

BMJ Open Quality Physicians' training and patient education initiative to improve quality of care decision communication at the emergency department

Saskia Briedé ^{1,2}, Tessa C van Charldorp,³ Joppe P Peerden,⁴ Karin AH Kaasjager²

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¹Internal Medicine, Amsterdam UMC Locatie AMC, Amsterdam, The Netherlands

²Department of Internal Medicine and Dermatology, University Medical Centre, Utrecht, The Netherlands

³Department of Languages, Literature and Communication, Utrecht University, Utrecht, The Netherlands

⁴Intensive Care Department, Meander Medical Centre, Amersfoort, The Netherlands

Correspondence to

Saskia Briedé;
s.briede@amsterdamumc.nl

ABSTRACT

Background Discussions about care decisions, including code status documentation and advance care planning, are crucial components of patient-centred care. However, due to numerous barriers, these discussions are often avoided by both physicians and patients. As a result, these discussions often take place at the emergency department (ED). We aimed to improve the quality of care decision conversations in the internal medicine ED.

Methods This pre–post intervention study was conducted at the internal medicine ED of a tertiary hospital in the Netherlands. Two interventions were implemented simultaneously: physician training and patient education. Physician training included an e-learning module and simulated patient sessions. Patients received a leaflet providing information about care decisions. Primary outcome was patient satisfaction with the care decision discussions, assessed using the Quality of Communication questionnaire. Secondary outcomes included the percentage of patients recalling a care decision discussion, initiator of the discussion, leaflet recall, leaflet evaluation, prior care decision discussions and perceived appropriate timing for discussions.

Results 333 patients participated, 149 before and 184 after the interventions. Postintervention, there were significant improvements in patient-reported quality of care decision communication ($p<0.001$) and more patients recalled having care decision discussions (63.7% vs 45.9%, $p=0.001$). However, only 12% of patients recalled receiving the leaflet.

Conclusions Implementation of physician training and patient education significantly improved the quality of care decision conversations in our internal medicine ED. Despite low leaflet recall, the interventions demonstrated a notable impact on patient satisfaction with care decision discussions. Future research could explore alternative patient education methods and involve other healthcare professionals in initiating discussions. These findings underscore the importance of ongoing efforts to enhance communication in healthcare settings, particularly in emergency care.

INTRODUCTION

Care decisions comprise a broad spectrum of topics, all with the purpose to align treatment with the preferences of the patient.

WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ Care decision discussions are vital for patient-centred care but are often avoided due to barriers faced by physicians and patients.

WHAT THIS STUDY ADDS

⇒ Implementation of physician training and patient education significantly improved the quality of care decision conversations in the internal medicine emergency department, even though only a limited number of patients received the education.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ Policy-makers and healthcare institutions may consider integrating similar interventions into standard practice to enhance the quality of care decision conversations.
⇒ Future research could explore alternative patient education methods and involve other healthcare professionals in initiating care decision discussions.

This includes code status documentation (ie, whether limitations to specific life-sustaining treatments are in place) and all forms of advance care planning. In 2014, the Dutch association for Internal Medicine compiled a list of 10 Wise Choices to improve the quality and efficiency of healthcare in the spirit of the nationwide Choosing Wisely Campaign.^{1–5} One of these is to discuss care decisions when discussing treatment with patients.² Although this implies care decision discussions should be a regular part of the medical consultation, both physicians and patients face multiple barriers in doing so, leading to avoidance of the topic.^{6–12} Besides, the care decisions discussion in the outpatient clinic is often perceived as being too soon.^{9–11} This results in postponing care decision discussions until the end of life, which is reflected in research conducted mostly in these end-of-life settings.¹²

Over the past decades, patient-centred care and shared decision-making have become the ideal model for doctor–patient–decision-making.^{13–15} Within the framework of patient-centred care, physicians are encouraged to partner with patients to codesign and deliver personalised care.¹⁶ It is surprising that despite the well-acknowledged importance of patient-centred care and shared decision-making, both physicians and patients tend to avoid conversations about care decisions, a topic in which patient-centred care and shared decision-making are particularly important.

The quality standards of the Dutch association for Internal Medicine demand a code status is documented in every admitted patient.¹⁷ In a code status, it can be documented whether there are limitations to specific life-sustaining treatments or not. As a result of the avoidance and postponement of care decision discussions earlier in life, care decision discussions often take place at the emergency department (ED) to document a code status. This documentation, or registration, is only a small part of what we attempt to accomplish by improving care decision discussions. In a previous study, we saw the registration of a code status in hospitalised patients in our hospital is quite good (70%–73%).¹⁸ However, we are unaware of the quality of care decision discussions at the ED.

A study from Schlupe *et al* in some other hospitals in the Netherlands showed a discrepancy between the documented code status, and patients' memory of what was discussed and registered.¹⁹ Besides, an interview study with internal medicine outpatient clinic patients we performed, showed several misconceptions regarding the topic of care decisions and necessities in the patient's view for a proper care decision discussion.²⁰

We used the lessons we learnt from these previous studies to develop two interventions, one for physicians and one for patients, to improve care decision discussions at the ED. Because research shows educating both physicians' and patients simultaneously is more effective in improving shared decision-making than either of them alone,²¹ we decided to implement both interventions at the same moment in time and evaluate the effect of this combined intervention.

METHODS

Setting and context

This study was set at the internal medicine ED of the University Medical Centre Utrecht, a tertiary teaching hospital in the Netherlands. Patients were included between October–December 2020 (before group) and January–April 2021 (after group). The study was reported using the SQUIRE-2.0-checklist for reporting quality improvement studies.²²

Participants and procedures

Patients aged >18 years who were hospitalised following an ED visit for internal medicine (and related specialisms: endocrinology, haematology, gastroenterology,

geriatrics, immunology, infectious disease, nephrology, oncology, rheumatology and vascular diseases) were eligible for inclusion. Exclusion criteria were refusal to participate or a condition that limited their ability to answer the survey (eg, language barrier, decreased cognitive function, too critically ill, dementia or delirium). A patient was eligible to participate with every distinctive admission to the ED and could, therefore, be included multiple times.

We assessed potential admissions on the adjacent business day. After review of eligibility by the researcher, we contacted the responsible nurse to ascertain exclusion criteria. Subsequently, we informed the eligible patients about the study. Surveys were handed out on paper to each participant to collect data and obtaining informed consent. Surveys were anonymous, we did not collect names, birth dates or other patient identifiers. At the request of the patient, sometimes the survey was conducted orally. All data were entered manually into Castor electronic data capture system. A second researcher double-checked 10% for error interception, in which no discrepancies were found.

The inclusions of the before group coincided with the second wave in the Netherlands in the context of the COVID-19 pandemic. Due to upscaling of cohort divisions and the high risk of infection by cause of immunocompromised status, COVID-19 and haematology patients were not included for a few weeks. Subsequently, we established a protocol to resume inclusions in a safe way. We arranged that the resident or nurse of the corresponding department approached the patient with the survey instead of the researcher.

Interventions

Physicians' training

Internal medicine residents were approached through mail to participate in a training programme. The programme was composed of an e-learning module regarding communication on care decisions in conjunction with a hand-on training with simulated patients. The e-learning was established using expert opinions. The e-learning module was developed based on expert opinions and comprised written text and videos to emphasise the significance of the topic. It provided background information, discussed common pitfalls and offered valuable tips. The module concluded with example cases featuring simulated patients. As for the hands-on training, qualitative analysis of authentic conversations in the outpatient clinic of our hospital was used as input.²³ Trainees reflected on commonly used sentences and various strategies in care decision conversations. Afterwards, they practised care decision conversations with simulated patients. We organised five sessions to maximise attendance from December to February. From that moment on, the training became a permanent part of the introduction programme for internal medicine residents at the UMC Utrecht.

Patient leaflet

From December 2020 onwards, all patients at the internal medicine ED received a patient leaflet on care decisions at the ED. We chose to distribute the leaflet to all patients because the information might be useful for all patients, not just those who will be admitted. Besides, it is not always clear right away whether a patient is admitted or not. This was a quality improvement intervention, the leaflet was distributed to aid care decision discussions at the ED, thereby improving shared decision-making, patient-centred care and complying with the Wise Choice of the Dutch association for Internal Medicine. Patients may use the information to feel better informed, feel more clear about what is of importance to them and gain accurate expectations of the choices to be made.^{21 24} The leaflet was developed by the research team using an earlier developed patient information webpage on this subject (developed with the aid of the UMC Utrecht patient panel) and data from the previously mentioned interview study.²⁰ The research team consisted of an (acute) internal medicine resident/PhD student (SB), a language and communication scientist (TCvC) and a professor of acute internal medicine and programme director of the internal medicine residency (KAHK), thereby leading to an interdisciplinary approach with a focus on education. The written language was adjusted to Dutch B1 level. The residents at the ED distributed the leaflet and received weekly reminders by mail to do so.

Study of the interventions

We chose to conduct a before and after intervention study to evaluate the effect of both interventions combined. Because research shows educating both physicians' and patients simultaneously is more effective in improving shared decision-making than either of them alone,²¹ and for practical reasons, we decided to implement the training and leaflet at the same moment in time and evaluate the effect of this combined intervention.

Measures

Our primary outcome is patient satisfaction with the care decision discussion at the ED. We used the validated Quality of Communication (QOC) questionnaire,²⁵ which we translated to Dutch using the validated forward-backward method.²⁶ We handled the questionnaires in accordance with Engelberg: substituting sample median values for responses of 'don't know' or 'no response'; and imputing a value of 0 for 'doctor did not do this'. Engelberg *et al* chose for the imputation of a 0 for 'doctor did not do this' based on the assumption that all of the items identified important aspects of end-of-life communication, and therefore, the failure to complete or address an item warranted a low score.²⁵ However, our patient population was not (necessarily) at the end of life, and therefore, we deemed it inappropriate for two of the items ('Talking about how long you have to live' and 'Talking about what dying might be like') to impute a 0 for 'doctor did not do this'. Instead, we treated it as 'no response'.

We summarised scores in accordance with Engelberg to a median score for general communication (QOC-gen) and median score for care decision communication (QOC-CD).²⁵

To adjust for potential confounders, we assessed the following baseline characteristics: age, gender, educational level, health perception and the presence of a family member. To take into account the possibility of other factors that improve care decision discussions over time, we also explored the effect of time.

Secondary outcomes are (1) how many patients recall a care decision discussion, (2) who initiated this discussion, (3) how many patients recall to have received the leaflet, (4) their evaluation of this leaflet, (5) whether they had a previous care decision discussion and with whom and (6) what they perceive to be an appropriate moment for care decision discussions.

Originally, we planned to evaluate the physician's preparedness for care decision discussion as well, using a questionnaire inspired by the one used by Smith *et al* to evaluate residents approaches to advance care planning.²⁷ We intended to compare these before the implementation and 3 months after implementation. However, because of the extremely low response rate before implementation (<20%), possible due to extensive workload due to the COVID-19 pandemic, we dropped this analysis.

Statistics

We compared baseline characteristics between the two groups with χ^2 test for nominal data and Mann-Whitney U for ordinal data. Primary outcome (care decision communication, QOC-CD) was first compared using univariate analysis (Student's t-test or Mann-Whitney U test depending on distribution) and then analysed using a multiple linear regression model to adjust for potential confounders (age, gender, educational level, health perception and presence of a family member) using forced entry. The effect of time on quality of care decision communication was explored using linear regression. Dummy variables were made for categorical variables. Secondary outcomes 1 (how many patients recall a care decision discussion) and 2 (who initiated this discussion) are compared with χ^2 test. The other secondary outcomes are descriptive.

RESULTS

A total of 333 patients were included in this study, 149 before and 184 after the interventions. **Figure 1** shows the patient flow. **Table 1** shows the baseline patient characteristics of the patient population before and after the interventions. Missing values were <5% for all items. The populations were quite similar.

First, we handled the QOC questionnaire in accordance with Engelberg: substituting sample median values for responses of 'don't know' or 'no response' and imputing a value of 0 for 'doctor did not do this',²⁵ except for the items 'talking about how long you have to live' and 'talking

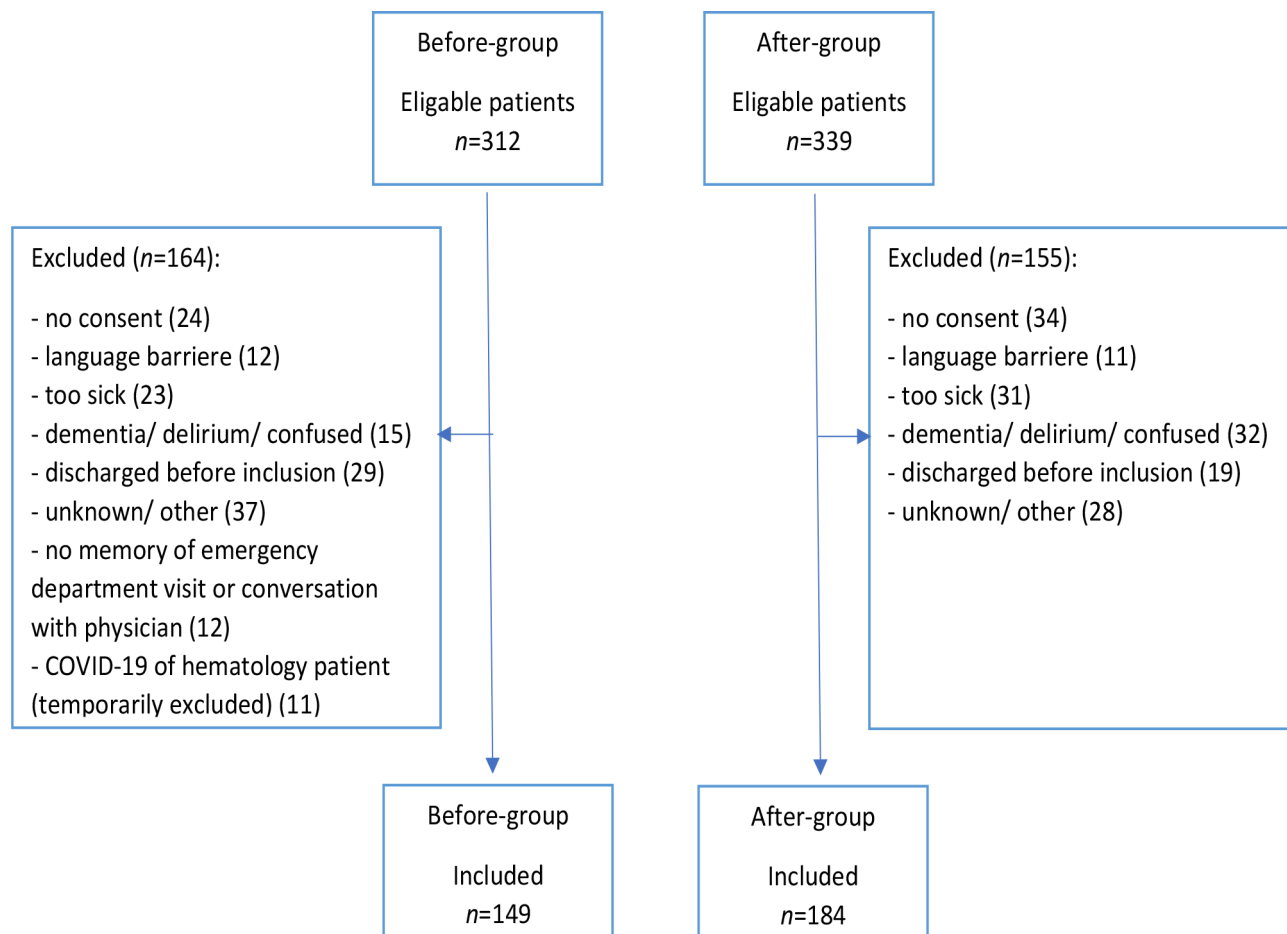


Figure 1 Patient flow.

about what dying might be like'. Although we anticipated these two items to be less applicable, and therefore, discussed less often (which is why we did not intend to impute 'doctor did not do this' with a zero, but with the sample median instead) we did not expect to only have a grade in 21/333 (6.3%) questionnaires for 'talking about how long you have to live' and 13/333 (3.9%) for 'talking about what dying might be like'. We, therefore, omitted these two items. Then, we calculated the median score on the five remaining items for care decision communication, the median score for the six items for general communication and the total median QOC score. **Table 2** shows the results of the univariate comparison of these scores between the groups before and after the interventions. As they were not normally distributed, we used Mann-Whitney U to test for statistical significance. As can be seen in **table 2**, both care decision communication and total QOC improved significantly after the interventions, as opposed to general communication.

Next, we aimed to adjust for potential confounders with a multiple linear regression model. First, we inspected the Pearson correlations among all variables (online supplemental appendix 1). All correlations were well below 0.8, so we continued with the model. In online supplemental appendix 2, the complete results from our multiple linear regression model to adjust for potential confounders

can be found. Both before and after addition of potential confounders to the model, there was a significant difference for the interventions. After adjustment for confounders, the quality of care decision communication was 1.753 (95% CI (0.906, 2.599)) higher in the after-group compared with the before group ($p < 0.001$).

Next, we explored the effect of time. **Table 3** shows the results from linear regression in the before and after group. Both before and after the interventions, there was no significant effect of time on quality of care decision communication, which makes it likely that the increase in quality of care decision communication after the interventions (1.753 higher after the interventions, see above) is due to the interventions and not simply an effect of increase over time.

After the interventions, significantly more patients recalled a care decision conversation at the ED (63.7% after vs 45.9% before, $p = 0.001$). Both before and after the interventions, most conversations were initiated by the physician (86.6 before vs 86.9% after).

Unfortunately, only 22 of the 184 patients in the after group recalled to have received the leaflet, of which 6 stated to have not read it because there was insufficient time (1), they felt too sick (2), thought it was not important (1), lost the leaflet (1) or forgot (1). None stated being scared by the subject. 14 patients rated the

Table 1 Baseline patient characteristics of the patient populations

	Before interventions n=149	After interventions n=184	Statistical comparison
Age			P=0.107
≤44 years	31 (21.1%)	27 (14.8%)	
45–64 years	55 (37.4%)	72 (39.6%)	
65–74 years	44 (29.9%)	45 (24.7%)	
75–84 years	12 (8.2%)	33 (18.1%)	
≥85 years	5 (3.4%)	5 (2.7%)	
Gender (male (%))	82 (56.2%)	106 (58.6%)	P=0.663
Educational level			P=0.082
Primary education	10 (7.0%)	7 (3.9%)	
Secondary education	32 (22.5%)	65 (36.3%)	
Middle education	50 (35.2%)	58 (32.4%)	
Higher education	50 (35.2%)	49 (27.4%)	
Health perception			P=0.174
Poor	26 (17.9%)	38 (20.9%)	
Average	57 (39.3%)	81 (44.5%)	
Good	52 (35.9%)	52 (28.6%)	
Very good	7 (4.8%)	9 (4.9%)	
Excellent	3 (2.1%)	2 (1.1%)	
Family member present at ED (yes (%))	119 (81%)	144 (79.1%)	P=0.680

χ^2 test was used for nominal data and Mann-Whitney U for ordinal data. <5% missing values. ED, emergency department.

folder, they scored the folder a median of 8 (IQR 6–8.25) on an 11-point Likert scale (0–10).

Figure 2a shows whether patients have had conversations about care decisions prior to current ED visit and with whom. In the ‘other’ group, they mentioned various things, such as nursing home, districts nurse, palliative team, ambulance, preoperative screening or they could not recall with whom exactly. Of the 106 patients who never discussed care decisions prior to the current ED visit, 71 (67%) did not think about it either.

Figure 2b shows what appropriate moments to discuss care decisions are according to patients. In the open field answers of the original ‘other’ group, four answers were frequently given (‘always’, ‘when relevant’, ‘with family’ and ‘do not know’), which is why we recoded these into four new categories and a new ‘other’ for the residual answers.

DISCUSSION

The objective of our study was to develop an intervention targeted to improve the quality of care decision conversations between physicians and ED patients through a pre-post intervention study. Quality of care decision communication demonstrated a significant improvement after the implementation of physician training and patient education, as compared with the period before intervention.

A similar approach was observed in an oncology outpatient department study, wherein a comprehensive strategy involving the Serious Illness Conversation Guide,²⁸ provisions of patient and family information materials pre-conversation and postconversation, clinician training, and system changes resulted in increased, earlier and superior documented serious illness conversations.²⁹ The

Table 2 Quality of communication scores before and after implementation of the interventions

	Before interventions n=149	After interventions n=184	Statistical comparison P value
Care decision communication, median (IQR)	0.0 (0.0–7.0)	6.0 (0.0–8.0)	<0.001
General communication, median (IQR)	8.0 (7.5–9.0)	8.0 (8.0–9.0)	0.126
Total quality of communication, median (IQR)	8.0 (7.0–8.0)	8.0 (7.0–9.0)	0.003

Univariate analysis. Mann-Whitney U was used to test for statistical significance.

Table 3 The effect of time on quality of care decision communication using linear regression in the before and after groups

Variable	B	95% CI for B	β	t	P value
Before interventions					
Constant	3.344	(2.205, 4.483)		5.803	<0.001
Time	0.014	(-0.019, 0.046)	0.069	0.833	0.406
After interventions					
Constant	5.111	(3.018, 7.205)		4.817	<0.001
Time	-0.006	(-0.035, 0.023)	-0.029	-0.391	0.696

Dependent variable: Quality of care decision communication. Linear regression model. The regression equation before interventions: predicted quality of care decision communication = 3.344 + 0.014 * Time, and after interventions: predicted quality of care decision communication = 5.111 - 0.006 * Time.

Time is the number of days after the first training (so value is negative in the before group and positive in the after group).

B, unstandardized coefficients (values for predicting the dependent variable from the independent variable); 95% CI for B, 95% confidence interval for unstandardized coefficients; p-value, 2 tailed p-value; t, t-value; β , standardized coefficients.

intervention, with slight modifications, was later applied in a study involving patients hospitalised for at least 48 hours, yielding comparable outcomes.³⁰ Another study also indicated that physician training increased care decisions in the electronic medical record.³¹ While these last

two studies align closely with our study in terms of population and intervention, they did not measure patient satisfaction or QOC. One of our secondary endpoints, the number of (patient-reported) code status discussions, indicated that prior to the intervention, code status was

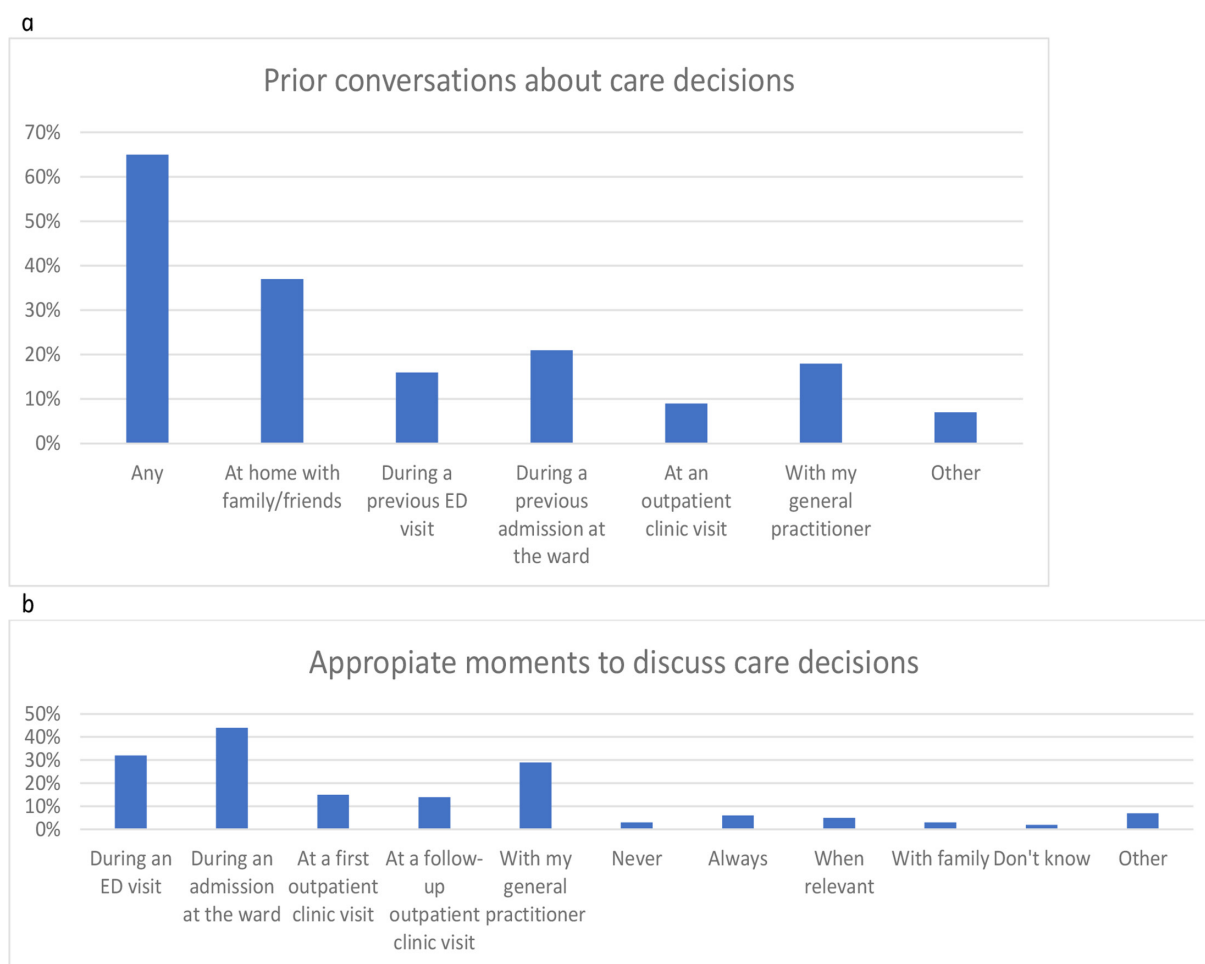


Figure 2 Prior conversations about care decisions and appropriate moments to discuss care decisions according to patients. (a) Patients were asked whether they had a prior talk about care decisions and with whom. They could give multiple answers. (b) Patients were asked what they perceived appropriate moments to discuss care decisions. They could give multiple answers. ED, emergency department.

discussed in 46% of patients, compared with 64% after the implementation of the intervention. Noteworthy, in a previous study we observed that the registration of a code status in hospitalised patients in our hospital was 70%–73%,¹⁸ which is more than the 46%–64% of (patient-reported) code status discussions. This discrepancy between the documented code status, and patients memory of what was discussed and registered, was found in other Dutch hospitals as well.¹⁹ This could either mean code statuses are registered without discussion, or the patient does not recall the discussion. Ma *et al* demonstrated that code status documentation (DNR) did not increase postintervention (76% vs 71%). However, choices regarding life-sustaining treatments in general were noted much more frequently (67% vs 32%).³⁰

High health literacy emerged as an important factor in achieving high-quality care decisions. However, the optimal means of achieving this remains uncertain. Some studies have looked into video-assisted interventions, which proved to be a viable option.³² In our study, we chose to provide an information letter because of practical reasons in the ED. Remarkably, our study uncovered that a mere 12% of patients reported receiving the information letter. One plausible explanation could be the heightened workload experienced by physicians during our study period due to the COVID-19 pandemic, rendering it a low priority.

Strengths and limitations

One strength of our study lies in the comprehensive examination of the intervention's impact on all types of admitted patients, as opposed to exclusively focusing on critically ill individuals. This approach enhances the generalisability of our data. Moreover, our investigation delved into patient satisfaction rather than the sheer quantity of conversations, providing a nuanced perspective on the intervention's outcomes. Our study is susceptible to recall bias due to its postexperience interview nature. However, we prioritised the patient's recollection of the conversation over the specific details discussed. Additionally, almost half of the patients were excluded due to critical illness, cognitive impairment or language barriers, precluding conclusions about these groups. COVID-19 restrictions limited family presence, hindering their role as proxies for patients. There may also be selection bias as critically ill patients unable to respond to the questionnaire were excluded from care decision conversations. The pre–post intervention study design may introduce effects from unexamined factors, however, we explored the effect of time on our outcome, which showed to be insignificant. Because of the decision to implement both interventions at the same moment in time, we are unable to distinct which intervention (the patient leaflet or the physician training) is more effective. However, as mentioned before, only 12% of patients recalled receiving the leaflet. This suggests that the physician training contributed more to the significant improvement in patient-reported QOC than the patient leaflet.

We did not separately evaluate the effect of different parts of the training either. However, in a previous study at the outpatient clinic, a physician training without this basis on care decision conversations was shown to be ineffective in improving patient satisfaction.²⁴ Although that study differed in terms of setting and outcome measurements from the current study, it indicates that the adjustments we made based on conversation analysis of authentic care decision conversations²³ contributed to the effectiveness. This could be explained by an increased perceived relevance for the physician when authentic, recognisable sentences are provided and the interactional implications are discussed. Increasing the perceived relevance stimulates the retention of the gained knowledge/skills.^{25–34}

Future perspectives

Various studies have explored alternative approaches to care decision conversations, such as those conducted by social workers or nurses.^{33 34} These studies indicated that such conversations need not be exclusively conducted by physicians, with high patient satisfaction observed. The emotional proximity that social workers and nurses establish with patients may render them particularly well suited for initiating these conversations. Additionally, nurses may face fewer time constraints, increasing the likelihood of these discussions, particularly during challenging periods such as the COVID-19 pandemic.

An ongoing study by Prachanukool *et al* investigates the impact of a priming conversation by a nurse in the emergency room on subsequent care decisions.³⁵ Another approach involves a brief negotiated interview conducted by a different physician, which has proven effective in increasing the number of care decision conversations and subsequent self-reported care decisions.³⁶ However, this method is time-consuming and may not be feasible in an ED setting. Further research could explore the most suitable individuals for conducting care decision conversations. Although our data suggest the physicians' training probably contributed most to the effectiveness of the interventions, we recognise the potential of patient education materials. Further research could explore optimal approaches to patient education and increasing the distribution of the patient educational materials.

We based part of our hands-on training on our prior study, in which we used conversation analysis of authentic care decision conversations in our hospital.²³ The examples that we use in our training might be generalisable to other settings, especially in the Netherlands and countries comparable to the Netherlands in communication strategies. However, to adjust the training to another setting, especially where communication strategies are quite different from the Netherlands, we would suggest to videotape several care decision conversations in that setting and discuss the interactional implication of strategies and words physicians use with a communication expert. In this way, the training can be adapted to other settings as well.

CONCLUSION

To conclude, our study successfully achieved its objective of enhancing the quality of care decision conversations in the ED, revealing a substantial improvement following the implementation of physician training and brief patient education.

Contributors SB: conceptualisation, methodology, validation, formal analysis, investigation, writing—original draft, visualisation, project administration. TCvC: conceptualisation, writing—review and editing, supervision. JPP: formal analysis, writing—original draft, visualisation. KAHK (guarantor): conceptualisation, methodology, investigation, resources, writing—review and editing, supervision, project administration.

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Patient consent for publication Not applicable.

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ORCID iD

Saskia Briedé <http://orcid.org/0000-0002-4673-2667>

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Supplementary appendix 1. Additional information multiple linear regression model

1a Pearson correlations among the dependent and all independent variables

Pearson Correlations	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.
1. Quality of care decision communication	-	0.228	0.023	-0.031	-0.023	0.045	-0.111	-0.009	0.028	-0.014	0.116	0.005	-0.184	-0.037
2. Intervention		-												
3. Age (45-64)			-	-0.474	-0.310	-0.138	0.095	0.025	-0.02	-0.022	0.055	0.024	0.003	-0.055
4. Age (65-74)				-	-0.239	-0.106	-0.145	0.015	-0.012	0.047	-0.014	-0.013	0.023	-0.02
5. Age (74-84)					-	-0.07	-0.038	-0.037	-0.029	0.075	0.172	-0.199	-0.026	0.023
6. Age (>85)						-	0.063	-0.041	0.031	0.033	-0.035	0.028	-0.076	-0.044
7. Gender							-	0.028	0.022	-0.037	0.03	-0.046	-0.001	0.016
8. Health (bad)								-	-0.410	-0.329	0.006	0.037	-0.067	-0.003
9. Health (moderate)									-	-0.567	0.024	0.016	-0.014	-0.036
10. Health (good)										-	0.01	-0.024	0.058	0.047
11 Education (secondary)											-	-0.444	-0.417	-0.009
12. Education (middle)												-	-0.451	-0.022
13. Education (higher)													-	0.047
14. Family member present														-

For categorical variables (age, educational level and health perception) dummy variables were created. Baseline/reference groups were: age <44 years for age, primary education for education and very good/excellent health for health perception. All correlations are <0.8

Supplementary appendix 2. Multiple linear regression model to adjust for potential confounders

Variable	B	95% CI for B	β	t	p
Step 1					
Constant	2.877	[2.260, 3.494]		9.175	<0.001
Intervention	1.781	[0.952, 2.610]	0.228	4.226	<0.001
Step 2					
Constant	4.419	[1.884, 6.954]		3.430	<0.001
Intervention	1.753	[0.906, 2.599]	0.225	4.074	<0.001
Age 45-64 years	-0.037	[-1.236, 1.161]	-0.005	-0.061	0.951
Age 65-74 years	-0.440	[-1.726, 0.847]	-0.050	-0.672	0.502
Age 75-84 years	-1.083	[-2.655, 0.489]	-0.096	-1.356	0.176
Age \geq 85 years	0.493	[-2.091, 3.077]	0.022	0.375	0.708
Gender	-0.966	[-1.806, -0.125]	-0.123	-2.261	0.024
Health (bad)	0.490	[-1.316, 2.296]	0.050	0.533	0.594
Health (moderate)	0.788	[-0.887, 2.463]	0.100	0.926	0.355
Health (good)	0.805	[-0.909, 2.519]	0.096	0.924	0.356
Education (secondary)	-0.741	[-2.443, 0.961]	-0.087	-0.856	0.393
Education (middle)	-1.393	[-3.101, 0.315]	-0.168	-1.604	0.110
Education (higher)	-2.308	[-4.014, -0.601]	-0.273	-2.660	0.008
Family present	-0.197	[-1.222, 0.827]	-0.020	-0.379	0.705

Dependent Variable: Quality of care decision communication

For categorical variables (age, educational level and health perception) dummy variables were created.

Baseline/reference groups were: age <44 years for age, primary education for education and very good/excellent health for health perception. CI = confidence interval