisfaction in patients with sensitive topics. It would be important to study the effect of addressing sensitive topics in the inpatient population regarding satisfaction with care in an interventional study.

Over the last decades, medicine has shifted from a paternalistic to a participatory, patient-involving model, with shared decision-making as a key element. Schifferli hypothesises that disagreements between patients and physicians may be a consequence of increasing patient involvement and highlights the importance of patients' wish for participation in clinical decision-making.[24] However, not all patients may prefer shared decision- making and a personalized approach in this regard may be needed [25]. We found that disagreements between physicians and patients were a significant risk factor for low satisfaction in patients with sensitive topics. The example of our qualitative analysis in **Box 2** shows a potential for disagreement when patients wish to actively participate in the definition of treatment options, and the concept of best care differs between the patient and physician.

Chief physician: We know that you normally take Diazepam, which has a long half-life …

Patient: Yes, 24 hours.

Chief physician: Even longer, especially if the liver is not working properly. I've seen two people die from Diazepam. We prefer to prescribe Lorazepam

Patient: I do not tolerate Lorazepam.

Chief physician: What do you mean by "don't tolerate"?

Patient: Once when I withdrew from alcohol and doctors gave me Lorazepam I hallucinated. I saw a mouse in my room. Then I had delirium and woke up in another hospital.

Chief physician: We cannot assume that this was because of the Lorazepam. It was more likely due to alcohol withdrawal.

Patient: Yes, but I've never experienced anything like that with Diazepam.

Chief physician: It is important to me that we informed you about this …

Box 2: *Example of a disagreement between patient and physician*

A recent study showed that patients with active decisional preference are less satisfied with their care and have less trust in the healthcare team compared to patients preferring less in depth involvement in medical decisions.[25] This is in line with the present findings, suggesting that disagreements are a risk factor for low satisfaction. A patient's wish for participation is therefore relevant, and a more personalised approach may improve the patient-physician relationship and increase

patients' satisfaction with medical care. However, as shown in our study, correctly addressing sensitive topics remains a major challenge during ward rounds due to several factors including lack of privacy, time constraints, lack of training and standards how to best address sensitive topcis among others. Future research and quality initiatives should focus on this important issue to improve the care of patients with sensitive topics.

This trial has several limitations. First, we only included Swiss teaching hospitals. This might cause a selection bias and limits generalisability of the findings. Second, using a pragmatic approach, ward rounds in the three participating hospitals were not standardised regarding clinical practice and to ensure external validity. Consequently, the internal validity might be reduced. Third, the questionnaire used to assess patient perception has not yet been validated. Finally, there is no well accepted definition of sensitive topics and we thus defined it based on the clinical experience of the physician-researcher team. Still, there is some data suggesting that patients find value and comfort when their doctors openly discuss uncertainty with them.[26] Yet, a sensitivity analysis excluding uncertainty from the definition of sensitive topics showed similar results.

Conclusion

This analysis suggests that a large proportion of a broad medical inpatient sample have sensitive health topics, which was associated with lower satisfaction with care - particularly if the patient perceived patient-physician interactions during ward rounds as unsatisfactory. Specific physicians training in communication techniques how to identify, discuss and address sensitive topics may help to improve the care of these patients. Besides improving communication skills, future studies need to address the

question which sensitive topics can be discussed at the bedside or in a more private setting.

Contributorship statement

All listed authors were involved in conducting the present study.

SG designed, analysed, and interpreted this ancillary analysis, and drafted the article.

CB designed the original trial, wrote the proposal for the ethics committee, provided study material or patients and critically revised the manuscript for important intellectual content.

KB collected patient data and critically revised the manuscript for important intellectual content.

VM analysed and interpreted patient data and critically revised the manuscript for important intellectual content.

JG contributed to design of this ancillary analyses and critically revised the manuscript for important intellectual content.

PS designed the original trial, contributed statistical expertise, and critically revised the manuscript for important intellectual content.

JL provided study material or patients and critically revised the manuscript for important intellectual content.

RS contributed to the study design and critically revised the manuscript for important intellectual content.

WL designed the original trial and critically revised the manuscript for important intellectual content.

MT provided study material or patients and critically revised the manuscript for important intellectual content.

TB provided study material or patients and critically revised the manuscript for important intellectual content.

JE provided study material or patients and critically revised the manuscript for important intellectual content.

MO provided study material or patients and critically revised the manuscript for important intellectual content.

SB designed the original trial, provided study material or patients, and critically revised the manuscript for important intellectual content.

SH designed the original trial, wrote the proposal for the ethics committee, analysed and interpreted patient data, drafted the article, critically revised the manuscript for important intellectual content, provided study material or patients, contributed statistical expertise, and obtained funding.

All authors approved the final manuscript.

Competing interests

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Data Sharing Statement

The data will be made available to parties placing a reasonable request to the lead author.

Ethics statement

The BEDSIDE-OUTSIDE trial including this pre-planned ancillary analysis was registered prior to initiation at clinicaltrials.gov on 7 July 2017 (https://clinicaltrials.gov/ct2/show/NCT03210987) and approved by the local Ethics Committee (Northwest and Central Switzerland, EKNZ, 2017-00991).

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Figure legends

Figure 1. **Sensitive topics and their frequency (n=791)**

Appendix D

Study IV

Gross S, Amacher SA, Rochowski A, Reiser S, Becker C, Beck K, Blatter R, Emsden C, Nkoulou C, Sutter R, Tisljar K, Pargger H, Marsch S, Hunziker S. "Do-not-resuscitate" preferences of the general Swiss population: Results from a national survey. Resusc Plus. 2023 Apr 5;14:100383. doi: 10.1016/j.resplu.2023.100383. PMID: 37056958; PMCID: PMC10085778.

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Clinical paper

"Do-not-resuscitate" preferences of the general Swiss population: Results from a national survey

Sebastian Gross[a,1], *Simon A. Amacher*[a,b,c,1], *Anton Rochowski*[d], *Stefan Reiser*[d], *Christoph Becker*[a,c], *Katharina Beck*[a], *René Blatter*[a], *Christian Emsden*[b,e], *Coralie Nkoulou*[f], *Raoul Sutter*[b,g], *Kai Tisljar*[b], *Hans Pargger*[b,g], *Stephan Marsch*[b,g], *Sabina Hunziker*[a,g,*]

Abstract

AIMS: To assess the do-not-resuscitate preferences of the general Swiss population and to identify predictors influencing decision-making.

Methods: A nationwide web-based survey was conducted in Switzerland on a representative sample of the adult population. The primary endpoint was the preference for a "Do Not Resuscitate" order (DNR Code Status) vs. cardiopulmonary resuscitation (CPR Code Status) in a clinical case vignette of an out-of-hospital cardiac arrest. Secondary endpoint were participants' own personal preferences for DNR.

Results: 1138 subjects participated in the web-based survey, 1044 were included in the final analysis. Preference for DNR code status was found in 40.5% ($n = 423$) in the case vignette and in 20.3% ($n = 209$) when making a personal decision for themselves. Independent predictors for DNR Code Status for the case vignette were: Personal preferences for their own DNR Code Status (adjusted OR 2.44, 95%CI 1.67 to 3.55; $p < 0.001$), intubation following respiratory failure (adjusted OR 1.95, 95%CI 1.20 to 3.18; $p = 0.007$), time-period after which resuscitation should not be attempted (adjusted OR 0.91, 95%CI 0.89 to 0.93); $p < 0.001$), and estimated chance of survival in case of a cardiac arrest (adjusted OR per decile 0.91, 95%CI 0.84 to 0.99, $p = 0.02$; which was overestimated by all participants.

Conclusions: Main predictors for a DNR Code Status were personal preferences and the overestimation of good neurological outcome after cardiac arrest. Overestimation of positive outcomes after cardiac arrest seems to influence patient opinion and should thus be addressed during code status discussions.

Keywords: Cardiac arrest, Cardiopulmonary resuscitation, Ethics, Personal preferences, Shared-decision-making, End-of-life care

Introduction

Patients suffering an in-hospital cardiac arrest (IHCA) or out-of-hospital cardiac arrest (OHCA) have a high risk for mortality, and debilitating neurological impairment is prevalent in survivors.[1–5] In the United States of America Heart Disease and Stroke Statistics from 2019, survival until hospital discharge for OHCA patients averages at 10.5%, with higher survival rates of 26.7% for IHCA patients.[6] However, OHCA and IHCA survivors frequently suffer from clinically significant neurological disabilities resulting in partial or complete dependence on others in daily life.[4–10] Accordingly, the number of do-not-resuscitate orders (DNR Code Status) stipulating the withholding of cardiopulmonary resuscitation has been increasing over the last decades, especially in chronically ill and elderly patients.[11] As discussions regarding resuscitation preferences are no longer possible during an acute event, the question of whether a patient wishes to be resuscitated or not in case of a cardiac arrest must be addressed at time of hospital admission; in a decision-making process involving both, the patient and treating physician.[12] In Switzerland, this practice is recommended by the Swiss Academy of Medical Sciences and is considered standard procedure for every patient admitted to hospital[12] but literature in this context is scarce.

Previous studies have found that communication interventions addressing shared decision-making regarding CPR were significantly associated with a preference for DNR status.[13] However,

* Corresponding author at: University Hospital Basel, Petersgraben 4, CH - 4031 Basel, Switzerland.
E-mail address: sabina.hunziker@usb.ch (S. Hunziker).

[1] These authors contributed equally to this work and should be considered as first authors.

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there is room for improvement regarding Code Status discussions in general clinical practice. An alarming survey of medical and surgical inpatients at a Swiss University Hospital revealed that 61.4% did not remember discussing Code Status and 72.4% of physicians attested having implemented a DNR Code Status without consulting the patient.[14]

Previous studies have shown that the general population may be too optimistic regarding outcomes following cardiopulmonary resuscitation (CPR) - possibly influenced by the unrealistic depiction of positive CPR results on television and in movies.[15–21] This might substantially bias the shared decision-making and informed consent process between patient and physician. Fuller knowledge of the general population's DNR preferences by physicians, their understanding of CPR and its outcomes, and which personal values and expectations influence the decision, may provide important guidance for shared decision-making discussions concerning DNR Code Status. Accordingly, the present survey aims to assess DNR Code Status rates and its predictors in a representative sample of the general Swiss population.

Materials and methods

Survey administration and participants

A nationwide web-based survey was conducted in Switzerland on a representative sample of the general adult population (18–99 years) provided by LINK Zurich, a commercial polling firm. Participants were invited to complete a web-based questionnaire and received a monetary compensation with local custom expense allowance from LINK. Data was collected across all language regions of Switzerland and every Swiss inhabitant with a mobile or landline phone in his/her household (relates to >98% of Swiss households according to Swiss Federal Statistical Office, bfs.admin.ch) had the same likelihood of being recruited. In this way, the greatest possible generalizability of the data was achieved.

Ethics

All participants completed the survey voluntarily. The first page of the online questionnaire included a short introduction, an explanation of the study's goals, and a statement from the research team guaranteeing confidentiality. Informed consent was assumed upon partial or complete response to the questionnaire. The Ethics Committee of Northern and Central Switzerland was consulted regarding formal clarification of responsibility but waived the necessity for ethical approval (Req-2021-01439).

Questionnaire development

The design, conductance, and reporting of the survey followed Best Practices for Survey Research[22] and Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines.[23] The questionnaire was developed in a three-stage process: Firstly, the core research team developed an initial version based on their clinical expertise and a literature review. Several questions were adapted from previous key publications in the field.[24,25] Secondly, the draft was evaluated by three senior critical care physicians, a critical care advanced practice nurse, and a member of the ethical counsel. The feedback was incorporated into the questionnaire which was then presented to three members of the public (including a hospital pastor) according to the concept of Patient and Public Involvement (PPI)[26] for evaluation. The final version (Supplement 3) was scripted in Responsive Web Design and had an average interview length of approx. 4.5 minutes. It was translated into French and Italian by bilingual native speakers and checked for correctness by bilingual members of the study team.

Outcome measures

The questionnaire consisted of two sections. The first contained the following outcome measures: Primary outcome was the reported rate of DNR Code Status vs. CPR Code Status in a clinical case vignette of a 70-year-old patient suffering an out-of-hospital cardiac arrest with a no-flow time (time from collapse to start of CPR)[27] of 10 minutes (Box 1). The secondary endpoint was the respondents' own personal DNR preference, independent of the case vignette.

Box 1 Clinical Case Vignette for the Primary Outcome.

Imagine being 70 years old. You have high blood pressure and diabetes. During a walk, you suddenly suffer a cardiac arrest. You lose consciousness and fall to the ground. You don't breathe anymore, and your heart has also stopped beating. A passerby notices your distress and immediately calls an ambulance, but the person is overwhelmed by the situation and doesn't take any measures. After 10 minutes, the emergency medical service arrives. Would you want to be resuscitated in this specific situation?

The second part of the questionnaire included (1) how long after cardiac arrest should resuscitation not be attempted anymore, (2) the wish for or against mechanical ventilation in the case of severe illness, (3) preferences for end-of-life care (prioritizing either the prolonging life or alleviation of pain), and (4) preferred location in case of imminent death. Regarding resuscitation and mechanical ventilation, participants were asked to choose between four options (yes, probably yes, probably no, no), which were later dichotomized.

Baseline characteristics and predictors

The second section of the questionnaire covered baseline characteristics (age, sex, language, region, highest educational degree, employment status), and the following presumed potential key predictors:

- Estimate of survival rates with independence in activities of daily living after an out-of-hospital or in-hospital cardiac arrest. Estimates were compared with IHCA and OHCA survival data, which shows a survival rate until hospital discharge with independence in activities of daily life of approximately 18.0% for IHCA and 8.5% for OHCA.[6]
- Existence of an advance directive
- Religious beliefs
- Individual beliefs about an afterlife
- Previous admission to intensive care
- Previous admission of a relative to intensive care
- Having witnessed cardiopulmonary resuscitation in the past
- History of cardiac arrest

- Comorbidities
- Perceived self-rating of health measured by the validated EQ-VAS visual analog scale from 0–100[28]
- Symptoms of anxiety measured by the validated German version of the Generalized Anxiety Disorder-2 questionnaire (GAD-2)[29]
- Symptoms of depression measured by the validated German version of the Patient Health Questionnaire-2 (PHQ-2)[30]

Statistical analysis

Baseline parameters and survey questions were stratified according to primary and secondary endpoints. The following analyses were also performed: i) Logistic regression to evaluate associations between the above factors and the endpoints; ii) Multivariate linear and logistic regression models adjusted for age and sex to control for population characteristics; iii) Calculations of a final overall model including all parameters associated in univariable analysis with the primary and secondary endpoints; and iv) Univariate subgroup analyses of age categories, as well as anxiety and depression scores. A p-value of < 0.05 (two-tailed) was considered statistically significant. STATA 15.0 (Stata Corp., College Station, TX, USA) was used for all analyses.

Results

Baseline characteristics and other factors associated with outcome: Univariate associations

Of 4′935 panelists asked to participate in the web-based survey, 1044 subjects were included in the final analysis (21.2% response rate). Regarding the case vignette (primary endpoint), 59.5% (n = 621/1044) of the subjects, preferred CPR Code Status versus 40.5% (n = 423/1044) that preferred DNR Code Status (Fig. 1a). Among the 1030 participants that reported preferences about their own personal code status, 20.3% (n = 209) preferred a DNR Code Status (Fig. 1b). This frequency was higher among participants that preferred a DNR code status in the case vignette (44/617 (7.1%) vs. 165/413 (40.0%), OR 2.44 (95%CI 1.67 to 3.55), p < 0.001) (Table 1).

The mean age of participants was 45 years ± 16 years (SD). Participants with preference for DNR Code Status were significantly older than participants with no preference for DNR Code Status 48 years ± 16 years versus 43 years ± 16 years (mean, SD), p < 0.001; OR per decile increase 1.12, (95%CI 1.07 to 1.17; p < 0.001) (Supplement 1). Overall, 49.4% (n = 516) of respondents were female, and there was no difference in the primary endpoint between male and females. Regional differences were also seen when choosing DNR Code Status, with 69.9% of participants from German-speaking Switzerland, 23.9% from French-speaking areas, and 6.2% from the Italian-speaking canton responding positively (Supplement 1). The level of education was similar in subjects with and without preference for DNR Code Status. However, professions differed significantly between groups (p = 0.007), and unemployment was a predictor of opposition to DNR Code Status (Supplement 1).

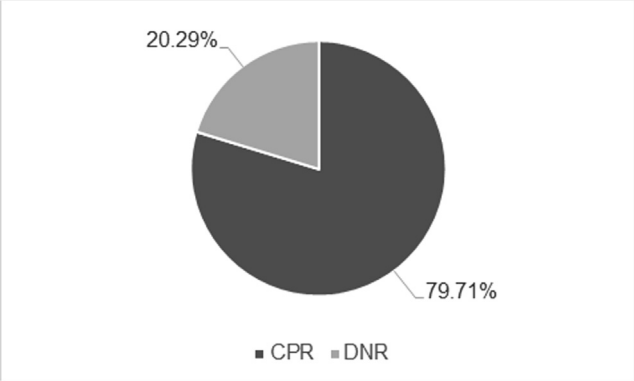

Fig. 1b – Own Code Status preference of the Swiss general population (secondary endpoint, *n* = 1030).

Belief in an afterlife, admission to an intensive care unit (ICU), admission of a relative to an ICU, having been resuscitated in the past, pre-existing illnesses, as well as self-rating of health were not associated with DNR Code Status (Supplement 1).

Baseline characteristics and the other factors predicted secondary outcome similarly. However, female sex was a predictor of preference for own personal DNR Code Status (Supplement 2).

Multivariable associations in an overall model for the primary endpoint

We applied univariable and multivariable analyses to factors associated with DNR code status in the patient case vignette (Table 1). As estimated OHCA and IHCA survival were collinear, only OHCA survival was added to the overall model. The strongest predictors in the overall model were estimated cardiac arrest survival (adjusted OR per decile increase 0.91, 95%CI, 0.84 to 0.99; p = 0.022 (Fig. 2), preferred own DNR Code Status (adjusted OR 2.44, 95%CI, 1.67 to

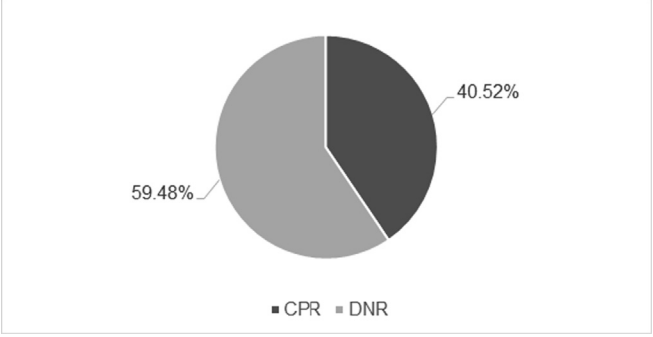

Fig. 1a – Code Status preference of the Swiss general population in the case vignette (primary endpoint, *n* = 1044).

Table 1 – Predictors for DNR Code Status preference in a case vignette.

		n	All	CPR	DNR	*p-value*	Adjusted OR** (95%CI)	*p-value*
n			1044	621	423			
Baseline Characteristics								
Age categories, n (%)	≤40 years	1044	432 (41.4%)	294 (47.3%)	138 (32.6%)	***<0.001***	1 (ref.)	
	41–60 years		414 (39.7%)	222 (35.7%)	192 (45.4%)		1.1 (0.66, 1.85)	*0.711*
	61–70 years		121 (11.6%)	65 (10.5%)	56 (13.2%)		0.82 (0.34, 1.97)	*0.664*
	>70 years		77 (7.4%)	40 (6.4%)	37 (8.7%)		0.59 (0.19, 1.85)	*0.367*
Region, n (%)	German-speaking part of Switzerland	1044	730 (69.9%)	411 (66.2%)	319 (75.4%)	***0.003***	1 (ref.)	
	French-speaking part of Switzerland		249 (23.9%)	162 (26.1%)	87 (20.6%)		0.79 (0.44, 1.42)	*0.434*
	Italian-speaking part of Switzerland		65 (6.2%)	48 (7.7%)	17 (4.0%)		1.04 (0.41, 2.64)	*0.932*
Profession, n (%)	Employed	1028	681 (66.2%)	396 (64.6%)	285 (68.7%)	***0.007***	1 (ref.)	
	At university/ school/training		96 (9.3%)	67 (10.9%)	29 (7.0%)		1.3 (0.58, 2.9)	*0.519*
	Unemployed		50 (4.9%)	37 (6.0%)	13 (3.1%)		0.49 (0.13, 1.82)	*0.286*
	Retired		143 (13.9%)	74 (12.1%)	69 (16.6%)		0.79 (0.33, 1.88)	*0.596*
	Housewife/husbehusband		58 (5.6%)	39 (6.4%)	19 (4.6%)		0.55 (0.21, 1.45)	*0.227*
Cardiac arrest survival								
Estimated OHCA survival with independence in activities of daily living [0–100%], mean (SD)		1022	41.58 (25.35)	45.49 (25.18)	35.87 (24.54)	***<0.001***	0.91 (0.84, 0.99)	***0.022***
Personal preferences								
In the event of a cardiac arrest, would you want to be resuscitated regardless of the circumstances?, n (%)	DNR Code Status	1030	209/ 1030 (20.3%)	44/617 (7.1%)	165/ 413 (40.0%)	***<0.001***	2.44 (1.67, 3.55)	***<0.001***
In case of a cardiac arrest: At what time-point without any treatment should resuscitation not be attempted anymore? (categories), n (%)	0–5 min	639	125 (19.6%)	9 (2.9%)	116 (34.9%)	***<0.001***	1 (ref.)	
	5–10 min		119 (18.6%)	21 (6.8%)	98 (29.5%)		0.39 (0.15, 1.01)	***0.052***
	11–20 min		206 (32.2%)	129 (42.0%)	77 (23.2%)		0.06 (0.02, 0.13)	***<0.001***
	20–60 min		189 (29.6%)	148 (48.2%)	41 (12.3%)		0.03 (0.01, 0.06)	***<0.001***
In the event of severe illness and respiratory failure, would you wish to be mechanically ventilated?, n (%)	NO	1029	652/ 1029 (63.4%)	307/ 610 (50.3%)	345/ 419 (82.3%)	***<0.001***	1.95 (1.2, 3.18)	***0.007***
If you had to decide now: What option would you prefer?, n (%)	Prolonging life is more important to me, even if it	1037	62 (5.9%)	56 (9.0%)	6 (1.4%)	***<0.001***	1 (ref.)	

Table 1 (continued)

		n	All	CPR	DNR	*p-value*	Adjusted OR** (95%CI)	*p-value*
n			1044	621	423			
	means more pain and discomfort							
	Alleviating pain and discomfort is more important to me, even if this might shorten life		737 (70.6%)	377 (60.7%)	360 (85.1%)	***<0.001***	2.68 (0.52, 13.72)	*0.237*
	I'm not sure what I would choose		238 (22.8%)	185 (29.8%)	53 (12.5%)	***<0.001***	2.06 (0.39, 10.95)	*0.395*
Do you possess an advance directive?, n (%)	Yes	1044	283/1044 (27.1%)	140/621 (22.5%)	143/423 (33.8%)	***<0.001***	1.22 (0.73, 2.05)	*0.447*
Personal beliefs								
Religiousness, n (%)	Yes	1019	437/1019 (42.9%)	268/604 (44.4%)	169/415 (40.7%)	*0.25*	1.2 (0.77, 1.87)	*0.432*
Experience with cardiac arrest								
Have you ever witnessed a cardiopulmonary resuscitation?, n (%)	Yes	1037	172/1037 (16.6%)	88/616 (14.3%)	84/421 (20.0%)	***0.016***	1.59 (0.89, 2.82)	*0.114*

**adjusted for univariable factors, significantly associated with primary outcome (i.e., age, region, profession, estimated survival after cardiac arrest, personal preference for *DNR*, preference for mechanical ventilation, preferred time until CPR is withheld, preference of life-prolonging measures, having an advanced directive, religiousness, history of witnessing a cardiac arrest.

*** *OR (95% CI) per decile increase; odds ratios were calculated with logistic* regression *models.*

Abbreviations: OR, odds ratio*; CPR, cardiopulmonary resuscitation; DNR, do-not-resuscitate; OHCA, out-of-hospital cardiac arrest; ref., reference value; SD, standard deviation.*

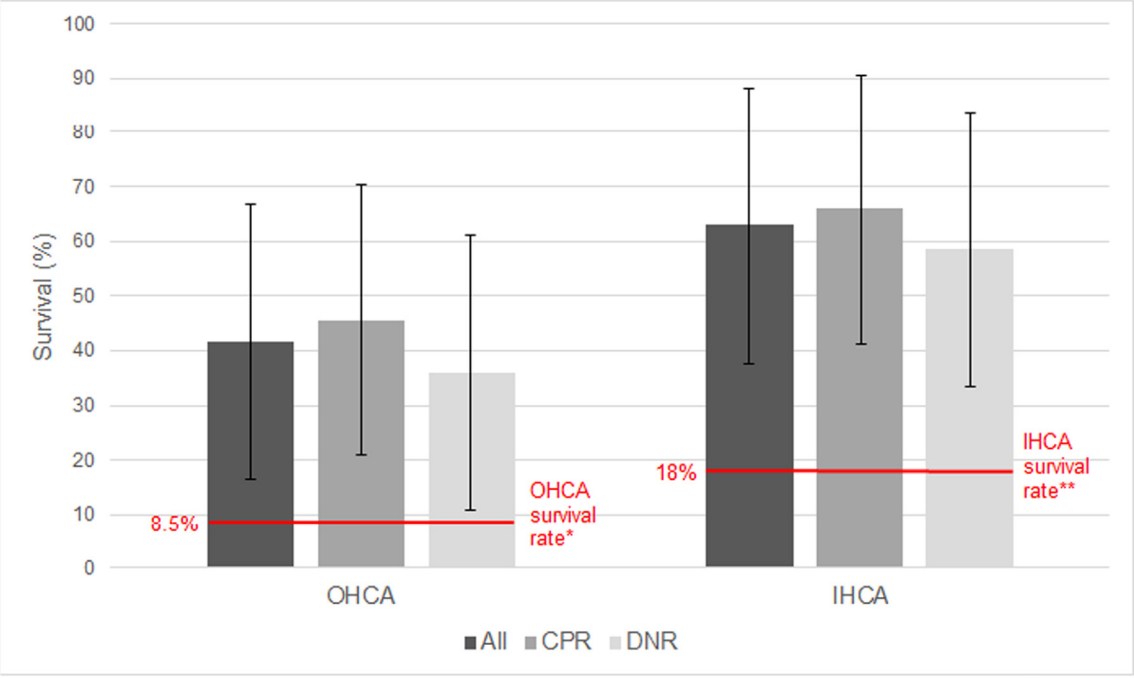

Fig. 2 – Cardiac arrest survival with independence in activities of daily living - Estimates by the general population compared to the actual rate (*n* = 1044). **OHCA-survival with independence in activities of daily living (CPC 1 or 2) according to Virani et al. (2021),[6] **IHCA-survival with independence in activities of daily living (CPC 1 or 2) according to Virani et al. (2021),[6] Abbreviations: CPC, cerebral performance category score; OHCA, out-of-hospital cardiac arrest; IHCA, in-hospital cardiac arrest; CPR, cardio-pulmonary resuscitation; DNR, do-not-resuscitate.*

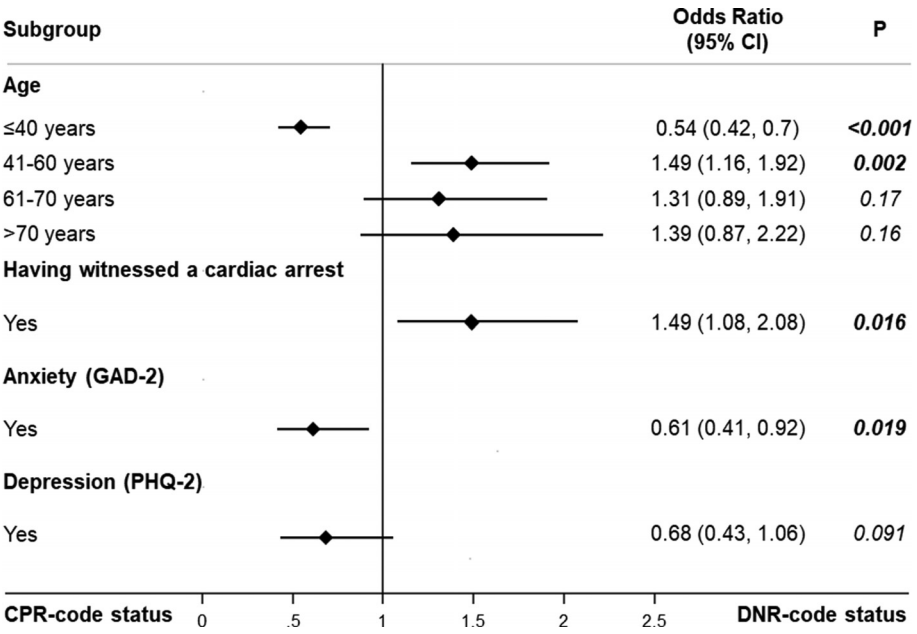

Fig. 3 – Subgroup analysis of age categories and psychometric measures with primary endpoint. ***All odds ratios were calculated with univariate logistic regression models. Abbreviations: CI, confidence interval; CPR, cardiopulmonary resuscitation; DNR, do-not-resuscitate; GAD-2, General Anxiety Disorder-2 questionnaire; PHQ-2, Patient-Health-Questionnaire-2.***

3.55; $p < 0.001$), time-period (minutes) after which own resuscitation should not be attempted (Table 1), and preference against being intubated (adjusted OR 1.95, 95%CI, 1.2 to 3.18; $p = 0.007$).

Multivariable associations in an overall model for the secondary endpoint

We then applied univariable and multivariable analyses to factors associated with participants' own DNR preference, independent of the patient case vignette (Table 2). The most important predictors were: residence in the French-speaking region of Switzerland (adjusted OR 0.41, 95%CI, 0.24 to 0.7; $p = 0.001$), estimated survival following cardiac arrest (adjusted OR increase per decile 0.89, 95%CI, 0.83 to 0.96; $p = 0.002$), time-period (minutes) after which resuscitation should not be attempted (Table 2), and preference against being intubated (adjusted OR 1.64, 95%CI 1.02 to 2.64, $p = 0.041$).

Subgroups (Fig. 3)

Univariate subgroup analysis of age categories (divided by quartiles) showed young age (≤40 years) to be negatively associated with DNR Code Status in the case vignette, and middle age (41–60 years) to be positively associated with a DNR Code Status. Having witnessed a cardiopulmonary resuscitation was also associated with a DNR Code Status. Furthermore, participants with symptoms of anxiety disorder indicated by the GAD-2 questionnaire (11.6% of participants) were negatively associated with a DNR Code Status, while no reported symptoms of anxiety were positively associated with DNR Code Status. The same was true for depression outcomes (8.9% of participants), however without reaching significance. 27% ($n = 283/1044$) of participants possessed an advance directive. Survival estimates of participants without and with advance directive were similar for OHCA ($p = 0.16$) and IHCA ($p = 0.25$) (Supplement 4).

Discussion

Within this representative sample of the Swiss population, approximately 40% of individuals preferred a DNR Code Status when imagining the hypothetical case vignette of a 70-year-old person suffering from arterial hypertension and diabetes (Box 1) experiencing an out-of-hospital cardiac arrest with a no-flow time of 10 minutes. Key predictors for DNR preference in the case vignette were overestimation of cardiac arrest survival, preferred own Code Status, time (minutes) after which resuscitation should not be attempted, and own preference for being intubated in case of respiratory failure.

When considering DNR status for themselves in case of cardiac arrest, the rate dropped to 20% with residence in the French-speaking region of Switzerland, overestimation of survival following cardiac, absence of an advance directive, time-period (minutes) after which resuscitation should not be attempted anymore, and preference for being intubated in case of respiratory failure as key predictors for a DNR Code Status.

Our findings from a representative sample of the Swiss population are in line with a recent study including 873 dialysis patients, of whom 15% preferred a DNR Code Status in case of a cardiac arrest.[25] In another study on 608 outpatients with heart failure, 26% chose DNR Code Status.[31] However, research looking at patients with more advanced illness report higher tendency for DNR. In one study with 249 terminal cancer patients, around 90% preferred DNR Code Status.[32] Quality of life and life expectancy seem to play an important role in this population, as seen in a study of 520 patients with metastatic colorectal cancer and overall good quality of life: 37% chose a DNR Code Status in case of cardiac arrest - with younger age, a better quality of life, and more optimistic patient expectations for 2-month prognosis being the most important predictors.[33] Interestingly, physicians did not correctly identify the

Table 2 – Predictors for the participants' own preferences regarding DNR Code status.

		n	All	CPR	DNR	*p-value*	Adjusted OR** (95%CI)	*p-value*
n			1030	821	209			
Baseline Characteristics								
Sex, n (%)	Female	1030	509 (49.4%)	389 (47.4%)	120 (57.4%)	***0.01***	1.04 (0.97, 1.13)	*0.29*
Age categories, n (%)	≤40 years	1030	425 (41.3%)	366 (44.6%)	59 (28.2%)	***<0.001***	1 (ref.)	
	41–60 years		410 (39.8%)	323 (39.3%)	87 (41.6%)		0.91 (0.57, 1.46)	*0.694*
	61–70 years		119 (11.6%)	83 (10.1%)	36 (17.2%)		1.37 (0.67, 2.82)	*0.387*
	>70 years		76 (7.4%)	49 (6.0%)	27 (12.9%)		1.72 (0.67, 4.42)	*0.261*
Region, n (%)	German-speaking part of Switzerland	1030	730 (69.9%)	552 (67.2%)	168 (80.4%)	***<0.001***	1 (ref.)	
	French-speaking part of Switzerland		249 (23.9%)	220 (26.8%)	27 (12.9%)		0.41 (0.24, 0.7)	***0.001***
	Italian-speaking part of Switzerland		65 (6.2%)	49 (6.0%)	14 (6.7%)		1.43 (0.65, 3.12)	*0.373*
Profession, n (%)	Employed	1016	674 (66.3%)	545 (67.5%)	129 (62.0%)	***0.013***	1 (ref.)	
	At university/ school/training		94 (9.3%)	80 (9.9%)	14 (6.7%)		1.38 (0.65, 2.91)	*0.398*
	Unemployed		49 (4.8%)	40 (5.0%)	9 (4.3%)		1.45 (0.54, 3.91)	*0.464*
	Retired		141 (13.9%)	97 (12.0%)	44 (21.2%)		0.97 (0.47, 2.01)	*0.937*
	Housewife/househusband		58 (5.7%)	46 (5.7%)	12 (5.8%)		1.27 (0.56, 2.89)	*0.569*
Cardiac arrest survival								
Estimated OHCA survival with independence in activities of daily living [0–100%], mean (SD)		1008	41.43 (25.37)	43.74 (25.17)	32.34 (24.12)	***<0.001***	0.89 (0.83, 0.96)	***0.002***
Do you possess an advance directive?, n (%)	Yes	1030	280 (27.2%)	191 (23.3%)	89 (42.6%)	***<0.001***	1.45 (0.95, 2.22)	*0.088*
Personal preferences								
In case of a cardiac arrest: At what time-point without any treatment should resuscitation not be attempted anymore? (categories), n (%)	0–5 min	639	125 (19.6%)	50 (11.6%)	75 (35.9%)	***<0.001***	1 (ref.)	
	5–10 min		119 (18.6%)	72 (16.7%)	47 (22.5%)		0.46 (0.26, 0.81)	***0.007***
	11–20 min		206 (32.2%)	155 (36.0%)	51 (24.4%)		0.29 (0.17, 0.49)	***<0.001***
	20–60 min		189 (29.6%)	153 (35.6%)	36 (17.2%)		0.23 (0.13, 0.41)	***<0.001***

(*continued on next page*)

Table 2 (continued)

		n	All	CPR	DNR	*p-value*	Adjusted OR** (95%CI)	*p-value*
n			1030	821	209			
In the event of severe illness and respiratory failure, would you wish to be mechanically ventilated?, n (%)	NO	1030	645 (63.4%)	470 (58.1%)	175 (83.7%)	***<0.001***	1.64 (1.02, 2.64)	***0.041***

**adjusted for univariable factors, significantly associated with primary outcome (i.e., sex, age, region, profession, estimated survival after cardiac arrest, personal preference for DNR, preference for mechanical ventilation, preferred time until CPR is withheld.

*** *OR (95% CI) per* decile *increase; odds ratios were calculated with logistic regression models.*

Abbreviations: OR, odds ratio; CPR, cardiopulmonary resuscitation; DNR, do-not-resuscitate; OHCA, out-of-hospital cardiac arrest; ref., reference value; SD, standard *deviation.*

patient's preferences in 30% of the cases, which highlights the importance of a shared decision-making process and physicians respecting the autonomy of the patient.[33]

Our study revealed the following strong predictors for the preference of a DNR Code Status in the case vignette: Older age, residence in the German-speaking part of Switzerland, estimated survival after OHCA or IHCA, fewer religious beliefs, the absence of anxiety, and prioritization of alleviating pain and discomfort over life-prolonging measures.

Age and cultural background have also been identified as predictors of Code Status preferences in a previous study[34]: A recent investigation of hospitalized patients in a Swiss University Hospital found that 30.8% of patients where CPR was presumed futile had chosen CPR Code Status - which was also independently associated with younger age, male gender, non-Christian religion, and non-Swiss citizenship.[34] Also, in the present investigation the preference for a lower acceptable maximal no-flow time was significantly associated with a DNR Code Status in the case vignette and the own DNR preference.

Interestingly, affiliation to a specific religion, belief in an afterlife, previous admission to intensive care, admission of a close relative to intensive care, depressive symptoms, and poor health self-rating showed no association with DNR Code Status preference in the case vignette. In line with our findings, previous research has also not found associations between Code Status decisions and spiritual/religious beliefs. Physicians should therefore avoid assumptions about affiliations of spiritual/religious beliefs and decisions regarding resuscitation.[35] Symptoms of anxiety (but not depression) were negatively associated with a preference of DNR Code Status in the clinical case vignette. One might hypothesize that higher levels of anxiety increase the fear of dying, which in turn may influence Code Status preferences. In fact, a trial including 200 psychiatric patients found anxiety surrounding death to be a strong predictor of psychopathology, including depression and anxiety.[36]

When looking at the secondary endpoint, only 20.0% of participants preferred DNR for themselves. At first, the lower proportion of DNR Code Status compared to the case vignette seems counterintuitive. However, difference might be partly explained when younger and presumably healthier individuals than the case vignette put themselves into the place of a 70-year-old OHCA patient with significant comorbidities and a no-flow time of 10 min. Interestingly, residence in the French-speaking part of Switzerland, overestimation of survival after OHCA or IHCA and the preference for mechanical ventilation in case of respiratory failure were strong predictors for a CPR code-status when looking at the participants' own preferences. The higher preference of CPR code status in the French-speaking part of Switzerland might be partly explained by a different cultural background, as the French-speaking part is culturally more strongly oriented towards France as opposed to the German-speaking or Italian-speaking part of Switzerland, which are more oriented towards Germany or Italy respectively.

The effectiveness of CPR and outcomes after cardiac arrest were largely overestimated by participants in our study. Survival with a favorable neurological outcome (independence in activities of daily living) was estimated at a mean of 41.6% for OHCA and 62.9% for IHCA patients. One recent meta-analysis of outcomes after OHCA, found survival until hospital discharge after OHCA at 8.8%,[3] of which only approximately 83%[8] experienced favorable neurological conditions. For IHCA, results were only marginally better, with survival until hospital discharge at around 20%; of which approximately 85% experience a favorable neurological outcome.[7] When considering the no-flow time, the surveyed public also had unrealistic expectations. In our survey, the estimated mean time when CPR was considered futile was 18 minutes – which in the majority of cases is fatal.[27] These unrealistic beliefs and misconceptions concerning the success of CPR are in line with previous research in the field.[18,20] Even though CPR results in endotracheal intubation in two third of cases,[37] 50% of participants choosing CPR Code Status in the case vignette were against mechanical ventilation. This results in a clinical dilemma with the potential of disrespecting the participants' wishes. This issue must be addressed when conducting Code Status discussions. Misinformation of the public through television, movies and other media might be contributing to these misconceptions.[16,19,21] Improved education of the public could change opinions and increase preference for DNR.

This study has several implications for research and clinical practice:

Firstly, when discussing DNR preferences with patients, clinicians should be aware that overestimating outcomes after cardiac arrest and misinformation concerning intensive care might influence patient opinion and should be addressed adequately in the shared-decision-making process. A multicenter trial using a checklist-guided shared decision-making process for medical inpatients is currently being conducted by our research group in Switzerland (https://clinicaltrials.gov/ct2/show/NCT03872154).

Secondly, as with previous research in the field, our study found a significant gap in knowledge about cardiac arrest outcomes which

might substantially increase preference for CPR. The survival rates estimated by study participants roughly correspond to the findings of a previous trial analyzing television shows for CPR survival rates.[21] This suggests a possible influence of the media on the general public's beliefs about CPR. In the current study, participants with an advance directive chose a higher rate of DNR which might be the result of previous reflection on the topic. Consequently, future informational programs should educate the general population and specific patient groups on the possible choices and outcomes of CPR, as in Wales via the "*Talk CPR*" project for individuals affected by life-limiting illnesses.[38]

This study has several strengths and limitations. Firstly, the participants represent a large Swiss-nationwide sample, and collaboration with a polling-firm guaranteed high quality data and a low dropout rate (7%). Secondly, the questionnaire was developed in a three step procedure involving experts from several disciplines, as well as the public. However, as an observational study, our findings are hypothesis-generating, and several findings might be confounded (as comorbidities might influence e.g., advance directives) which in turn can also affect DNR preference.

Also, the case vignette was based on a case of OHCA which might limit the extension of the study's results to IHCA cases. Finally, as the study was performed in Switzerland, results may not be applicable to other cultures or regions of the world.

Conclusion

Within this Swiss nationwide survey, the main predictors for a DNR Code Status were personal preferences and the overestimation of good neurological outcome after cardiac arrest. Overestimation of positive outcomes after cardiac arrest seems to influence patient opinion and should thus be addressed adequately during the shared decision-making process of code status discussions.

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Conflict of interest statement

The authors disclose no potential conflict of interest relevant to this study.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.resplu.2023.100383.

Author details

[a]*Medical Communication and Psychosomatic Medicine, University Hospital Basel, Basel, Switzerland* [b]*Department of Intensive Care, University Hospital Basel, Basel, Switzerland* [c]*Department of Emergency Medicine, University Hospital Basel, Basel, Switzerland* [d]*Link Marketing Services AG, Lucerne, Switzerland* [e]*Institute of Nursing Science, University of Basel, Basel, Switzerland* [f]*Department of Intensive Care, University Hospital Zurich, Zurich, Switzerland* [g]*Medical Faculty, University of Basel, Basel, Switzerland*

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Appendix E

Study V

Gross S, Amacher SA, Arpagaus A, Becker C, Urben T, Gaab J, Emsden C, Sutter R, Tisljar K, Pargger H, Marsch S, Hunziker S. Misconceptions and do-not-resuscitate preferences of healthcare professionals commonly involved in cardiopulmonary resuscitations: Results from a national survey. Manuscript submitted for publication.

Misconceptions and do-not-resuscitate preferences of healthcare professionals commonly involved in cardiopulmonary resuscitations: Results from a national survey

Simon A. Amacher, MD[1,2,3*]; Sebastian Gross, MSc[1*]; Christoph Becker, MD[1,3]; Armon Arpagaus, MD[1]; Tabita Urben, MD[1]; Jens Gaab, PhD[4]; Christian Emsden, MScN[2,5,6]; Raoul Sutter, MD[2,7]; Kai Tisljar, MD[2]; Hans Pargger, MD[2,7]; Stephan Marsch, MD PhD[2,7] and Sabina Hunziker, MD MPH[1,5,7]

[1] Medical Communication and Psychosomatic Medicine, University Hospital Basel, Basel, Switzerland.
[2] Department of Intensive Care, University Hospital Basel, Basel, Switzerland.
[3] Department of Emergency Medicine, University Hospital Basel, Basel, Switzerland.
[4] Division of Clinical Psychology and Psychotherapy, Faculty of Psychology, University of Basel,
[5] Switzerland Institute of Nursing Science, University of Basel, Basel, Switzerland.
[6] Post-Intensive Care Clinic, University Hospital Basel, Basel, Switzerland.
[7] Medical Faculty, University of Basel, Basel, Switzerland.

*These authors contributed equally to this work and should be considered first authors.

Corresponding author:
Prof. Dr. med. Sabina Hunziker
University Hospital Basel
Petersgraben 4
CH - 4031 Basel
Switzerland
Email: sabina.hunziker@usb.ch

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ABSTRACT

BACKGROUND

The study aims to assess the DNR preferences of healthcare professionals involved in CPR, to identify factors influencing decision-making, and to raise awareness for prejudices concerning CPR outcomes.

METHODS

A nationwide survey was conducted in Switzerland. The primary outcome was the preference for a Do-Not-Resuscitate order (DNR Code Status) vs. cardiopulmonary resuscitation (CPR Code Status) in a clinical case vignette of an out-of-hospital cardiac arrest (OHCA). Secondary outcomes were participants' personal preferences for DNR and estimates of survival with good neurological outcome after cardiac arrest.

RESULTS

Within 1803 healthcare professionals, a preference for DNR code status was found in 85% (n = 1532) regarding the case vignette and 53.2% (n = 932) when making a personal decision. Main predictors for DNR Code Status regarding the case vignette included personal preferences for DNR Code Status, (n, [%] 896 [58.5] vs. 87 [32.1]; adjusted OR 2.97, 95% CI 2.25 to 3.92; $p < 0.001$) and lower estimated OHCA survival (mean [±SD] 12.3 [±11.8] vs. 14.7[±12.8]; adjusted OR 0.98, 95% CI 0.97 to 0.99; $p = 0.001$). Physicians more often chose a DNR order compared to nurses and paramedics.

CONCLUSION

The estimation of survival rates following cardiac arrest is a pivotal factor influencing the decisions about resuscitation measures in both, health care professionals and the general population. Consequently, health care professionals should be aware of prognosis and implications, when engaging in comprehensive discussions with their patients to facilitate informed decision-making.

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INTRODUCTION

Patients suffering a cardiac arrest experience a high mortality and neurological disability is frequent in survivors.[1-5] In the 2021 United States of America Heart Disease and stroke statistics assessing data from 2019, mortality rates until hospital discharge average 89.5% for out-of-hospital cardiac arrests (OHCA) and 73.3% for in-hospital cardiac arrests (IHCA).[6] Survivors, however, depict high rates of neurological impairment leading to partial or complete dependence on others in activities of daily life.[4-10] At hospital discharge, around 10-15% of OHCA- and 10-12% of IHCA survivors suffer from severe disability, usually requiring care.[4,5,7]

However, there is evidence that the public substantially overestimates the success of cardiopulmonary resuscitation (CPR), possibly skewed by the unrealistic display of CPR success in television and movies.[11-15] The question of whether a patient wishes to be resuscitated or not is commonly discussed on hospital admission in a shared decision-making conversation between the patient and the treating physician, as the hyperacute nature of cardiac arrest makes ad-hoc discussions of resuscitation preferences impossible.[16] In Switzerland, the Swiss Academy of Medical Sciences highly recommends a shared decision-making conversation concerning patients` preferences in the event of a cardiac arrest. This discussion should be performed upon hospital admission and include an assessment of the patient's health status, information about the individual prognosis in case of a cardiac arrest, and potential consequences of a successful resuscitation. Nowadays, this conversation is considered a standard procedure for all patients admitted to a hospital in order to avoid futile CPRs and respect the patients' wishes as far as possible.[16] Patients' CPR preferences are then usually documented in their medical records, enabling their implementation even when patients are unconscious or otherwise incapable of communicating. This is crucial for patients without readily available next of kin, where physicians often act as surrogate decision-makers.[17] Thus, health professionals should be aware of their wishes and prejudices concerning CPR to be unbiased counselors for patients in a shared decision-making process or to act as surrogate decision-makers.[18-20] It is the aim of the present

study to assess emergency and critical care professionals' do-not-resuscitate (DNR) preferences for themselves, conceptions concerning CPR outcomes, and how these parameters compare to the general population.

METHODS

Study population

A multicenter web-based survey was conducted in Switzerland among healthcare professionals regularly involved in the care of in- and out-of-hospital cardiac arrest patients and compared to a representative sample of the general population. In Switzerland, the following healthcare professionals are predominantly involved in advanced cardiac life support and post-resuscitation care:

- Paramedics and prehospital emergency physicians
- Emergency nurses and emergency physicians
- Intensive care nurses and intensive care physicians
- Nurse anesthetists and anesthesiologists

Hence, healthcare professionals or trainees from the beforementioned professions were eligible to be surveyed.

Survey administration

The national Societies of the respective subspecialties were contacted and asked to participate in the survey. All national societies in question consented to participate in the survey and to distribute the survey link using their email communication channel, except the Swiss Society for Anaesthesiology and Perioperative Medicine, which rejected participation in the survey. To compensate for this matter, anesthesia departments of four large Swiss tertiary care centers (University Hospital Zurich, University Hospital Basel, Cantonal Hospital St. Gallen, and Cantonal Hospital Aarau) were asked to participate instead. Also, as the Swiss paramedics are only incompletely represented in their national society, six large emergency services participated in the survey. A list of all participating societies and institutions can be obtained from the online supplement (**Supplement 5**). The emails were only sent once without a reminder, and the number of emails sent was registered to calculate the response rate. (**Supplement 5**)

Questionnaire Development

The questionnaire was developed in accordance with the Best Practices for Survey Research[21] and Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines.[22] The questionnaire development has been previously reported in detail[23]; in brief, the multi-stage process involved members of the public (including a hospital pastor) according to the *Patient and Public Involvement* strategy[24], senior critical care physicians, a critical care nurse, and a member of the ethical counsel. The final version of the survey can be obtained from the online supplement (**Supplement 6**).

Outcomes

The primary outcome was the reported rate of DNR Code Status vs. CPR Code Status in a clinical case vignette of a 70-year-old patient suffering an out-of-hospital cardiac arrest with a no-flow time (time from collapse to start of CPR)[25] of 10 minutes (**Box 1**). The secondary endpoint was the respondents' personal DNR preferences, independent of the case vignette.

Baseline characteristics and factors potentially associated with preference for or against cardiopulmonary resuscitation measures

The questionnaire included the following baseline characteristics: age, self-reported gender, language, profession, nationality, specialty and subspecialty, region, highest educational degree, religion, grade of religiousness, comorbidities, years of work experience since degree, living conditions, number of children, type of emergency service.

Additionally, the following factors were registered:

- Estimated survival rates with independence in activities of daily living after an out-of-hospital or in-hospital cardiac arrest according to a cerebral performance category scale (CPC) of 1 or 2.26,27 In accordance with the original publication, a CPC of 1 indicates

144 "Good recovery - (…) Resumption of normal life even though there may be minor
145 neurological and psychological deficits." And CPC 2 indicates "Moderate disability -
146 Disabled but independent" in activities of daily living, such as the use of public
147 transportation or doing groceries".26 The survival with independence in activities of daily
148 living estimates were then compared with IHCA and OHCA outcome data from the Heart
149 Disease and Stroke Statistics-2021 Update.6 In the Heart Disease and Stroke Statistics-
150 2021 Update, the survival rate until hospital discharge with independence in activities of
151 daily life was reported as 18.0% for IHCA and 8.5% for OHCA.6 The responses were
152 categorized as 'correctly estimated', 'underestimated', and 'overestimated' based on a 5%
153 tolerance cut-off in comparison with the data.
154
155 - Number of resuscitations performed/participated
156 - Existence of an advance directive
157 - Individual beliefs about an afterlife
158 - Previous admission to intensive care
159 - Previous admission of a relative to intensive care
160 - History of cardiac arrest.
161 - Perceived self-rating of health measured by the validated EQ-VAS visual analog scale
162 from 0-100[28]
163 - Symptoms of anxiety measured by the validated German version of the Generalized
164 Anxiety Disorder-2 questionnaire (GAD-2)[29]
165 - Symptoms of depression measured by the validated German version of the Patient Health
166 Questionnaire-2 (PHQ-2)[30]
167 **Statistical analysis**
168 - Baseline characteristics and outcomes of healthcare professionals were stratified
169 according to the primary and secondary endpoint and to compare the health care

professionals with the Swiss general population cohort from a recently published by our group. For comparison, we used a two-tailed Student's t-test.[23] Logistic and linear regression analysis were used to evaluate associations of these factors with endpoints. Multivariate models were adjusted for age and gender. Finally, to compare the different professions (i.e., physicians, nurses and paramedics), we used an analysis of variance (ANOVA). A p-value of <0.05 (two-tailed) was considered statistically significant. The statistics software STATA 15.0 (Stata Corp., College Station, TX, USA) was used for all analyses. A p-value of <0.05 (two-tailed) was considered statistically significant.

RESULTS

Response rate

The response rate over all the participating societies and institutions was 26.5%, as 1822 of 6876 healthcare professionals contacted by email responded. Details regarding the response rate can be obtained from the online supplement (**Supplement 5**).

Baseline characteristics

Of 1822 healthcare professionals participating in the web-based survey, 1803 were included in the final analysis. Of the 1722 healthcare professionals providing information regarding their profession, 815 (47.2%) identified as paramedics, 580 (33.7%) as physicians, and 330 (19.2%) as nurses. In the physician subgroup, 125 participants (21.5%) identified as residents, 194 (33.4%) as attendings, 191 (32.9%) as consultants, and 70 (12.1%) as heads of department. Within healthcare professionals, paramedics formed the youngest subgroup with a mean (±SD) age (years) of 38.7 (± 9.6), followed by nurses (42.9 [± 10.9]), and physicians (44.3 [±10.5]). Our cohort expressed a long-standing professional experience (mean professional experience 14.2 years [± 10.4]), resulting in 67.7% of participants with a substantial CPR experience of 21 to 50 cases.

Primary endpoint: Code Status preference regarding the case vignette within healthcare professionals

Regarding the case vignette, 85% (n = 1532) of the 1803 subjects preferred DNR Code Status. The key predictor for a DNR Code Status regarding the case vignette was the OHCA survival estimate: Lower OHCA survival estimates were negatively associated with a DNR Code Status regarding the case vignette (mean [±SD] 12.3 [±11.8] vs. 14.7 [±12.8]; adjusted OR 0.98, 95% CI 0.97 to 0.99; p = 0.001)regarding the case vignette. However, estimated IHCA survival did not correlate with DNR Code Status. Preferring a DNR Code Status for their own (secondary

endpoint) was also predictive for a DNR Code Status regarding the case vignette (896 [58.5%] vs. 87 [32.1%]; adjusted OR 2.97, 95% CI 2.25 to 3.92; p < 0.001).

Further predictors for a DNR Code Status regarding the case vignette included a shorter no-flow time after which resuscitation should not be attempted anymore, not wanting to be mechanically ventilated, not believing in an afterlife, no symptoms of anxiety, lower perceived quality of life and having an advance directive (**Table 1**)

Secondary endpoint: Personal Code Status preference among healthcare professionals

Regarding their personal resuscitation preference, 53.2% (n = 932) of healthcare professionals preferred DNR Code Status independent of the circumstances. Main predictors for own DNR Code Status included lower estimated IHCA survival (mean [±SD] 26.3 [±19.5] vs. 29.0 [±20.9]; adjusted OR 0.99, 95% CI 0.99 to 1; p = 0.001) and OHCA survival (mean [±SD] 11.4 [±10.6] vs 14.0 [±13.1]; adjusted OR 0.98, 95% CI 0.97 to 0.99; p < 0.001). Overestimating IHCA and OHCA survival was negatively associated with the own DNR Code Status preference. Preferring a DNR Code Status regarding the case vignette (primary endpoint) also predicted the own DNR Code Status preference.

Further predictors for the own DNR Code Status preference included a shorter no-flow time after which resuscitation should not be attempted anymore, not wanting to be mechanically ventilated, not believing in an afterlife, not having children, having an advance directive, and having more professional experience **(Supplement 2)**.

Estimation of survival with independence in activities of daily living

57.5% of healthcare professionals (n = 1005) correctly estimated survival with independence in activities of daily living (CPC 1-2) after an OHCA. In contrast, only 25.3% of healthcare professionals (n = 443) correctly estimated survival with independence in activities of daily living (CPC 1-2) after an IHCA. (**Table 1**).

Interprofessional differences

Regarding the primary outcome, in physicians, nurses, and paramedics the rate of DNR orders was comparable. However, regarding the secondary outcome, physicians more often chose a DNR order than nurses and paramedics (adjusted OR 0.51, 95% CI 0.39 to 0.67; $p < 0.001$ and adjusted OR 0.6, 95% CI 0.48 to 0.75; $p < 0.001$, for nurses and paramedics respectively, **Supplement 2**). Physicians and paramedics had the highest proportion of correct estimations regarding OHCA outcomes (**Figure 3a, Table 2**). When looking at IHCA outcomes, physicians expressed the highest proportion of correct answers (**Figure 2a, Table 2**). Also, physicians were less likely to refuse mechanical ventilation than nurses and paramedics **(Table 2)**.

Differences between the Swiss general population and healthcare professionals

The Swiss general population cohort included 1044 subjects. The mean age of healthcare professionals was slightly lower than the mean age of the Swiss general population: 41 years ± 11 years and (SD) vs. 45.4 ± 16.3 years (mean, SD), $p < 0.001$. There was no significant difference in gender distribution between populations (528 [50.6%] versus 975 [54.3%], $p = 0.056$ were male, for the Swiss general population and health care professionals, respectively).

Compared to the Swiss general population, healthcare professionals reported lower IHCA- (mean [±SD] 41.6 [±25.5] vs. 27.7 [±20.6], $p < 0.001$) and OHCA survival estimates (mean [±SD] 62.9 [±25.1] vs 12.7 [±12.1], $p < 0.001$) **(Figure 1a and 1b)**. The majority of the general Swiss population overestimated IHCA and OHCA survival chances. 57.6% (n=1038) of healthcare professionals estimated OHCA survival correctly (±5%), whereas 12.5% (n=225) underestimated and 30% (n=540) overestimated it. IHCA survival was correctly (±5%) estimated by 25.2% (n=455), underestimated by 27.2% (n=491), and overestimated by 47.5% of subjects **(Table 3, Figures 2b and 3b).**

Further, compared to the Swiss general population, healthcare professionals were less religious, reported fewer symptoms of anxiety and depression, reported a higher quality of life, and more often had an advance directive **(Table 3)**.

DISCUSSION

In this multicenter study of 1803 healthcare professionals commonly involved in cardiopulmonary resuscitations, a preference for DNR Code Status was found in 85% in a clinical case vignette of a 70-year-old patient with a substantial no-flow time. Among the different professions (physicians, nurses, and paramedics) the rate of DNR orders in the case vignette was comparable. When making a general personal decision, more than half of the healthcare professionals preferred a DNR Code Status for themselves. Notably, physicians more often chose a DNR order than nurses and paramedics in the present study. The proportion of DNR Code Status was significantly higher among healthcare professionals compared to the general population. This was true for both the case vignette and the personal decision for themselves. One could hypothesize that this difference might result from the frequent direct confrontation of healthcare professionals with poor outcomes after cardiac arrest. This is in line with comparable research in the field. In a North American multicenter survey, most physicians preferred a DNR Code Status for themselves, and chose withdrawal of life-sustaining therapies in case of low probability of survival with a good quality of life.[31] In a Brazilian survey comparing the preferences of 163 intensivists with the general population's preferences regarding admission to intensive care in hypothetical case scenarios, intensivists were less likely to choose intensive care admission for themselves than for their patients.[32] In an older study from Israel looking at what doctors decide regarding life-prolonging therapies, what they prefer for themselves, and what elderly persons prefer, important differences between the physicians' practice, the preferences for themselves, and the preferences of elderly persons were noted regarding the provision of CPR or artificial feeding.[33] These findings are supported by a recent Australian survey including 747 doctors and 233 nurses. Approximately 25% of ICU practitioners indicated continuing aggressive treatment for a hypothetical patient. Still, they would refuse the treatment for themselves.[34] These findings suggest that there might be substantial discrepancies between what healthcare professionals assume to be a reasonable treatment for themselves and what is considered reasonable for their patients when making

clinical decisions involving invasive and burdensome treatments. This might lead to a substantial ethical dilemma as, according to the Swiss Oath Pledge for medical doctors, physicians should not “impose any treatment on patients that would not be acceptable for themselves or the people closest to them”.[35] Such ethical dilemmas between own beliefs, expectations and patients' preferences, especially when providing perceived futile treatments might cause moral distress for intensive care practitioners, potentially resulting in symptoms of burnout or a change of profession.[36-38] Also, clinicians should keep in mind that many of the functional states (e.g., bowel and bladder incontinence or confinement in bed) commonly observed after critical illness are considered worse than death by a significant number of patients.[39]

In accordance with previously published results from a representative sample of the Swiss general population, healthcare professionals commonly involved in cardiopulmonary resuscitations over- and underestimated the survival rate with independence in activities of daily living after cardiac arrest.[23] Although the surveyed healthcare professionals had a high exposure towards cardiopulmonary resuscitation, they substantially overestimated the no-flow time, after which resuscitation should not be attempted anymore. However, it is well known that a no-flow time of around 10 minutes is associated with a <2% chance of survival without neurological sequelae depending on the low-flow time.[40] Still, compared to the general population, healthcare professionals gave lower cardiac arrest survival estimates and more often estimated survival chances correctly.

Also, the majority of healthcare professionals did not want to be mechanically ventilated in case of severe illness and respiratory failure. Over- and underestimation of survival rates and refusal of mechanical ventilation were predictive for a DNR Code Status regarding the case vignette and when healthcare professionals were making a general personal decision for themselves. Healthcare professionals should be well aware of these issues when counseling patients regarding DNR preferences and end-of-life decisions, as poor prognostic estimation, lack of

311 communication skills, and physicians' attitudes toward death have been shown to interfere with
312 modern end-of-life care.[41]
313 Interestingly, although intensivists and critical care societies advocate completing an advance
314 directive, only 32.4% of healthcare professionals in our survey possessed an advance directive.[42]
315 Notably, possessing an advance directive was predictive for a DNR Code Status, which might
316 indicate previous personal engagement with this topic.
317
318 The present study has several implications for clinical practice, personal reflections, and future
319 research.
320 First, healthcare professionals should be aware of their prejudices, choices, and ethical values
321 when supporting patients and families in end-of-life discussions, such as code status preferences.
322 This might potentially influence their counseling and shared decision-making. Standardized
323 communication tools might be supportive in such situations. Currently, a multicenter trial
324 assessing a checklist-guided shared decision-making process performed by our research group
325 has just completed recruitment (https://classic.clinicaltrials.gov/ct2/show/NCT03872154).
326 Second, healthcare professionals should be aware that a reasonable number of professionals
327 wrongly estimated survival with independence in activities of daily living and overestimated the
328 duration of a reasonable no-flow interval. Thus, we advocate that healthcare professionals
329 commonly counseling patients regarding code status and deciding about termination of CPR are
330 aware of realistic outcome data and time intervals.
331 Third, we suggest that healthcare professionals commonly involved in cardiopulmonary
332 resuscitations engage personally and in-depth with advance directives, as only a minority of the
333 surveyed healthcare professionals possess an advance directive. Additionally, as shown in the
334 present study, previous mental engagement with the topic might influence personal decision-
335 making.
336

Strengths and Limitations

The present study has several strengths: First, to the best of our knowledge, it is the largest of its kind looking at healthcare professionals' DNR preferences and comparing them to the preferences of a representative sample of the general population. Second, the present survey was developed in a multi-level iterative process applying the concepts of public and patient involvement and multi-expert input. Also, validated tools for the assessment of anxiety and quality of life were used.[29,30]

Third, the study integrates healthcare professionals from different professions and multiple centers and societies, thus resulting in a high external validity.

However, this study also has imitations: First, as the study was performed exclusively in Switzerland, the results might not be extrapolated to different countries or cultural backgrounds. Second, the present study's design is observational, and the results are thus rather hypothesis generating.

CONCLUSIONS

Healthcare professionals have a significantly higher preference for a DNR Code Status compared to the general population in both a hypothetical clinical case vignette and when making a general decision for themselves. The estimation of survival rates following cardiac arrest is a pivotal factor influencing the decisions about resuscitation measures in both health care professionals and the general population. Consequently, healthcare professionals should be aware of prognosis and implications, when engaging in comprehensive discussions with their patients to facilitate informed decision-making.

BOXES

Box 1. Clinical Case Vignette for the Primary Outcome

Box 1. Clinical Case Vignette for the Primary Outcome
Imagine being 70 years old. You have high blood pressure and diabetes. During a walk, you suddenly suffer a cardiac arrest. You lose consciousness and fall to the ground. You don't breathe anymore, and your heart has also stopped beating. A passerby notices your distress and immediately calls an ambulance, but the person is overwhelmed by the situation and doesn't take any measures. After 10 minutes, the emergency medical service arrives. Would you want to be resuscitated in this specific situation?

TABLES

Table 1. Predictors for Code Status preference regarding the case vignette within healthcare professionals

		All	CPR	DNR	p-value	Unadjusted OR (95%CI)	p-value	Adjusted OR* (95%CI)	p-value
n		1803	271	1532					
Baseline Characteristics									
Gender, n (%)	Male	979 (54.3%)	172 (63.5%)	807 (52.7%)	0.001	0.63 (0.48, 0.83)	0.001	0.65 (0.49, 0.85)	0.001
Age, mean (SD)		41.4 (10.6)	42 (10.8)	41.3 (10.6)	0.39	0.99 (0.98, 1.01)	0.387	1 (0.99, 1.01)	0.689
Age categories, n (%)	≤40 years	943 (52.3%)	130 (48.0%)	813 (53.1%)	0.46	1 (ref.)		1 (ref.)	
	41-60 years	788 (43.7%)	128 (47.2%)	660 (43.1%)		0.82 (0.63, 1.07)	0.153	0.63 (0.38, 1.04)	0.072
	61-70 years	62 (3.4%)	11 (4.1%)	51 (3.3%)		0.74 (0.38, 1.46)	0.387	0.48 (0.17, 1.36)	0.165
	>70 years	10 (0.6%)	2 (0.7%)	8 (0.5%)		0.64 (0.13, 3.05)	0.575	0.34 (0.05, 2.33)	0.273
Language, n (%)	German	1519 (84.2%)	198 (73.1%)	1321 (86.2%)	<0.001	1 (ref.)		1 (ref.)	
	French	215 (11.9%)	53 (19.6%)	162 (10.6%)		0.46 (0.32, 0.65)	<0.001	0.48 (0.34, 0.67)	<0.001
	Italian	69 (3.8%)	20 (7.4%)	49 (3.2%)		0.37 (0.21, 0.63)	<0.001	0.39 (0.23, 0.68)	0.001
Religion, n (%)	Don't know / no information	79 (4.4%)	15 (5.5%)	64 (4.2%)	0.012	1 (ref.)		1 (ref.)	
	No religion	687 (38.1%)	84 (31.0%)	603 (39.4%)		1.68 (0.91, 3.08)	0.095	1.58 (0.86, 2.91)	0.139
	Reformed (Evangelical)	540 (30.0%)	83 (30.6%)	457 (29.8%)		1.41 (0.76, 2.62)	0.282	1.17 (0.63, 2.16)	0.613
	Catholic	478 (26.5%)	82 (30.3%)	396 (25.8%)		1.13 (0.61, 2.08)	0.691	1.05 (0.57, 1.94)	0.873
	Muslim	15 (0.8%)	5 (1.8%)	10 (0.7%)		0.47 (0.14, 1.57)	0.22	0.41 (0.12, 1.4)	0.156
	Other	4 (0.2%)	2 (0.7%)	2 (0.1%)		0.23 (0.03, 1.8)	0.163	0.24 (0.03, 1.83)	0.167
Religiousness, n (%)	Yes	509 (28.2%)	83 (30.6%)	426 (27.8%)	0.34	0.85 (0.63, 1.13)	0.263	0.86 (0.65, 1.15)	0.318
Health self-rating VAS [0-100], mean (SD)		87.5 (11.5)	85.5 (13.2)	87.8 (11.1)	0.003	1.01 (1, 1.02)	0.005	1.01 (1, 1.02)	0.006
Experience with cardiac arrest									
Do you have an advance directive?, n (%)	Yes	563 (32.1%)	56 (21.4%)	507 (34.0%)	<0.001	1.9 (1.39, 2.6)	<0.001	1.95 (1.42, 2.67)	<0.001
Estimated survival*									
Estimated IHCA survival	[0-100%], mean (SD)	27.7 (20.3)	27.2 (18.3)	27.7 (20.7)	0.69	1 (0.99, 1.01)	0.673	1 (0.99, 1.01)	0.94
Estimated OHCA survival	[0-100%], mean (SD)	12.6 (12)	14.7 (12.8)	12.3 (11.8)	0.002	0.99 (0.98, 1)	0.003	0.98 (0.97, 0.99)	0.001
Estimated IHCA survival (categories), n (%)	Correctly estimated (5% tolerance)	455 (25.2%)	70 (25.8%)	385 (25.1%)	0.78	1 (ref.)		1 (ref.)	
	Underestimated	491 (27.2%)	69 (25.5%)	422 (27.5%)		1.11 (0.78, 1.59)	0.563	1.13 (0.78, 1.61)	0.522

	Overestimated	857 (47.5%)	132 (48.7%)	725 (47.3%)		1.02 (0.74, 1.41)	0.888	0.96 (0.7, 1.32)	0.811
Estimated OHCA survival (categories), n (%)	Correctly estimated (5% tolerance)	1038 (57.6%)	154 (56.8%)	884 (57.7%)	<0.001	1 (ref.)		1 (ref.)	
	Underestimated	225 (12.5%)	15 (5.5%)	210 (13.7%)		2.46 (1.42, 4.27)	0.001	2.39 (1.38, 4.15)	0.002
	Overestimated	540 (30.0%)	102 (37.6%)	438 (28.6%)		0.78 (0.59, 1.03)	0.083	0.7 (0.53, 0.93)	0.013
Resuscitation preferences									
Own resuscitation preference, n (%)	DNR yes	983 (54.5%)	87 (32.1%)	896 (58.5%)	<0.001	2.98 (2.26, 3.95)	<0.001	2.97 (2.25, 3.92)	<0.001
In case of a cardiac arrest: At what time-point without any treatment should resuscitation not be attempted anymore? (categories), n (%)	0-5 min	514 (28.5%)	4 (1.5%)	510 (33.3%)	<0.001	1 (ref.)		1 (ref.)	
	>5-10 min	693 (38.4%)	26 (9.6%)	667 (43.5%)		0.14 (0.05, 0.42)	<0.001	0.21 (0.07, 0.6)	0.004
	>10-15 min	303 (16.8%)	57 (21.0%)	246 (16.1%)		0.03 (0.01, 0.07)	<0.001	0.03 (0.01, 0.09)	<0.001
	>15-60 min	293 (16.3%)	184 (67.9%)	109 (7.1%)		0.01 (0, 0.04)	<0.001	0 (0, 0.01)	<0.001
In the event of severe illness and respiratory failure, would you wish to be mechanically ventilated?, n (%)	NO	1128 (62.6%)	122 (45.0%)	1006 (65.7%)	<0.001	1.96 (1.49, 2.56)	<0.001	2.31 (1.77, 3)	<0.001
Profession-related information									
Profession, n (%)	Physician	582 (32.3%)	104 (38.4%)	478 (31.2%)	0.047	1 (ref.)		1 (ref.)	
	Nurse	401 (22.2%)	50 (18.5%)	351 (22.9%)		1.73 (1.16, 2.59)	0.008	1.35 (0.93, 1.96)	0.12
	Paramedic	820 (45.5%)	117 (43.2%)	703 (45.9%)		1.3 (0.97, 1.73)	0.077	1.33 (0.98, 1.79)	0.063

*adjusted for age and gender
**With independence in activities of daily living (CPC 1-2).
Abbreviations: CPC , Cerebral Performance Category Scale; CPR, cardiopulmonary resuscitation; DNR, do-not-resuscitate; IHCA, in-hospital cardiac arrest; OHCA, out-of-hospital cardiac arrest; OR, odds ratio; ref., reference value; SD, standard deviation.

Table 2 Interprofessional differences

		All	Physicians	Nurses	Paramedics	*p-value*
n		1722	580	330	812	
Estimated survival*						
Estimated IHCA survival [0-100%], mean (SD)		27.6 (20.5)	25.7 (17.3)	39.4 (24.5)	24.2 (19.1)	<0.001
Estimated OHCA survival [0-100%], mean (SD)		12.6 (12.1)	10.7 (9.2)	19.3 (16.3)	11.3 (11.1)	<0.001
Estimated IHCA survival (categories), n (%)	Correctly estimated (5% tolerance)	448 (26.0%)	184 (31.7%)	48 (14.5%)	216 (26.6%)	<0.001
	Underestimated	481 (27.9%)	137 (23.6%)	57 (17.3%)	287 (35.3%)	
	Overestimated	793 (46.1%)	259 (44.7%)	225 (68.2%)	309 (38.1%)	
Estimated OHCA survival (categories), n (%)	Correctly estimated (5% tolerance)	985 (57.2%)	358 (61.7%)	126 (38.2%)	501 (61.7%)	<0.001
	Underestimated	221 (12.8%)	81 (14.0%)	28 (8.5%)	112 (13.8%)	
	Overestimated	516 (30.0%)	141 (24.3%)	176 (53.3%)	199 (24.5%)	
Own resuscitation preference, n (%)	DNR yes	941 (54.6%)	370 (63.8%)	170 (51.5%)	401 (49.4%)	<0.001
In the event of severe illness and respiratory failure, would you wish to be mechanically ventilated?, n (%)	NO	1066 (61.9%)	271 (46.7%)	213 (64.5%)	582 (71.7%)	<0.001

*With independence in activities of daily living (CPC 1-2)
Abbreviations: CPC, Cereberal Performance Category Scale; DNR, do-not-resuscitate; IHCA, in-hospital cardiac arrest; OHCA, out-of-hospital cardiac arrest; SD, standard deviation.

Table 3. Differences between the Swiss general population and healthcare professionals

		All	General Population	Healthcare Professionals	*p-value*
n		2847	1044	1803	
Baseline Characteristics					
Gender, n (%)	Male	1503 (52.9%)	528 (50.6%)	975 (54.3%)	0.056
Age, mean (SD)		42.9 (13.1)	45.4 (16.3)	41.437603 (10.609759)	<0.001
Age categories, n (%)	≤40 years	1375 (48.3%)	432 (41.4%)	943 (52.3%)	<0.001
	41-60 years	1202 (42.2%)	414 (39.7%)	788 (43.7%)	
	61-70 years	183 (6.4%)	121 (11.6%)	62 (3.4%)	
	>70 years	87 (3.1%)	77 (7.4%)	10 (0.6%)	
Religiousness, n (%)	Yes	933 (35.0%)	437 (42.9%)	496 (30.1%)	<0.001
Anxiety (GAD-2), n (%)	Yes	229 (8.3%)	121 (11.6%)	108 (6.3%)	<0.001
Depression (PHQ-2), n (%)	Yes	151 (5.5%)	93 (8.9%)	58 (3.4%)	<0.001
Health self-rating VAS [0-100], mean (SD)		84.2 (14.1)	78.9 (16)	87.5 (11.8)	<0.001
Do you have an advance directive?, n (%)	Yes	846 (30.6%)	283 (28.0%)	563 (32.1%)	0.025
Estimated survival*					
Estimated IHCA survival (categories), n (%)	Correctly estimated (5% tolerance)	594 (21.4%)	139 (13.6%)	455 (25.9%)	<0.001
	Underestimated	668 (24.0%)	177 (17.3%)	491 (27.9%)	
	Overestimated	1517 (54.6%)	706 (69.1%)	811 (46.2%)	
Estimated OHCA survival (categories), n (%)	Correctly estimated (5% tolerance)	1055 (38.1%)	51 (5.0%)	1004 (57.1%)	<0.001
	Underestimated	231 (8.3%)	6 (0.6)	225 (12.8%)	
	Overestimated	1485 (53.6%)	957 (94.4%)	528 (30.1%)	
Resuscitation preferences					
Resuscitation preference regarding the case vignette, n (%)	DNR yes	1955 (68.7%)	423 (40.5%)	1532 (85.0%)	<0.001
Own resuscitation preference, n (%)	DNR yes	1140 (41.0%)	209 (20.3%)	931 (53.2%)	<0.001
In case of a cardiac arrest: At what time-point without any treatment should resuscitation not be attempted anymore? (min), mean (SD)		12.6 (10.6)	18.3 (13.8)	10 (7.4)	<0.001

*With independence in activities of daily living (CPC 1-2).
Abbreviations: CPC, Cerebral Performance Category Scale; CPR, cardiopulmonary resuscitation; DNR, do-not-resuscitate; GAD-2, Generalized Anxiety Disorder 2-item questionnaire; PHQ-2, Patient Health Questionnaire-2; IHCA, in-hospital cardiac arrest; OHCA, out-of-hospital cardiac arrest; SD, standard deviation.

FIGURES

Figures 1a and 1b. Cardiac arrest survival estimates compared to the actual rate

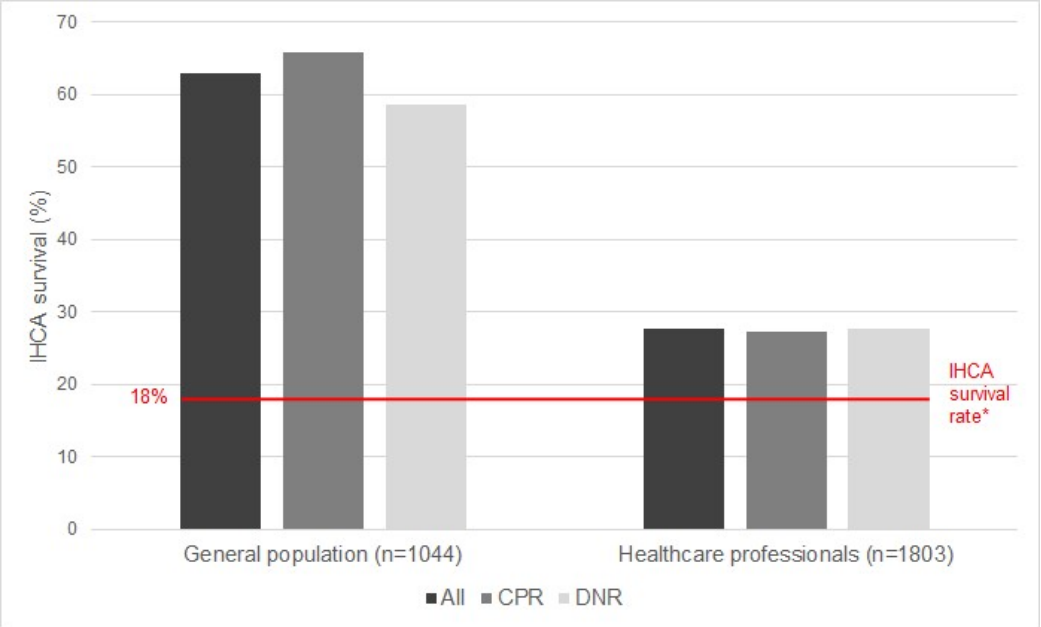

Figure 1a. In-hospital cardiac arrest (IHCA) survival estimates compared to the actual rate.
*Survival with independence in activities of daily living (CPC 1 or 2) according to Virani et al. (2021)[6]
Abbreviations: CPC, Cerebral Performance Category Scale; IHCA, In-hospital cardiac arrest.

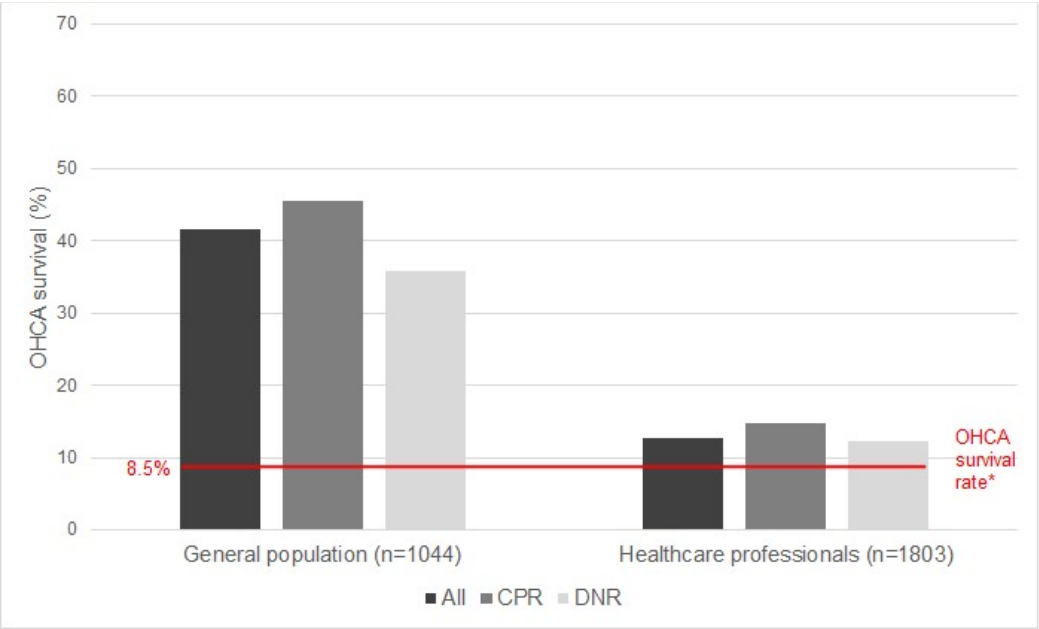

Figure 1b. Out-of-hospital cardiac arrest (OHCA) survival estimates compared to the actual rate.
*Survival with independence in activities of daily living (CPC 1 or 2), according to Virani et al. (2021)[6]
Abbreviations: CPC, Cerebral Performance Category Scale; OHCA, Out-of-hospital cardiac arrest.

Figures 2a and 2b. Percentage of correctly estimated, overestimated, and underestimated in-hospital cardiac arrest survival

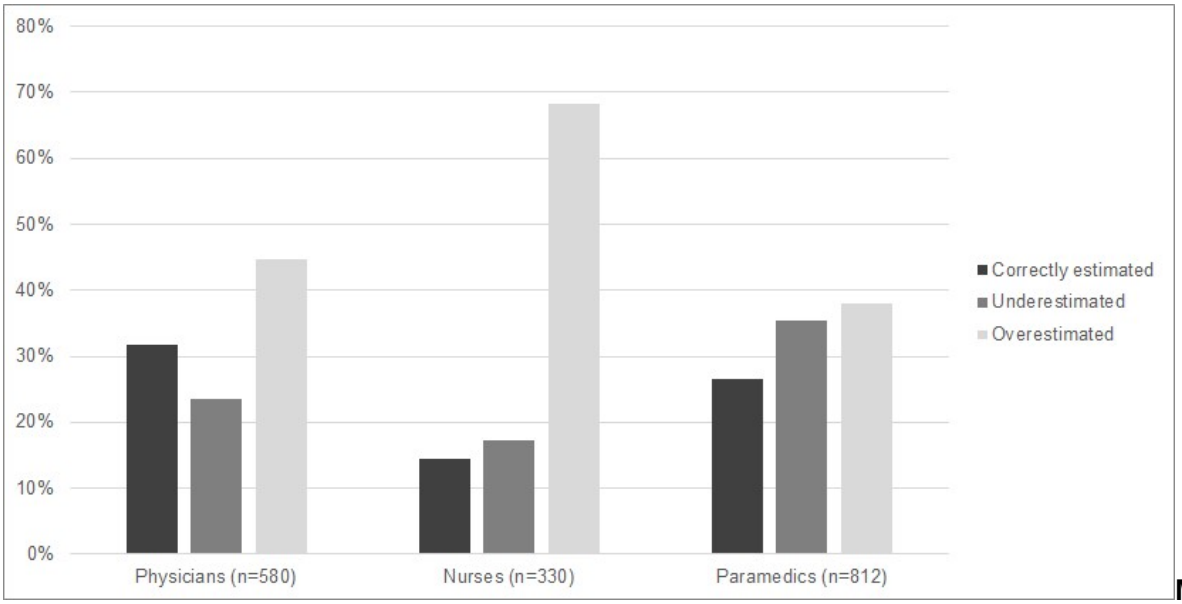

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Figure 2a. Percentage of correctly estimated, overestimated, and underestimated in-hospital cardiac arrest survival with independence in activities of daily living (CPC 1-2) among healthcare professionals. Abbreviation: *CPC* Cerebral Performance Category Scale.

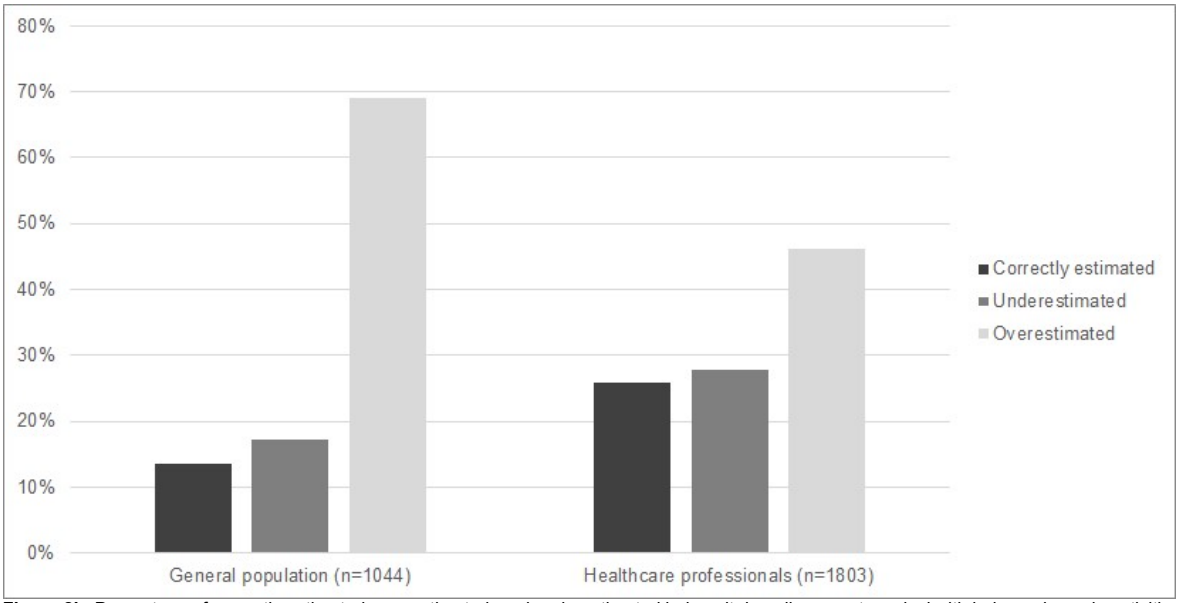

Figure 2b. Percentage of correctly estimated, overestimated, and underestimated in-hospital cardiac arrest survival with independence in activities of daily living (CPC 1-2) given by the general population and healthcare professionals. Abbreviation: *CPC* Cerebral Performance Category Scale.

Figures 3a and 3b. Percentage of correctly estimated, overestimated, and underestimated out-of-hospital cardiac arrest survival

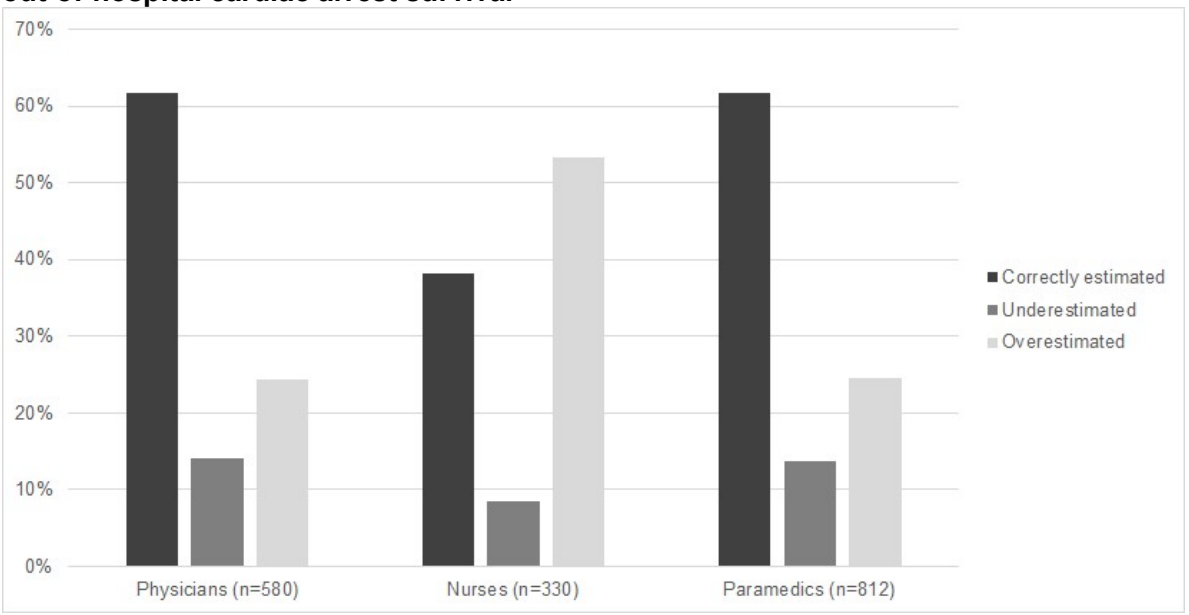

Figure 3a. Percentage of correctly estimated, overestimated, and underestimated out-of-hospital cardiac arrest survival with independence in activities of daily living (CPC 1-2) among healthcare professionals. Abbreviation: *CPC* Cerebral Performance Category Scale.

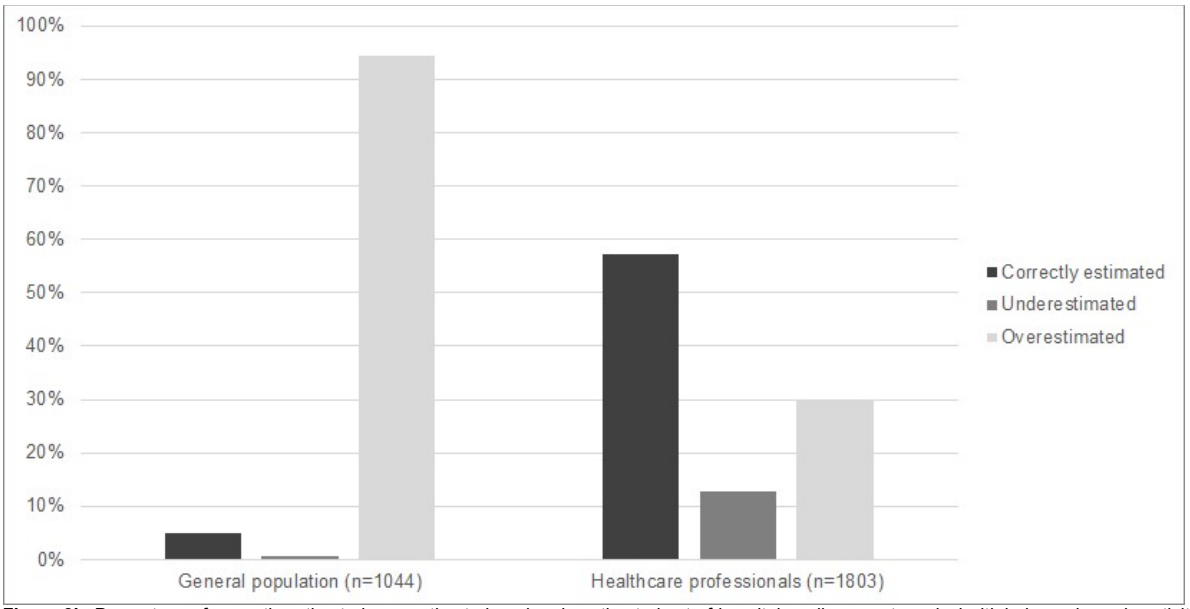

Figure 3b. Percentage of correctly estimated, overestimated, and underestimated out-of-hospital cardiac arrest survival with independence in activities of daily living (CPC 1-2) among members of the general population and healthcare professionals. Abbreviation: *CPC* Cerebral Performance Category Scale.

LIST OF ABBREVIATIONS

CPC	Cerebral Performance Category Score
CPR	Cardiopulmonary resuscitation
ICU	Intensive Care Unit
IHCA	In-hospital Cardiac Arrest
IQR	Interquartile Range
OHCA	Out-of-hospital Cardiac Arrest
SD	Standard Deviation

DECLARATIONS

Ethics approval and consent to participate

For formal clarification of responsibility, the competent ethics committee (Ethics Committee of Northern and Central Switzerland) was consulted, which denied the necessity for ethical approval (Req-2021-01439). A short introduction, including an explanation of the study's goals and a confidentiality statement, was included on the first page of the online questionnaire. Also, upon checking a box on the first page of the survey, the participants gave informed consent for participation in the study.

Consent for publication

Not applicable.

Availability of data and materials

The datasets generated and/or analysed during the current study are available from the corresponding author upon reasonable request.

Competing interests

Raoul Sutter received research grants from the Swiss National Foundation (No 320030_169379), the Research Fund of the University Basel, the Scientific Society Basel, and the Gottfried Julia Bangerter-Rhyner Foundation. He received personal grants from UCB-pharma and holds stocks from Novartis, Roche, Alcon, and Johnson & Johnson.

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Author's contributions

SAA, SG and SH were the main contributors regarding the conceptualization, methodology, acquisition, analysis, and interpretation of the data, as well as writing, editing, and visualizing the manuscript. CE, CB, AA, TU, HP, SM, KT, RS and JG made substantial contributions to the conceptualization of the study. The questionnaire for the survey was developed by SAA, SG, CB, CE, HP, RS, SM, and SH. SAA was responsible for the survey administration. SG was responsible for data acquisition using Survey Monkey®. All authors revised the manuscript for important intellectual content. All authors read and approved the final manuscript. SH was the senior supervisor of the project and acts as a guarantor.

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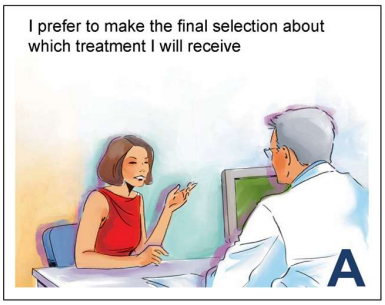
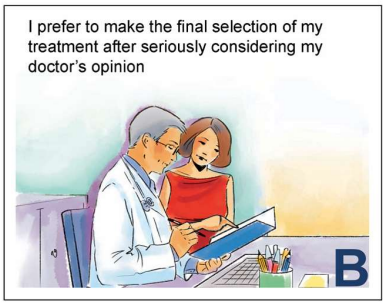
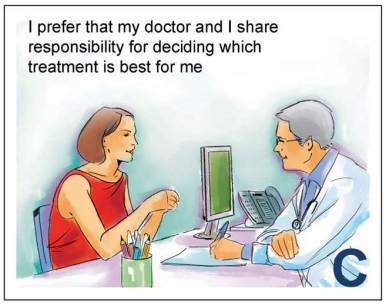
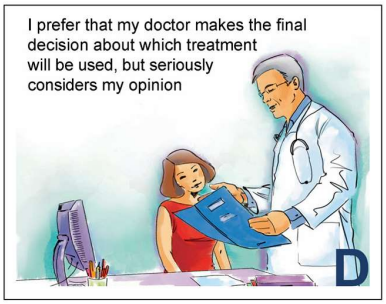
Appendix F

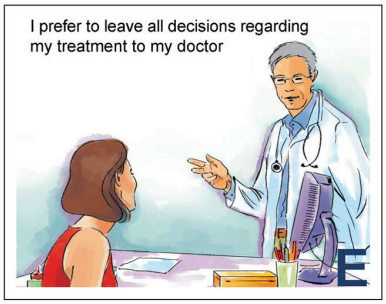
Role Preferences of People with Multiple Sclerosis: Image-Revised, Computerized Self-Administered Version of the Control Preference Scale (Solari et al., 2013)











Appendix G

Curriculum vitae

1. Personal information

Name:	Sebastian Severin Gross
Citizenship:	Basel-Stadt, Switzerland
Date of birth	20.03.1994
Address:	Schneidergasse 30; CH – 4051 Basel; Switzerland
Title:	M. Sc. in Psychology
Business address:	University of Basel Hospital, Abt. für Med. Kommunikation Klingelbergstr. 23, 4056 Basel
Email:	Sebastianseverin.gross@usb.ch
Researcher ID:	orcid.org/0000-0002-0231-8595

2. Education

Feb 21 – present	PhD in Psychology, University of Basel Hospital, focus on medical communication, supervised by Prof. Dr. Jens Gaab
Sep 19 – Sep 20	Postgraduate training in systemic psychotherapy, first year completed, IEF Institut für systemische Entwicklung und Fortbildung, Zürich
Sep 16 – Jul 19	Master of Science in Psychology, University of Basel, focus on clinical psychology and psychotherapy, master's thesis „Components of psychotherapy", supervised by Prof. Dr. Jens Gaab
Sep 13 – Jul 16	Bachelor of Science in Psychology, University of Basel

3. Employment history including current position

Feb 21 – present	PhD candidate in Psychology 100%, University of Basel, clinical research and student teaching in medical communication
May 20 – Jan 21	Internship 80% Records Management, Universitäts-Kinderspital beider Basel, digitalization and management of medical records
Nov 18 – Sep 19	Postgraduate Psychologist 100% Psychosomatics, University of Basel Hospital, outpatient psychotherapy, inpatient relaxation and mindfulness training, development of digital PROM
Jun 17 – Sep 17	Internship 100% affective disorder unit, Psychiatrie Baselland, individual patient consultations, observation of group and art therapy
Avril 16 – Dec 17	Research assistant 10%, Psychosomatics, University of Basel Hospital, development and implementation of digital patient reported outcome measures (PROM)
Jan 16 – Feb 16	Internship psychosomatics 100%, University of Basel Hospital, administration and observation of psychotherapy

4. Institutional responsibilities

- Data collection including patient interviews in a multi-centre randomized trial funded by the SNF (READ study). – 40-50% activity rate
- Data evaluation of a multi-centre randomized trial funded by the SNF (BEDSIDE-OUTSIDE trial) 40-50% activity rate
- Teaching activities (detailed below) 10% activity rate

5. Approved research projects

-

6. Supervision of junior researchers at graduate and postgraduate level

-

7. Teaching activities

- Administration of video based communication training for medical students (e-learning)
- Tutoring in communication seminars for medical students and resident doctors
- Lecturing fundamentals of communication for medical students

8. Memberships in panels, boards, etc., and individual scientific reviewing activities

-

9. Active memberships in scientific societies, fellowships in renowned academies

-

10. Organisation of conferences

-

11. Prizes, awards, fellowships

- **7th Swiss congress for Internal Medicine (SGAIM), Basel 2023:** 2nd prize for the 3 best 'Freie Mitteilungen'; "Do-not-resuscitate" preferences of the general Swiss population: Results from a national survey"

12. Career breaks (provide justification)

-

Major scientific achievements (MSA)

Major scientific achievement: I was awarded with the 2nd price for the best best 3 'Freie Mitteilungen' at the 7th Swiss congress for Internal Medicine (SGAIM), Basel, 2023: Gross S*, Amacher SA*, Rochowski A, Reiser S, Becker C, Beck K, Blatter R, Emsden C, Nkoulou C, Sutter R, Tisljar K, Pargger H, Marsch S, Hunziker S.; "Do-not-resuscitate" preferences of the general Swiss population: Results from a national survey.

Second major scientific achievement: I was nominated for the best 10 posters from young researchers and given the opportunity for an oral presentation at the Swiss congress for Internal Medicine (SGAIM), Lausanne, 2022: Gross S, Becker C, Beck K, Memma V, Gaab J, Schuetz P, Leuppi J, Schaefert R, Langewitz W, Trendelenburg M, Breidthardt T, Eckstein J, Osthoff M, Bassetti S, Hunziker S.; “The occurrence of sensitive topics during ward round: An ancillary analysis of the BEDSIDE-OUTSIDE Trial.”

Third major achievement: -

Research Output

Gross S*, Amacher SA*, Rochowski A, Reiser S, Becker C, Beck K, Blatter R, Emsden C, Nkoulou C, Sutter R, Tisljar K, Pargger H, Marsch S, Hunziker S. "Do-not-resuscitate" preferences of the general Swiss population: Results from a national survey.
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Becker C, Gross S, Gamp M, Beck K, Amacher SA, Mueller J, Bohren C, Blatter R, Schaefert R, Schuetz P, Leuppi J, Bassetti S, Hunziker S. Patients' Preference for Participation in Medical Decision-Making: Secondary Analysis of the BEDSIDE-OUTSIDE Trial.
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Long COVID 1 year after hospitalisation for COVID-19: a prospective bicentric cohort study.
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Meinlschmidt G, Berdajs D, Moser-Starck R, Frick A, Gross S, Schurr U, Eckstein FS, Hunziker S, Schaefert R
Perceived Need for Psychosocial Support After Aortic Dissection: Cross-Sectional Survey
J Participat Med 2020, 12(3), e15447
Schmid D, Allum J, Sleptsova M, Gross S, Gaab J, Welge-Lüssen A, Schaefert R, Langewitz W
Effects of a program of cognitive-behavioural group therapy, vestibular rehabilitation, and psychoeducational explanations on patients with dizziness and no quantified balance deficit, compared to patients with dizziness and a quantified balance deficit
Journal of Psychosomatic Research. 2018; 105:21-30

*These authors contributed equally to the study.