

# Patient Understanding Of Cardiopulmonary Resuscitation Status

Sushmita Khadka (✉ [tshushmita@gmail.com](mailto:tshushmita@gmail.com))

Guthrie Robert Packer Hospital

**Kriti Suwal**

Guthrie Robert Packer Hospital

**Nirajan Adhikari**

Guthrie Robert Packer Hospital

**Chandrakala Dadeboyina**

Guthrie Robert Packer Hospital

**Litty Thomas**

Guthrie Robert Packer Hospital

**Sri Senapathi**

Guthrie Robert Packer Hospital

**James Walsh**

Guthrie Robert Packer Hospital

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## Research Article

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# Abstract

## Background

Cardiopulmonary Resuscitation (CPR) or Code status discussion usually happen late in the hospital admission. Lack of clear communication, various level of training of providers and discrepancy in health literacy among patient act as barrier in proper understanding of code status understanding. In this study we utilized brief video and validated survey to determine if viewing a short, educational video could improve patient understanding of CPR and code status at Robert Packer Hospital.

## Method

This study was conducted as single center randomized study at Guthrie Robert Packer Hospital. Total number of participants was 150. Participants were randomly assigned (1:1) to Intervention group where they viewed brief educational video. The primary end point was the composite score ranging from 0 to 15 generated based on correct responses to the questionnaire (supplemental file).

## Result

There was statistically significant high understanding of code status among intervention group with mean composite score of 8.6 with a significant difference between the video group (10.3) and control group (6.9) with a p-value < 0.001. The multivariate linear model had a significant F-statistic with a p-value of < 0.001. We found age and randomization group significantly changes the composite scores. On average, the composite score of the intervention group was 3.36 points higher than the control group with 95% confidence interval of 2.36 – 4.35, p<0.001, when adjusted for age and gender of the patient.

## Conclusion

Understanding of cardiopulmonary resuscitation status holds important place in guiding management of a patient. Use of short video explaining CPR and code status was found to be effective in improving patient understanding of these issues. It has the potential to save time and improve patient's understanding if incorporated into code status discussions with hospitalized patients.

# Background

Cardiopulmonary Resuscitation (CPR) status is represented by code status, which simply indicates whether a person desires to be resuscitated with life support protocols in the event of cardiopulmonary arrest<sup>1</sup>. CPR and intubation for breathing support are complementary components of cardiopulmonary resuscitation. Although code status discussions do occur in the hospital setting, they often occur late in the inpatient admission. Use of medical jargon by health care providers and absence of a consistent and comprehensive approach to discussions regarding code status hinders patient understanding of CPR. The Patient Self-determination Act of 1991 mandated use and documentation of advanced directives during the hospital admission, but it is underutilized<sup>2</sup>.

With varying levels of healthcare literacy among patients, there are significant differences in their understanding of resuscitation measures. At the same time, the stressful nature of code status discussions for inpatient care providers and various levels of provider training in initiating and conducting these discussions, contributes to poor patient knowledge<sup>3</sup>. In addition, disparity in goals of care between the healthcare provider and the patient presents a barrier to effective code status discussions. Clear communication from health care providers to the patient and their family regarding prognosis and the prospect of functional recovery is essential<sup>4,5</sup>. The results from a controlled study to improve care for seriously ill hospitalized patients (SUPPORT trial) showed that only 25% of the patients had a CPR discussion with their physician and only 47% of the physicians knew if their patient preferred to be DNR<sup>6</sup>. Various ways have been formulated and tested for improving patient understanding of code status. In a single center study, use of standardized scripted code status explanation by residents did not alter the patients' understanding<sup>7</sup>. A randomized control study using an informational pamphlet and discussion with patients with metastatic cancer did not change their knowledge regarding CPR<sup>8</sup>. A few studies using an informational video have shown effectiveness in enhancing understanding of CPR<sup>9,10</sup>. A study by Merino and colleagues, performed at the Minneapolis, MN Veterans Affairs Healthcare system utilizing a 5 minute video describing code status choices including full code, DNR and DNI, showed that, patients, after watching the video, often wished to have their status established as DNR and Do not intubate (DNI) compared to full code<sup>10</sup>. Similarly, to assess the understanding of the CPR and code status, Wilson and colleagues developed a 12 question survey, which was found to have strong face, content and discriminative validity and was easily administered<sup>11</sup>.

In this study we utilized the video developed by Merino et al.<sup>10</sup> and the survey validated by Wilson and colleagues<sup>11</sup> to determine if viewing a brief, educational video could improve patient understanding of CPR and code status at Robert Packer Hospital.

## Methods

**Design:** The study was conducted as single center randomized study at Guthrie Robert Packer Hospital. Two groups were randomly assigned to see or not see the video presentation developed by Marino and colleagues, which is available online publicly at <https://www.mmcmeservices.org/codestat.html>. Both groups knowledge of CPR and code status was then assessed utilizing the questionnaire developed and validated by Wilson and colleagues<sup>11</sup> (supplement 1). This study was reviewed and approved by the Robert Packer Hospital Institutional Review Board.

### Setting and participants

Eligible participants were identified from the hospital's Electronic Medical Record (EMR) database (EPIC-Madison, WS). Patients aged 18 years or older admitted to a medical-surgical floor were eligible to participate. Patients admitted to the critical care unit who were stabilized and ready for transfer to a medical floor were also included. Patients with altered mental status or inability to consent for the study

were excluded. The study design is summarized in Fig. 1. Patients were randomly allocated (1:1) to the educational video group or a control group and assignment was concealed from the researchers using sealed envelopes. Randomization was done via Sealed Envelope (London, UK) <sup>12</sup> and used random permuted blocks (block sizes of 4, 6 and 8). Sealed envelopes (150) were distributed randomly among 5 investigators. Investigators discussed the study with the patient's primary provider team. Patients who met eligibility were invited to participate and verbal consent was obtained. The sealed envelope was opened inside the patient room to determine whether the patient was to watch the intervention video followed by the survey or to be given the survey only.

The intervention group watched the video discussing code status from the website using their personal phone, laptop or a tablet provided by the researcher, and then completed the questionnaire (supplemental file). Patients randomized to not watch the video completed the questionnaire only. Correct answers to each question received a score of 1. The responses were recorded in Microsoft Forms. Total time spent was 15–20 minutes for intervention group and 10–15 minutes for the non-intervention group. Age and gender of each patient was also documented. The patient's current code status and change in code status were not documented. If the patient wished to discuss changing or establishing code status, this information was relayed to the patient's primary provider team.

### Aims and outcome

The primary aim of the study was to evaluate the understanding of cardiopulmonary resuscitation and code status among patients and to determine if video instruction was an effective means to improve patient understanding of this. The primary end point was the composite score generated based on correct responses to the questionnaire (supplemental file). Composite scores ranged from 0 to 15. Our secondary aim was to assess if age and gender had any influence on understanding of cardiopulmonary resuscitation and code status.

### Statistical analysis

Patient age and gender were compared between the intervention and control group using Wilcoxon rank sum and chi-squared test statistics, respectively. Total scores for each patient were calculated by adding the scores of individual questions. Total scores between the intervention and control group were compared using Wilcoxon rank sum test. For our secondary analysis, a multivariate linear regression was modelled using the variables age, gender, and randomization group to assess for variability in total scores.

## Results

Among the 150 patients that were enrolled for the study, 2 were lost and the remaining 148 completed the survey questionnaire. 74 patients were enrolled in the intervention group who were assigned to see an educational video before completing the questionnaire and the remaining 74 patients were enrolled in control group, who completed only the questionnaire.

## Demographics:

The mean age in the intervention group was 62.9 years whereas that in the no intervention group was 63.1 years. A total of 56 males and 81 (79) females were enrolled in the study, with data for 11 patients missing. 31 males were in the intervention group and 25 in the control group. Among the females 38 were in the intervention group with the remaining 41 in control group. Mean age and gender were similar with no significant difference between the two groups. (table 1).

Table -1 demographics

Variables:	levels	Video	No video	p
age	Mean (SD)	62.9 (17.5)	63.1 (17.1)	0.96
gender	Female	39 (55.7)	42 (62.7)	0.512
	Male	31 (44.3)	25 (37.3)	
Total points	Mean (SD)	10.3 (2.8)	6.9 (3.3)	<0.001

## Knowledge:

A validated questionnaire was administered among all the 148 enrolled patients, with a maximum score being 15. Overall, the mean composite score was 8.6 with a significant difference between the video group (10.3) and control group (6.9) with a p-value < 0.001 (Table-2)

Table -2 showing composite score of video versus no video group

	Video (N=74)	No video (N=74)	Overall (N=148)
<b>total_points</b>			
Mean (SD)	10.3 (2.84)	6.93 (3.32)	8.60 (3.50)
Median [Min, Max]	11.0 [3.00, 15.0]	7.00 [0, 14.0]	9.00 [0, 15.0]

Regarding each knowledge question, although 45 (60.8%) patients in the intervention group correctly answered what the acronym CPR stood for compared to 33 (44.6%) patients in the control group, this was not statistically significant. Similarly, the intervention group scored higher than the control group for several other questions. These were, knowing the purpose of CPR and that chest compression and breathing assistance were treatments during CPR but these differences were not significant. For all remaining areas assessed by the questionnaire the difference in knowledge was statistically significant. For remaining questions regarding treatments used in CPR, 27 (36.5%) in intervention group answered defibrillation compared to 10(13.5%); p-value of 0.002. Only 17 (23%) in intervention group identified use of medications as one of the treatments used in CPR compared to 5 (6.8%); p-value of 0.01. Fifty-three (71.6%) in the intervention group knew what intubation meant vs 24 (32.4%) of the patients in the control group, p- value of < 0.001. Similarly, 41 (55.4%) patients in the intervention group knew what mechanical

ventilation meant in comparison to 28 (37.8%); p-value 0.048, 63 (85.1%) could identify at least one possible complication of CPR vs 37 (50%); p-value of < 0.001. Also 64 (86.5%) in the intervention group were aware of what DNR stood for, in comparison to 40 (54.1%); p-value of < 0.001. Likewise, 56 (75.7%) in the intervention group knew what DNI stood for vs 23 (31.1%); p-value of < 0.001. Forty-eight (64.9% patient in the control group knew what the response of the medical team would be when the patient is “full code”, whereas only 35 (47.3%) in the control group was aware about the same. 50 (67.6%) in the intervention group answered the correctly to the response of medical team when patient is “DNR”, in comparison to 27 (36.5%). Twenty-four (32.4%) patients in the intervention arm knew what “code status” meant, vs 6 (8.1%) in the control arm, with a significant p-value of 0.001. (table 3)

Table-3 showing comparison of knowledge between video versus no video group

Questions	Video n (%)	No video n (%)	P-value
What does CPR stand for?	45 (60.8)	33 (44.6)	0.07
What is the purpose of CPR?	73 (98.6)	67 (90.5)	0.06295
When would medical team start performing CPR?	69 (93.2)	58 (78.4)	0.018
What treatments are used in CPR			
• Chest compression	70 (94.6)	65 (87.8)	0.245
• Breathing assistance	60 (81.1)	55 (74.3)	0.43
• Defibrillation	27 (36.5)	10 (13.5)	0.002
• medication	17 (23.0)	5 (6.8)	0.011
What does intubation mean?	53 (71.6)	24 (32.4)	<0.001
What does mechanical ventilation mean?	41 (55.4)	28 (37.8)	0.048
What are possible complication of CPR	63 (85.1)	37 (50.0)	<0.001
What does “DNR” stand for	64 (86.5)	40 (54.1)	<0.001
What does “DNI” stand for	56 (75.7)	23 (31.1)	<0.001
What is the response of medical team when patient is “full code”	48 (64.9)	35 (47.3)	0.047
What is the response of medical team when patient is “DNR”	50 (67.6)	27 (36.5)	<0.001
What does the team “code status” mean	24 (32.4)	6 (8.1)	0.001

The multivariate linear model had a significant F-statistic with a p-value of < 0.001. We found age and randomization group significantly changes the composite scores. On average, the composite score of the intervention group was 3.36 points higher than the control group with 95% confidence interval of 2.36–4.35, p < 0.001, when adjusted for age and gender of the patient. There is no significant difference in composite score based on gender (Table-4)

Table -4 showing predictors of knowledge

<i>Predictors</i>	<b>total points</b>		
	<i>Estimates</i>	<i>CI</i>	<i>p</i>
(Intercept)	9.44	7.53 – 11.36	< <b>0.001</b>
age	-0.05	-0.07 – -0.02	<b>0.001</b>
gender [Male]	0.85	-0.17 – 1.86	0.102
patient_randomization [Video]	3.36	2.36 – 4.35	< <b>0.001</b>
Observations	137		
R <sup>2</sup> / R <sup>2</sup> adjusted	0.307 / 0.291		

## Discussion

Since the introduction of cardiac massage as a means of effective resuscitation in 1960, CPR has been a routine emergency procedure <sup>13</sup>. It is seen that patients who have a cardiac arrest tend to have poor prognosis with an average survival to hospital discharge of 20% <sup>14</sup>. Post resuscitation, they tend to have prolonged Intensive care stay, persistent neurological damage, rib fracture and psychological harm impairing quality of life <sup>15</sup>. Despite these facts, patients tend to rely on other lay sources for information such as Television (TV) shows which tend to portray CPR as a painless procedure with spectacular recovery leading to unrealistic expectations among patients <sup>16</sup>. In a study looking at representation of CPR in medical dramas, the portrayed survival rate was 69.6% <sup>17</sup>. In this study we investigated patient's understanding of cardiopulmonary resuscitation status and the effect of watching a 5-minute education video on patient understanding. Results suggest that watching the video enhanced patient understanding based on assessment of knowledge with a validated questionnaire.

Our study suggests that patients viewing the video had greater understanding of cardiopulmonary resuscitation and code status with a mean composite score of 10.3 +/-2.84, compared to 6.93 +/- 3.32 for patients not viewing the video. This result is consistent with the meta-analysis findings by Becker and colleagues <sup>18</sup> where use of resuscitation videos act as strong decision aid for patients when compared to other interventions (RR = 0.56, CI = 0.48–0.64). Differences among patient's understanding regarding the basic meaning of CPR, its purpose and some of the treatments administered during CPR did not have statistical significance between the groups. There was significant improvement in understanding of the meaning of intubation, mechanical ventilation, complications of CPR, meaning of DNR, DNI and code status among those patients that viewed the video. Our study shows that patients lack understanding regarding terminologies associated with CPR, code status, and CPR complications and that this can be mitigated, at least on a short term basis, by viewing an educational video.

Analysis of secondary outcomes demonstrated that with increasing age there is slight decrease of knowledge This finding may be biased by worsening disease condition or worsening cognition. No

difference in composite score based on gender was noted. A prior study showed no significant statistical difference in knowledge based on a patient's age or gender<sup>18</sup>.

Our study has several limitations, The sample size is small and only from a single institution which may limit the generalizability of the findings. We did not assess whether the intervention lead to change in code status for patients. Various confounding variables like co-morbidities, educational status, influence of family and friends, prior discussion with other healthcare providers were not assessed. The unblinded nature of the study in which the investigator administers the questionnaire at the time of randomization may also be a source of bias. There is also no assessment as to whether the intervention improved patients long term understanding of code status and cardiopulmonary resuscitation.

Despite these limitations our study is unique in that we have combined a validated video instruction tool to improve knowledge of CPR and code status and a validated questionnaire to assess that knowledge. This study suggests that viewing the instructional video may be a useful standardized way to enhance patient understanding of cardiopulmonary resuscitation at the time of discussion of code status with hospitalized patients, though there remained substantial lack of understanding of many factors associated with CPR and code status even among patients that viewed the video. It is also possible that this video may be better utilized to enhance patient understanding during outpatient visits rather than at the time of hospitalization. Additionally, certain patient groups such as patients with severe lung disease, heart failure or advanced cancer may gain more benefit than a general patient group.

## **Conclusion**

Understanding of cardiopulmonary resuscitation status holds important place in guiding management of a patient. With advancement of medical science code status basically includes full code, DNR and DNI. The decision is always made by patient or designated proxy. Proper understanding of the meaning of terminology is essential. Resuscitation techniques lead to pain and are often associated with complications. Underlying co-morbidities, common among hospitalized patients, often lead to a poor prognosis in the event CPR is required. Patients tend to have poor understanding of CPR and code status. Poor communication from healthcare providers, time constraints and influence of media, which portray CPR with spectacular recovery, often leads patients to have unrealistic expectations with poor knowledge of the likelihood of CPR outcomes.

Use of short video explaining CPR and code status was found to be effective in improving patient understanding of these issues. It has the potential to save time and improve patient's understanding if incorporated into code status discussions with hospitalized patients.

## **Declarations**

### **Disclosures:**

None of the authors have any disclosures or potential conflict of interest.

### **Ethics approval and consent to participate**

Study was approved by IRB board, Guthrie Robert Packer Hospital. All the study participants were included in the study after their verbal consent for participation.

### **Consent for publication**

All the authors consent for publication

### **Availability of data and material**

All the data and material will be freely available

### **Competing interests**

There is no competing interest involved

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### **Author Contributions:**

(I) Conception and design: James Walsh, Sushmita Khadka, Nirajan Adhikari

(II) Administrative support: James Walsh, Sri Senapathi

(III) Provision of data: Sri Senapathi

(IV) Collection and assembly of data: Nirajan Adhikari, Chandrakala Dadeboyina, Sushmita Khadka, Kriti Suwal, Lity Thomas

(V) Data analysis and interpretation: Sri Senapathi, Sushmita Khadka, Kriti Suwal

(VI) Manuscript writing: All authors

(VII) Final approval of manuscript: All authors

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## **References**

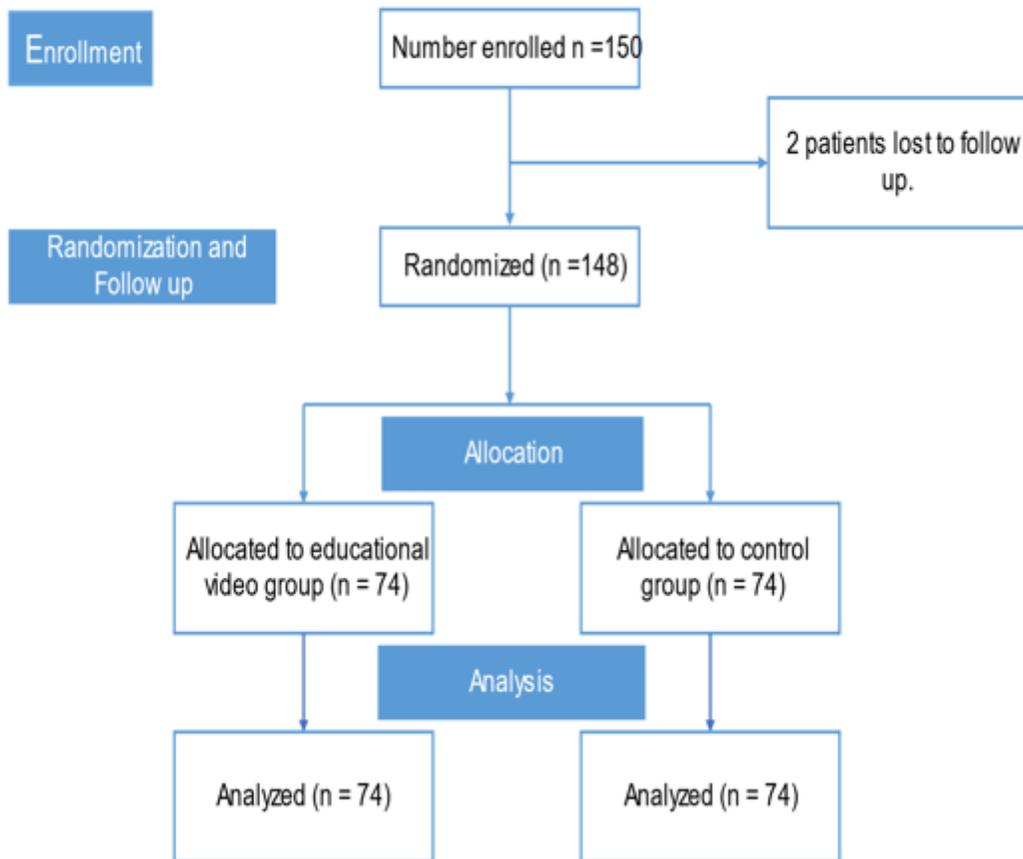
1. code status. (n.d.) McGraw-Hill Concise Dictionary of Modern Medicine. <https://medical-dictionary.thefreedictionary.com/code+status>. Published 2002.
2. White ML, Fletcher JC. The Patient Self-Determination Act. On balance, more help than hindrance. *JAMA*. 1991;266(3):410–412. doi:10.1001/jama.1991.03470030110035
3. Anderson WG, Chase R, Pantilat SZ, Tulsy JA, Auerbach AD. Code status discussions between attending hospitalist physicians and medical patients at hospital admission. *J Gen Intern Med*. 2011;26(4):359–366. doi:10.1007/s11606-010-1568-6

4. Kaldjian LC, Erekson ZD, Haberle TH, et al. Code status discussions and goals of care among hospitalised adults. *J Med Ethics*. 2009;35(6):338–342. doi:10.1136/jme.2008.027854
5. Rosenfeld KE, Wenger NS, Kagawa-Singer M. End-of-life decision making: a qualitative study of elderly individuals. *J Gen Intern Med*. 2000;15(9):620–625. doi:10.1046/j.1525-1497.2000.06289.x
6. Connors Jr AF, Dawson N V, Desbiens NA, et al. A Controlled Trial to Improve Care for Seriously Ill Hospitalized Patients: The Study to Understand Prognoses and Preferences for Outcomes and Risks of Treatments (SUPPORT). *JAMA*. 1995;274(20):1591–1598. doi:10.1001/jama.1995.03530200027032
7. Mittal K, Sharma K, Dangayach N, et al. Use of a standardized code status explanation by residents among hospitalized patients. *J Community Hosp Intern Med Perspect*. 2014;4(2):23745. doi:10.3402/jchimp.v4.23745
8. Stein RA, Sharpe L, Bell ML, Boyle FM, Dunn SM, Clarke SJ. Randomized controlled trial of a structured intervention to facilitate end-of-life decision making in patients with advanced cancer. *J Clin Oncol Off J Am Soc Clin Oncol*. 2013;31(27):3403–3410. doi:10.1200/JCO.2011.40.8872
9. Volandes AE, Paasche-Orlow MK, Mitchell SL, et al. Randomized controlled trial of a video decision support tool for cardiopulmonary resuscitation decision making in advanced cancer. *J Clin Oncol Off J Am Soc Clin Oncol*. 2013;31(3):380–386. doi:10.1200/JCO.2012.43.9570
10. Merino AM, Greiner R, Hartwig K. A randomized controlled trial of a CPR decision support video for patients admitted to the general medicine service. *J Hosp Med*. 2017;12(9):700–704. doi:10.12788/jhm.2791
11. Wilson ME, Akhoundi A, Krupa AK, et al. Development, validation, and results of a survey to measure understanding of cardiopulmonary resuscitation choices among ICU patients and their surrogate decision makers. *BMC Anesthesiol*. 2014;14:1–8. doi:10.1186/1471-2253-14-15
12. Sealed Envelope Ltd. 2020. Simple randomisation service. [Online] Available from: <https://www.sealedenvelope.com/simple-randomiser/v1>.
13. Kouwenhoven WB, Jude JR, Knickerbocker GG. CLOSED-CHEST CARDIAC MASSAGE. *JAMA*. 1960;173(10):1064–1067. doi:10.1001/jama.1960.03020280004002
14. Perkins GD, Cooke MW. Variability in cardiac arrest survival: the NHS Ambulance Service Quality Indicators. *Emerg Med J*. 2012;29(1):3–5. doi:10.1136/emered-2011-200758
15. Perkins GD, Temple RM, George R. Time to intervene: lessons from the NCEPOD report. *Resuscitation*. 2012;83(11):1305–1306. doi:10.1016/j.resuscitation.2012.08.332
16. Muusses LD, van Weert JCM, van Dulmen S, Jansen J. Chemotherapy and information-seeking behaviour: characteristics of patients using mass-media information sources. *Psychooncology*. 2012;21(9):993–1002. doi:https://doi.org/10.1002/pon.1997
17. Portanova J, Irvine K, Yi JY, Enguidanos S. It isn't like this on TV: Revisiting CPR survival rates depicted on popular TV shows. *Resuscitation*. 2015;96:148–150. doi:https://doi.org/10.1016/j.resuscitation.2015.08.002

18. Becker C, Lecheler L, Hochstrasser S, et al. Association of Communication Interventions to Discuss Code Status With Patient Decisions for Do-Not-Resuscitate Orders: A Systematic Review and Meta-analysis. *JAMA Netw open*. 2019;2(6):e195033. doi:10.1001/jamanetworkopen.2019.5033

## Figures

### Flow Diagram



**Figure 1**

Flow diagram depicting flow of patients.

## Supplementary Files

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- [supplementalfile.docx](#)