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*Published in:*  
Resuscitation

*DOI:*  
10.1016/j.resuscitation.2023.109836

*Publication date:*  
2023

*Document version:*  
Final published version

*Document license:*  
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*Citation for polished version (APA):*

Hanson, S., Lassen, A., Nielsen, D., Ryg, J., Forero, R., & Brabrand, M. (2023). Resuscitation Preferences of Older Acutely Admitted Medical and Mentally Competent Patients with One and Six Months Follow-up. *Resuscitation*, 189, Article 109836. <https://doi.org/10.1016/j.resuscitation.2023.109836>

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## Clinical paper

# Resuscitation preferences of older acutely admitted medical and mentally competent patients with one and six months follow-up



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### Abstract

**Aim:** Determining patients' cardiopulmonary resuscitation (CPR) preferences in the emergency department (ED) is common practice but the stability of these preferences and their recollection by patients has been questioned. Therefore, this study assessed the stability and recall of CPR preferences of older patients at and following ED discharge.

**Methods:** This survey-based cohort study was conducted between February and September 2020 at three EDs in Denmark. It consecutively asked mentally competent patients aged 65 years or older who were admitted to hospital through the ED and then one and six months later "In your current state of health, do you wish that physicians should try to intervene if your heart stops beating?" Possible responses were confined to "definitely yes", "definitely no", "uncertain", and "prefer not to answer".

**Results:** In total, 3688 patients admitted to hospital via the ED patients were screened, 1766 were eligible and 491 (27.8%) were included: median age was 76 (IQR 71–82) years, and 257 (52.3%) were men. One third of patients who expressed definite yes or no preferences in ED had changed their preference at one month follow-up. Only 90 (27.4%) and 94 (35.7%) patients recalled their preferences at one and six months follow-up, respectively.

**Conclusion and Relevance:** In this study, one-in-three older ED patients who initially expressed definite resuscitation preferences had changed their minds at one month follow-up. Preferences were more stable at six months but only a minority were able to recall their preferences.

**Keywords:** Resuscitation, Preferences, End of life, Emergency department, Independence, Recall

## Introduction

The marked deterioration in wellbeing experienced by older people approaching end of life calls for care that recognizes individual end of life preferences and needs.<sup>1</sup> The use of advance directives to give care aligned with patients preferences has been well documented,<sup>2</sup> as many patients may lack decision-making capacity when they most needed it.<sup>3</sup> Any emergency department (ED) presentation for older patients may require do-not-resuscitate (DNR) decisions to be made.

However, rapid deterioration during any acute illness may alter a patient's emotional and cognitive state, so that their expressed preferences may temporarily become incongruent with their usual desires and values.<sup>4</sup> Moreover, in the ED sound decision making is often further undermined by the lack of a well-established patient-doctor relationship.<sup>5</sup>

In rapidly changing clinical circumstances cardiopulmonary resuscitation (CPR) may become futile and may only prolong suffering when death becomes inevitable.<sup>6</sup> Yet CPR preferences initially expressed by patients can follow them through the health care sys-

**Abbreviations:** ADL, Activities of daily living, AMTS, Abbreviated Mental Test score, CPR, Cardiopulmonary Resuscitation, DNR, Do-not-resuscitate, ED, Emergency Department, EOL, End-of-life, EQ-5D-index, Euro-QoL 5-Dimensions 5-Level index, HR-QOL, Health-related quality of life, IQR, Interquartile Range, OR, Odds ratio, SD, Standard Deviation, STROBE, The Strengthening the Reporting of Observational Studies in Epidemiology

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<https://doi.org/10.1016/j.resuscitation.2023.109836>

Received 16 February 2023; Received in Revised form 4 May 2023; Accepted 9 May 2023

tem and it is often assumed that these preferences are still valid when the patient's health status changes. Although several studies have reported CPR preferences made by patients remain stable,<sup>7–10</sup> most of these studies are decades old and only examined stability at one time point up to eight weeks after the initial preference was expressed.<sup>7–10</sup> Moreover, we could not find any study examining the long-term stability of CPR preferences expressed by older patients while in the ED, and if patients could even remember them. This study aimed to report resuscitation preferences expressed by mentally competent older patients admitted to hospital via the ED, and if patients still remembered and agreed with those decisions at one- and six-months follow-up.

## Methods

### Study design and population

This prospective survey-based cohort study included patients admitted via the EDs of the Hospital of South West Jutland Esbjerg, Odense University Hospital, and Svendborg Hospital between 3 February 2020 and 30 September 2020. Patients attending these EDs are representative of the mixed rural and urban population in the Region of Southern Denmark. Due to COVID-19, enrollment was disrupted between the 11 March to 7 May at one site and from 11 March to 29 June at the two other sites.

Trained staff screened and enrolled patients consecutively during daytime hours on weekdays. In a coherent manner enrolled patients were informed about the study, questionnaire, and the question regarding their preference for CPR in case of cardiac arrest.

We included patients aged 65 or older admitted to hospital via the ED with a medical condition. A hospital admission was defined as a patient who was in hospital overnight. Patients were excluded if admitted for surgical reasons, unable to speak Danish, previously diagnosed with dementia, or screened positive for delirium with the Confusion Assessment Method.<sup>11</sup> Research staff documented the reason for exclusion.

Patients were followed up at one and six months after ED admission with structured telephone interviews and a survey specifically designed for this study. The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guideline was used reporting this study.<sup>12</sup>

### Setting

The Danish healthcare system is universal and is based on the principles of free of charge at the point of delivery and equal care to all citizens.<sup>13</sup> This is based mainly on public funding by taxation. General Practitioners or emergency medical services serves as gatekeepers at all locations for patients' entry to the ED and hospital.

Odense University Hospital is the largest hospital in the Southern Denmark region and the ED in this hospital can initiate care for all patients in all medical specialties 24-hours a day. The Hospital of South West Jutland and Svendborg Hospital are regional teaching hospitals. Within 48 hours all patients in these three EDs are either discharged or transferred to the most appropriate specialty unit.

### Data collection

#### Survey

Consenting patients completed a 26-item questionnaire exploring what matters most to them and what may influence their resuscitation preferences. This questionnaire was developed, tested, and val-

idated in the same ED settings<sup>14</sup> and a qualitative study of its development has been reported elsewhere.<sup>15</sup> Patients were then asked, "In your current state of health, do you wish that physicians should try to intervene if your heart stops beating?" and their responses confined to: CPR (definitely yes), DNR (definitely no), uncertain ("I think yes", "I think no", "unsure"), and "prefer not to answer".

Patients' Health-related quality of life (HR-QOL) was then assessed by Euro-QoL 5-Dimensions 5-Level index (EQ-5D-index)<sup>16</sup> in five dimensions: mobility, self-care, usual activities, pain/discomfort, and anxiety/depression with response levels from (1) "no problems" to (5) "extreme problems". We used standard weights for the Danish population and cross-calculated EQ-5D-index, ranging from 1 (full health) to 0 (health state equal to death) and  $-0.59$  (conditions worse than death).<sup>17</sup> Self-reported health was rated using the visual analogue scale (EQ-5D VAS score), ranging from 0 (the worst health) to 100 (the best health).

The 26-item questionnaire, the resuscitation preference at initial ED presentation, along with the HR-QOL assessment were completed using an iPad. The screen was visually adapted for older patients and data was stored in a database.<sup>18</sup>

Finally patients' cognitive function was assessed by interview using with Abbreviated Mental Test score (AMTS)<sup>19</sup> and their performance in activities of daily living (ADL) measured using the Barthel-index, which ranges from 0 (dependent) to 100 (independent).<sup>20,21</sup> Information including age, educational level, marital status, living arrangements, religious beliefs, previous resuscitation conversations with clinician, and preexisting advance directive were collected.

### Follow-up by questionnaire and telephone interviews with recall of preferences

Patients were asked to return questionnaires by post or electronically; those who did not comply were defined as lost to follow-up. We conducted telephone interviews at one and six months after ED admission following a structured interview guide. Patients were asked to recall: (1) filling in the questionnaire in ED and (2) their resuscitation preference stated. Barthel-index and EQ-5D-index were reassessed by telephone.<sup>22–24</sup> Telephone interviews were not performed on patients who missed three follow-up calls.

### Outcomes

The primary outcome of this study focused on patients' resuscitation preferences at the point of ED presentation. The secondary outcomes were the changes in preferences during follow-up, and if patients accurately recalled them.

### Statistical analysis

Our hypothesis was that patients who changed resuscitation preferences to differ in patient characteristics. Based on this, we ranked the following response categories: 1. CPR (most willing), 2. Uncertain (less willing), 3. DNR (not willing), and 4. prefer not to answer (no willingness). We present patients characteristics of those who changed CPR preferences at follow-up in two groups; an "increased willingness" or a "decreased willingness" to receive CPR.

Categorical variables were presented by proportions (%) and continuous variables as median (interquartile range (IQR)), as appropriate. Groups lost to follow-up and the baseline population were compared using  $\chi^2$  test for categorical variables and the non-parametric Wilcoxon rank-sum test was used for skewed distributed continuous variables. Wilcoxon signed-rank test was used to com-

pare ED-5D-index at baseline and follow-up. A threshold of two-sided  $p$ -value of  $\leq 0.05$  was used in all analyses. All analyses were conducted using Stata version 17.0.

### Ethics

The study was approved by the Danish Data Protection Agency (file-number 2008–58-0035). In compliance with Danish law, survey studies need no specific ethics approval, therefore registration was waived (file-number 20192000–63). Both oral and written informed consent was obtained from all patients before inclusion.

## Results

### Baseline cohort of older ED patients

Out of 1,766 eligible patients, 770 declined to participate (Fig. 1). Patients with signs of delirium ( $n = 77$ ), confusion ( $n = 333$ ), or previously diagnosed with dementia ( $n = 240$ ) accounted for 33.8% of those patients not found eligible. After an overnight admission in the ED, 1067 patients (55.5%) were either discharged or transferred before they had the opportunity to participate. In total, 491 (27.8%) older ED patients were included in the study of whom 135 (27.5%) and 73 (20.5%) patients were lost to follow-up at one and six months, respectively.

### Patient characteristics

Median age was 76 (IQR 71–82) years, 257 (52.3%) were men, 131 (26.7%) were widowed, and 208 (42.4%) lived alone. Median Barthel-index was 96 (IQR 85–100) and median EQ-5D-index 0.735 (IQR 0.579–0.853) (Table 1). Patients lost to follow-up were at baseline comparable to the DNR group with no significant difference in living alone, widowhood, or HR-QOL (Table 1).

### Survey of resuscitation preferences in ED

From the total study population of 491 patients, 134 (27.3%) chose CPR, 119 (24.2%) DNR, 201 (40.9%) were uncertain, and 37 (7.5%) preferred not to answer the question (Table 1). Only 59 (12.0%) had previously discussed resuscitation with a clinician, of whom 27 (45.0%) expressed a definite DNR preference.

### One month follow-up

Among the 356 (72.5%) patients who completed one month follow-up, 205 (57.6%) patients had stable CPR preferences (Supplementary Table 1); 87 (64.9%) still wanted CPR, 78 (65.8%) still wanted DNR, 105 (52.1%) remained uncertain, and 7 (30.4%) still preferred not to answer (Fig. 2A and Supplementary Table 3).

At one month, 151 (42.4%) patients changed their resuscitation preferences, 67 (24.6%) increased and 84 (29.1%) decreased in willingness to receive resuscitation (Fig. 2A and Supplementary Table 1). Among patients with a definite CPR or DNR resuscitation preference in the ED, 35.1% and 34.2% changed their resuscitation preference at one month, respectively (Supplementary Table 3).

At one month, EQ-5D-index increased to 0.786 (0.646–0.863) and 0.824 (0.731–1.000) for females and males, respectively.

### Six months follow-up

A total of 283 (57.6%) patients completed six months follow-up and reported stable preferences of wanting CPR, DNR, uncertain preferences, or “prefer not to answer” compared to one month of 72.2%,

79.6%, 69.0%, or 40.5% respectively (Fig. 2B and Supplementary Table 4).

At six months, 90 (31.8%) patients changed their resuscitation preferences, 50 (17.7%) patients increased their willingness and 40 (14.1%) patients decreased their willingness to receive CPR (Fig. 2B and Supplementary Table 2).

Regarding EQ-5D-index, no change was found between one and six months (Supplementary Tables 1 and 2).

### Recall of resuscitation preferences

At one month, 310 (94.5% of those interviewed) patients remembered completing the questionnaire in ED and 90 (27.4%) patients were able to recall their preference. Among those who could recall their preferences, 70 (77.8%) patients expressed definite preferences in the ED, (31 (34.4%) patients wanting CPR and 39 (43.3%) patients wanting DNR, respectively (Fig. 3).

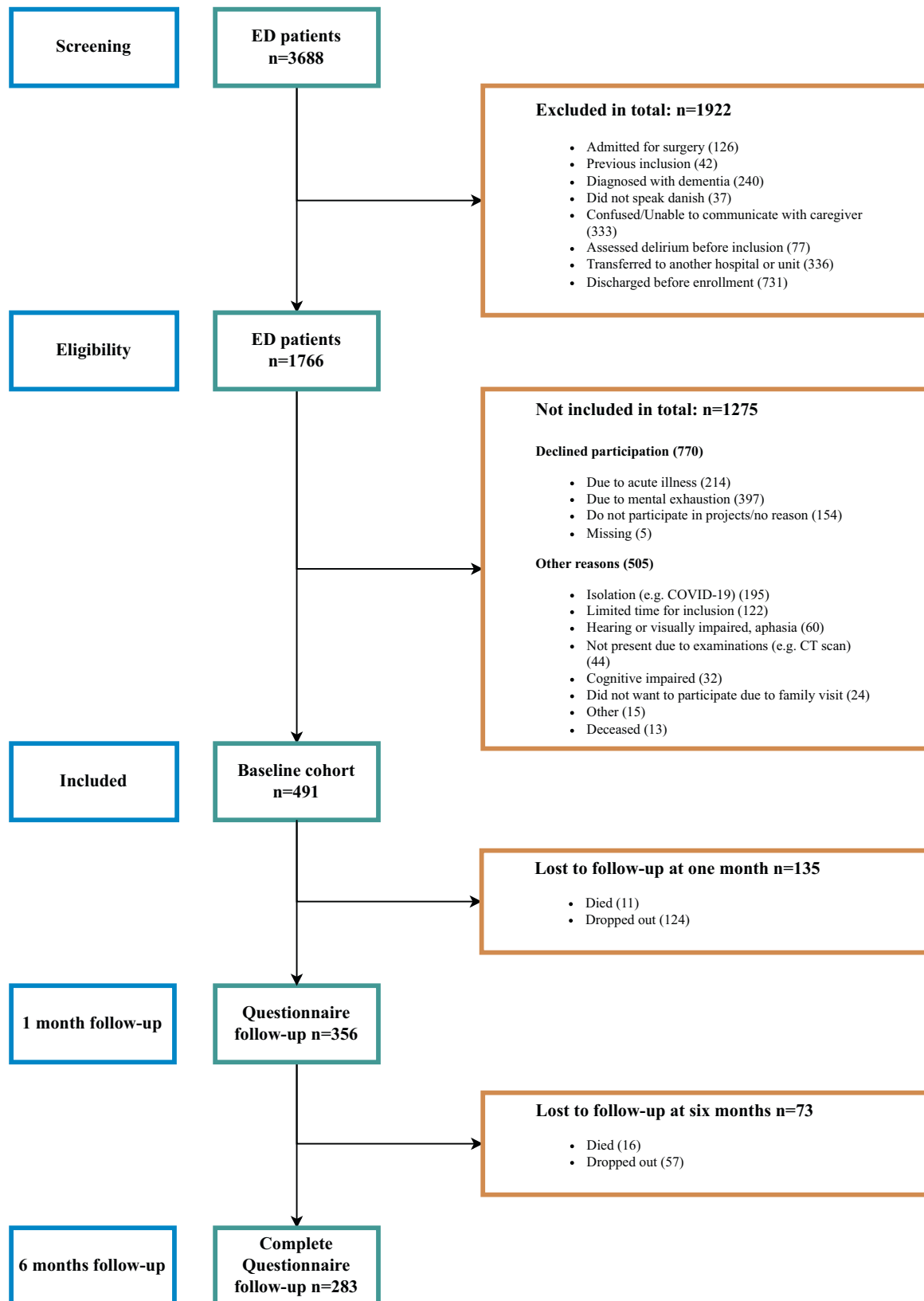
At six months, 244 (94.2% of those interviewed) patients remembered completing the questionnaire at one month. In total, 94 (35.7%) patients could recall their one-month preference when asked at six months follow-up.

## Discussion

In this prospective multicenter observational study, 201 (40.9%) older ED patients had uncertain resuscitation preferences while 134 (27.3%) wanted resuscitation and 119 (24.2%) did not. More than 40% of patients changed their expressed preference at one month follow-up and a further 30% changed their preference at six months. Surprisingly, one in three patients who expressed a definite CPR or DNR preference linked to their current condition that justified their ED admission changed their preferences at one month follow-up. More than 70% were unable to recall their resuscitation preference at one month follow-up, and at six months, only 35.7% were able to recall the preference stated at one month.

Most prior studies of resuscitation preferences among older patients have focused on selected groups such as community-dwelling older patients,<sup>25–27</sup> seriously ill outpatients,<sup>28,29</sup> seriously ill hospitalized patients,<sup>30–32</sup> or subgroups of patients e.g., needing dialysis,<sup>33</sup> acutely admitted with decompensated heart failure,<sup>34</sup> with depression,<sup>25</sup> or in-hospital patients above the age of 80 years.<sup>35</sup> To the best of our knowledge this is the first study to report CPR preferences expressed in the ED by mentally competent older patients and the patients' recollection of them over time. Interestingly, we found, that despite being functionally independent in activities in daily living (ADL), one in four of our older ED patients did not want to be resuscitated. We are not aware of any other study reporting such a high preference for DNR among older patients, who prior to their ED presentation had been well and living independently.

Our study of a selected sample of mentally competent older patients, indicates that older ED patients are likely to change their CPR preferences over time and, surprisingly, are often unable to recall them. These findings have profound ethical implications for CPR discussions and Advanced Care Planning (ACP) held in the acute care setting. We found resuscitation preferences to be more stable between one and six months, despite longer time between assessments. This may indicate those resuscitation preferences stated in home settings to be linked to more stable health conditions compared to those preferences stated in the ED. Our findings highlight the importance of ED clinicians exploring patient preferences



**Fig. 1 – Flowchart of the Enrollment of the Baseline Study Population With Follow-up.**

more carefully. However, whether this can be undertaken reliably in the acute ED settings with older patients remains unclear. Although an acute hospitalization should be a trigger for ACP tailored to the

patients' needs and values,<sup>36</sup> the ED may not be the best time and place to do it. It may be wiser to wait, or at least review preferences, after the patients' disease trajectory has become clearer.<sup>36</sup> Instead

**Table 1 – The Baseline Cohort From the Emergency Department. Baseline characteristics of the study population (n = 491), divided into groups: cardiopulmonary resuscitation (CPR) (n = 134), do-not resuscitation (DNR) (n = 119), uncertain (n = 201), and prefer not to answer (n = 37) along with the group of patients lost to follow-up at one and six months.<sup>a,b</sup>**

Characteristics	Baseline n = 491					1 month n = 356	6 months n = 283
	No. (%)	Total at baseline	CPR 134 (27.3)	DNR 119 (24.2)	Uncertain 201 (40.9)	Prefer not to answer 37 (7.5)	Lost to follow-up 135 (27.5)
Female	234 (47.7)	49 (36.6)	67 (56.3)	97 (48.3)	21 (56.8)	66 (48.9)	36 (49.3)
Age, median (IQR)	76 (71–82)	72 (68–77)	79 (73–84)	77 (72–82)	75 (71–81)	78 (73–83)	77 (72–84)
Admission specialty							
Emergency medicine	288 (58.7)	73 (54.5)	74 (62.2)	121 (60.2)	20 (54.1)	85 (63.0)	48 (65.8)
Geriatrics	42 (8.6)	7 (5.2)	12 (10.1)	18 (9.0)	5 (13.5)	18 (13.3)	4 (5.5)
Gastrointestinal diseases	12 (2.4)	5 (3.7)	2 (1.7)	2 (1.0)	3 (8.1)	3 (2.2)	1 (1.4)
Respiratory diseases	18 (3.7)	7 (5.2)	4 (3.4)	7 (3.5)	.	6 (4.4)	3 (4.1)
Infectious diseases	1 (0.2)	.	.	1 (0.5)	.	.	1 (1.4)
Cardiology	87 (17.7)	23 (17.2)	18 (15.1)	40 (19.9)	6 (16.2)	16 (11.9)	11 (15.1)
Endocrinology	8 (1.6)	4 (3.0)	1 (0.8)	3 (1.5)	.	3 (2.2)	.
Rheumatology	7 (1.4)	3 (2.2)	3 (2.5)	1 (0.5)	.	.	.
Neurology	28 (5.7)	12 (9.0)	5 (4.2)	8 (4.0)	3 (8.1)	4 (3.0)	5 (6.9)
Marital status, widowed	131 (26.7)	26 (19.4)	46 (38.7)	50 (24.9)	9 (24.3)	40 (29.6)	26 (35.6)
Living arrangement, living alone	208 (42.4)	45 (33.6)	60 (50.4)	89 (44.3)	14 (37.8)	68 (50.4)	35 (48.0)
Education level, ≤Primary school	206 (42.0)	58 (43.3)	50 (42.0)	76 (37.8)	22 (59.5)	55 (40.7)	26 (35.6)
Religious person							
Very much/quite a bit	96 (19.6)	30 (22.4)	23 (19.3)	38 (18.9)	5 (13.5)	25 (18.5)	17 (23.3)
Somewhat	121 (24.6)	36 (26.9)	23 (19.3)	55 (27.4)	7 (18.9)	29 (21.5)	15 (20.6)
A little bit/not at all	274 (55.8)	68 (50.8)	73 (61.3)	108 (53.7)	25 (67.6)	81 (60.0)	41 (56.2)
EQ-5D-index, median (IQR)	0.735 (0.579– 0.853)	0.768 (0.579– 0.859)	0.642 (0.452– 0.780)	0.742 (0.629–0.846)	0.769 (0.617–0.859)	0.677 (0.507–0.788)	0.719 (0.593–0.802)
EQ-VAS, median (IQR)	50 (40–75)	60 (40–80)	50 (30–64)	60 (50–75)	50 (40–70)	50 (34–74)	50 (50–74)
AMTS, median (IQR)	9 (9–10)	10 (9–10)	9 (9–10)	10 (9–10)	9 (9–10)	9 (9–10)	9 (9–10)
<7	9 (1.8)	1 (0.8)	3 (2.52)	5 (2.5)	.	7 (5.2)	.
7	16 (3.3)	3 (2.2)	7 (5.9)	6 (3.0)	.	8 (5.9)	4 (5.5)
8–10	464 (94.5)	130 (97.0)	107 (91.6)	190 (94.5)	37 (100)	118 (88.9)	69 (94.5)
Barthel-index, median (IQR)	96 (85–100)	98 (90– 100)	90 (77–98)	97 (85–100)	98 (87–100)	89 (72–97)	95 (87–100)
<50	21 (4.3)	3 (2.2)	11 (9.2)	7 (3.5)	.	15 (11.1)	1 (1.4)
50–74	43 (8.8)	6 (4.5)	16 (13.5)	18 (9.0)	3 (8.1)	21 (15.6)	9 (12.3)
75–89	96 (19.6)	24 (17.9)	24 (20.2)	40 (19.9)	8 (21.6)	33 (24.4)	15 (20.6)
90–99	155 (31.6)	43 (32.1)	42 (35.3)	58 (28.9)	12 (32.4)	42 (31.1)	22 (30.1)
100	176 (35.9)	58 (43.3)	26 (21.9)	78 (38.8)	14 (37.8)	23 (17.0)	26 (35.6)

Abbreviations: CPR: Cardiopulmonary resuscitation; DNR: do-not-resuscitate, IQR: interquartile range; EQ-5D-index: Euro-QoL 5-Dimensions 5-Level index; EQ-VAS: EQ-5D-visual analogue scale; AMTS: Abbreviated Mental Test Score.

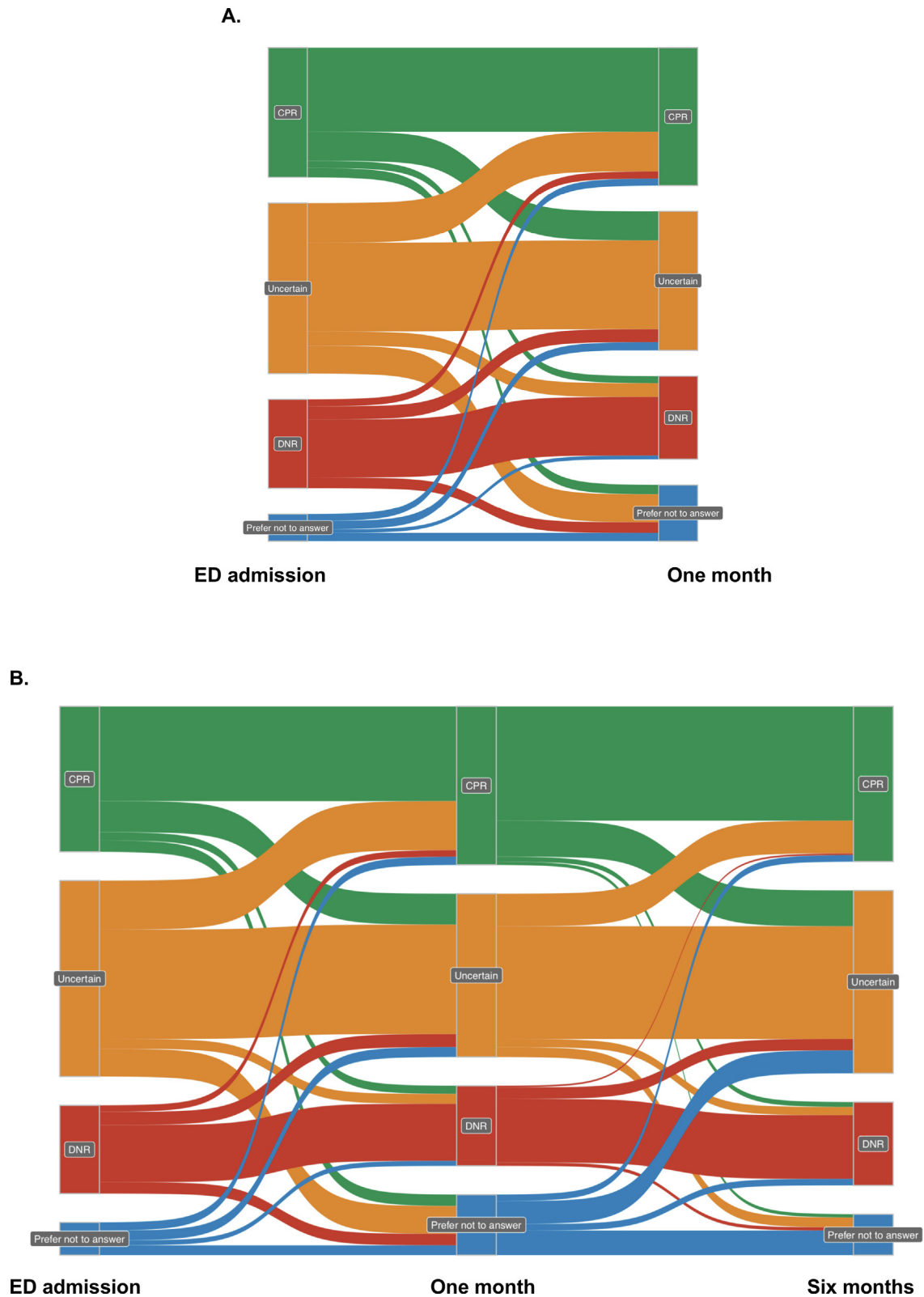
<sup>a</sup> Missing < 2% are not listed in the table.

<sup>b</sup> Missing values: Marital status n = 3 (0.6); Living arrangement n = 1 (0.2); Educational level n = 3 (0.6); EQ-5D-index n = 2 (0.4); EQ-VAS n = 4 (0.8); AMTS n = 2 (0.4).

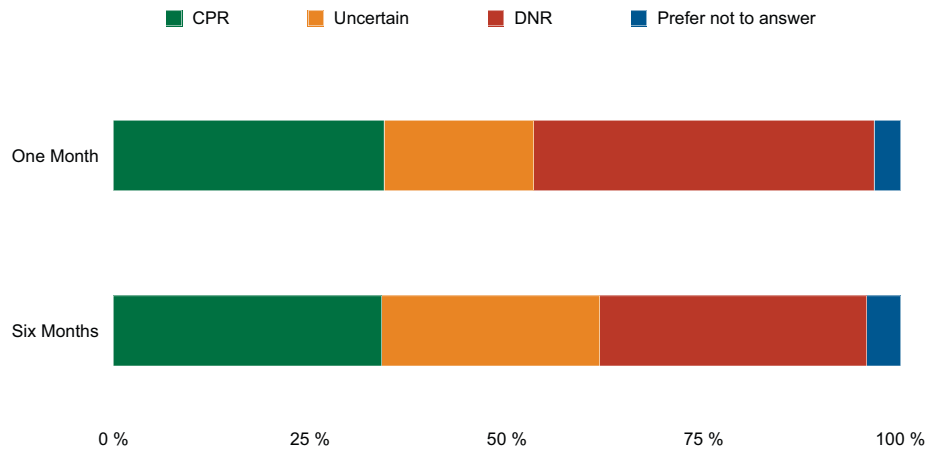
of demanding an immediate DNR decision, the ED should be the place to start but not finish conversations with patients about what matters most to them<sup>37</sup>; we found two in five patients are uncertain about their preferences, and many these patients may need help to make wise decisions that ensure their subsequent treatment is right for them.<sup>38</sup>

## Limitations

Our study has important limitations. Only patients admitted via the ED with medical (and not surgical issues) who stayed overnight were included, which limits the generalizability of our results. The participating EDs had high patient flows and were under pressure to either



**Fig. 2 – (A + B) Sankey Diagrams of Resuscitation Preferences Over Time After Admission to the Emergency Department. Legend: Sankey diagrams illustrating proportions of older patients who change their resuscitation preferences between emergency department admission and one month (n = 356) (A) and between emergency department admission and one and six months (n = 283) (B). CPR: cardiopulmonary resuscitation, which refers to the “definitely yes” preference for resuscitation, DNR: do-not-resuscitate. ED: emergency department.**



**Fig. 3 – Diagram of Patients Able to Recall Preferences at Follow-up. Legend: At one month, patients able to recall preferences (n = 90) and their recalled preferences in ED. At six months, patients able to recall their preferences (n = 94) and their recalled preferences at one month follow-up.**

discharge or transfer patients. Moreover, our study was conducted in the mist of the COVID-19 pandemic, which may have changed the way hospitals do business “as usual”<sup>39,40</sup> and negatively influenced patient recruitment and follow-up.<sup>41</sup> Therefore, we may not have been able to include many, and possibly the majority, of eligible patients. On the other hand, these findings may be used to raise awareness when ED clinicians’ approach older patients for discussions in daily practice. This should be done with caution and respect to older patient’s acute condition, mental wellbeing, along with surrounding environmental disturbing elements (family in the room, examinations, timing of scans, planned transfer or discharge).

There were other possible selection biases. Only mentally competent patients were included, yet the sickest patients may have declined participation because of physical and/or mentally exhaustion. Therefore, we may have underestimated uncertain or DNR preferences, as more seriously ill patients may be more likely to refuse life-sustaining treatment.<sup>32</sup>

Instead of entering into a dialogue to explore the preferences of our patients, our patients’ resuscitation preferences were determined by asking them to complete a questionnaire. Had we provided them with hypothetical scenarios of their likely clinical course or outcomes or considering their personal needs and values, we could have reached another conclusion.

## Conclusion

In this prospective observational cohort study, many older mentally competent patients had an uncertain CPR preference at ED presentation, and one in four expressed a preference for DNR but one in three changed their preferences within a month. Also, many forgot their initial preferences, but those with expressed CPR or DNR preferences were more likely to remember them. These findings suggests that resuscitation preferences expressed in the ED by older patients may require reevaluation, to ensure that the documented preferences remain correct and aligned the patient’s current wishes, values and needs following their disease trajectory. Larger studies to carefully examine CPR decisions and their recollection by older hospitalized patients are needed.

## CRediT authorship contribution statement

**Stine Hanson:** Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Validation, Writing – original draft, Writing – review & editing. **Annamarie Lassen:** Conceptualization, Formal analysis, Methodology, Resources, Supervision, Validation, Writing – review & editing. **Dorthe Nielsen:** Conceptualization, Data curation, Methodology, Supervision, Writing – review & editing. **Jesper Ryg:** Conceptualization, Data curation, Formal analysis, Methodology, Supervision, Validation, Writing – review & editing. **Roberto Forero:** Methodology, Supervision, Validation, Writing – review & editing. **Mikkel Brabrand:** Conceptualization, Data curation, Funding acquisition, Methodology, Project administration, Resources, Software, Supervision, Validation, Writing – original draft, Writing – review & editing.

## Declaration of Competing Interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests: ‘Stine Hanson reports financial support, article publishing charges, and statistical analysis were provided by Region of Southern Denmark’.

## Acknowledgements

The authors thank the research-staff, Line Emilie Lilholm Laugesen, Mette Rahbek Kristensen, Tanja Mose Kristensen, and Anne-Mette Green for coordinating data collection in the ED. We acknowledge the central role Mette Rahbek Kristensen played by handling telephone follow-up calls so the patients were contacted by the same nurse they met previously.

## Source of funding

This study has been supported by the Region of Southern Denmark [16/42004], the Health Foundation [17-B-0072], and the Karola Jor-



gensens Foundation. None of the funders played a role in the design, execution, analyses, interpretation of the data, or writing of the study.

## Appendix A. Supplementary material

Supplementary material to this article can be found online at <https://doi.org/10.1016/j.resuscitation.2023.109836>.

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## REFERENCES

- Fulmer T, Reuben DB, Auerbach J, Fick DM, Galambos C, Johnson KS. Actualizing better health and health care for older adults. *Health Aff* n.d.;40:219–25. <https://doi.org/10.1377/hlthaff.2020.01470>.
- Yadav KN, Gabler NB, Cooney E, et al. Approximately one in three us adults completes any type of advance directive for end-of-life care. *Health Aff* n.d.;36:1244–51. <https://doi.org/10.1377/hlthaff.2017.0175>.
- Silveira MJ, Kim SYH, Langa KM. Advance directives and outcomes of surrogate decision making before death. *N Engl J Med* n.d.;362:1211–8. <https://doi.org/10.1056/NEJMsa0907901>.
- Fisher KA, Tan ASL, Matlock DD, Saver B, Mazor KM, Pieterse AH. Keeping the patient in the center: Common challenges in the practice of shared decision making. *Patient Educ Couns* n.d.;101:2195–201. <https://doi.org/10.1016/j.pec.2018.08.007>.
- Hall CC, Lugton J, Spiller JA, Carduff E. CPR decision-making conversations in the UK: An integrative review. *BMJ Support Palliat Care* n.d.;9:1–11. <https://doi.org/10.1136/bmjspcare-2018-001526>.
- Mentzelopoulos SD, Haywood K, Cariou A, Mantzanas M, Bossaert L. Evolution of medical ethics in resuscitation and end of life. *Trends Anaesth Crit Care* n.d.;10:7–14. <https://doi.org/10.1016/j.tacc.2016.08.001>.
- Auriemma CL, Nguyen CA., Bronheim R, et al. Stability of End-of-Life Preferences: A Systematic Review of the Evidence. *JAMA Intern Med* n.d.;174:1085–92. <https://doi.org/10.1001/jamainternmed.2014.1183>.
- Watson DR, Wilkinson TJ, Sainsbury R, Kidd JE. The effect of hospital admission on the opinions and knowledge of elderly patients regarding cardiopulmonary resuscitation. *Age Ageing* n.d.;26:429–34. <https://doi.org/10.1093/ageing/26.6.429>.
- Bruce-Jones P, Roberts H, Bowker L, Cooney V. Resuscitating the elderly: what do the patients want? *J Med Ethics* n.d.;22:154–9. <https://doi.org/10.1136/jme.22.3.154>.
- Mukamel DB, Ladd H, Temkin-Greener H. Stability of Cardiopulmonary Resuscitation and Do-Not-Resuscitate Orders Among Long-term Nursing Home Residents. *Med Care* n.d.;51:666–72. <https://doi.org/10.1097/MLR.0b013e31829742b6>.
- Inouye SK, van Dyck CH, Alessi CA, Balkin S, Siegel AP, Horwitz RI. Clarifying confusion: the confusion assessment method. A new method for detection of delirium. *Ann Intern Med* n.d.;113:941–8.
- von Elm E, Altman DG, Egger M, et al. Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement: guidelines for reporting observational studies. *BMJ* n.d.;335:806–8. <https://doi.org/10.1136/bmj.39335.541782.AD>.
- Danish Ministry of Health. The Super Hospital Programme n.d.:7–14. <https://sum.dk/Media/0/2/TheDanishSuperHospitalProgramme2021.pdf>.
- Hanson S, Nissen SK, Nielsen D, et al. What matters and influence resuscitation preference? Development, field testing, and structural validation of items among older patients in the emergency department. *BMC Geriatr* n.d.;22:1–11. <https://doi.org/10.1186/s12877-022-03707-y>.
- Hanson S, Brabrand M, Lassen AT, Ryg J, Nielsen DS. What Matters at the End of Life: A Qualitative Study of Older Peoples Perspectives in Southern Denmark. *Gerontol Geriatr Med* n.d.;5:1–11. <https://doi.org/10.1177/2333721419830198>.
- Brooks R.R. EuroQol: the current state of play. *Health Policy (New York)* n.d.;37:53–72.
- Sørensen J, Gudex C, Davidsen M, Brønnum-Hansen H, Pedersen KM. Danish EQ-5D population norms. *Scand J Public Health* n.d.;37:467–74. <https://doi.org/10.1177/1403494809105286>.
- Harris PA, Taylor R, Thielke R, Payne J, Gonzalez N, Conde JG. Research electronic data capture (REDCap)—A metadata-driven methodology and workflow process for providing translational research informatics support. *J Biomed Inform* n.d.;42:377–81. <https://doi.org/10.1016/j.jbi.2008.08.010>.
- Hodkinson HM. Evaluation of a Mental Test Score for Assessment of Mental Impairment in the Elderly. *Age Ageing* n.d.;1:233–8. <https://doi.org/10.1093/ageing/1.4.233>.
- Mahoney FI, Barthel DW. Functional Evaluation: The Barthel Index. *Md State Med J* n.d.;14:61–5.
- Shah S, Vanclay F, Cooper B. Improving the sensitivity of the Barthel Index for stroke rehabilitation. *J Clin Epidemiol* n.d.;42:703–9. [https://doi.org/10.1016/0895-4356\(89\)90065-6](https://doi.org/10.1016/0895-4356(89)90065-6).
- Della Pietra GL, Savio K, Oddone E, Reggiani M, Monaco F, Leone MA. Validity and reliability of the barthel index administered by telephone. *Stroke* n.d.;42:2077–9. <https://doi.org/10.1161/STROKEAHA.111.613521>.
- Prasad K, Kumar A, Misra S, et al. Reliability and validity of telephonic Barthel Index: an experience from multi-centric randomized control study. *Acta Neurol Belg* n.d.;118:53–9. <https://doi.org/10.1007/s13760-017-0843-2>.
- McPhail S, Lane P, Russell T, et al. Telephone reliability of the Frenchay Activity Index and EQ-5D amongst older adults. *Health Qual Life Outcomes* n.d.;7:48. <https://doi.org/10.1186/1477-7525-7-48>.
- Danis M, Garrett J, Harris R, Patrick DL. Stability of choices about life-sustaining treatments. *Ann Intern Med* n.d.;120:567–73. <https://doi.org/10.7326/0003-4819-120-7-199404010-00006>.
- Ditto PH. Context Changes Choices: A Prospective Study of the Effects of Hospitalization on Life-Sustaining Treatment Preferences. *Med Decis Mak* n.d.;26:313–22. <https://doi.org/10.1177/0272989X06290494>.
- Carmel S, Mutran E. Preferences for different life-sustaining treatments among elderly persons in Israel. *Journals Gerontol - Ser B Psychol Sci Soc Sci* n.d.;52:97–102. <https://doi.org/10.1093/geronb/52B.2.S97>.

28. Golin CE, Wenger NS, Liu H, et al. A Prospective Study of Patient-Physician Communication About Resuscitation. *J Am Geriatr Soc* n.d.;48:S52–60. <https://doi.org/10.1111/j.1532-5415.2000.tb03141.x>.
29. Janssen DJA, Spruit MA, Schols JMGA, et al. Predicting Changes in Preferences for Life-Sustaining Treatment Among Patients With Advanced Chronic Organ Failure. *Chest* n.d.;141:1251–9. <https://doi.org/10.1378/chest.11-1472>.
30. Krumholz HM, Phillips RS, Hamel MB, et al. Resuscitation preferences among patients with severe congestive heart failure: Results from the SUPPORT project. *Circulation* n.d.;98:648–55. <https://doi.org/10.1161/01.CIR.98.7.648>.
31. Rosenfeld KE. Factors Associated With Change in Resuscitation Preference of Seriously Ill Patients. *Arch Intern Med* n.d.;156:1558. <https://doi.org/10.1001/archinte.1996.00440130104011>.
32. Phillips R, Wenger N, Teno J, et al. Choices of seriously ill patients about cardiopulmonary resuscitation: Correlates and outcomes. *Resuscitation* n.d.;33:87. [https://doi.org/10.1016/0300-9572\(96\)89032-0](https://doi.org/10.1016/0300-9572(96)89032-0).
33. Bernacki GM, Engelberg RA, Curtis JR, et al. Cardiopulmonary Resuscitation Preferences of People Receiving Dialysis. *JAMA Netw Open* n.d.;3:e2010398. <https://doi.org/10.1001/jamanetworkopen.2020.10398>.
34. Young KA, Wordingham SE, Strand JJ, Roger VL, Dunlay SM. Discordance of Patient-Reported and Clinician-Ordered Resuscitation Status in Patients Hospitalized With Acute Decompensated Heart Failure. *J Pain Symptom Manage* n.d.;53:745–50. <https://doi.org/10.1016/j.jpainsymman.2016.11.010>.
35. O'Donnell H, Phillips RS, Wenger N, Teno J, Davis RB, Hamel MB. Preferences for Cardiopulmonary Resuscitation Among Patients 80 Years or Older: The Views of Patients and Their Physicians. *J Am Med Dir Assoc* n.d.;4:139–44. <https://doi.org/10.1097/01.JAM.0000064464.85732.45>.
36. Bielinska AM, Archer S, Obanobi A, et al. Advance care planning in older hospitalised patients following an emergency admission: A mixed methods study. *PLoS One* n.d.;16:1–14. <https://doi.org/10.1371/journal.pone.0247874>.
37. Fritz Z, Slowther AM, Perkins GD. Resuscitation policy should focus on the patient, not the decision. *BMJ* n.d.;356:1–6. <https://doi.org/10.1136/bmj.j813>.
38. Terri R, Fried MD. Shared Decision Making — Finding the Sweet Spot. *N Engl J Med* n.d.;374:104–6. <https://doi.org/10.1056/NEJMp1513686>.
39. Ikram U, Ren H, Shields-Zeeman L, et al. Balancing COVID-19 preparedness and “business as usual” in hospitals: lessons from executives in China, Norway and the UK. *BMJ Lead* n.d.;5:130–3. <https://doi.org/10.1136/leader-2020-000314>.
40. Sutherland K, Chessman J, Zhao J, et al. Impact of COVID-19 on healthcare activity in NSW, Australia. *Public Heal Res Pract* n.d.;30:1–9. <https://doi.org/10.17061/PHRP3042030>.
41. Sathian B, Asim M, Banerjee I, et al. Impact of COVID-19 on clinical trials and clinical research: A systematic review. *Nepal J Epidemiol* n.d.;10:878–87. <https://doi.org/10.3126/nje.v10i3.31622>.