

In patients requiring in-hospital CPR, overall morbidity is a better predictor of survival to discharge than age.

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Clinical Scenario

“What is the survival rate and functional status of hospitalized elderly patients with multi-infarct dementia, HTN, and new onset atrial fibrillation who undergo in-hospital cardiopulmonary resuscitation?”

Bottom line

For all adult inpatients receiving CPR, the immediate survival rate is about 40% and the survival rate to discharge is only about 13%. For patients who survive to discharge, approximately half return to their pre-CPR baseline functional status or better. A patient's overall morbidity seems to be a more important prognostic factor than age. Specifically; sepsis within last 24 hours, cancer (both metastatic and non metastatic), **dementia**, African-American race, creatinine >1.5, no CAD, dependent status, and location of resuscitation on a non-ICU floor are all associated with failure to survive to discharge. However, several indices have been developed to help predict a patient's survival to discharge after CPR using some pre-CPR characteristics about the patients. If this data is applied to the team's patient, she would have a very low to zero chance of surviving to discharge.

The evidence

Ebell et al (1988) conducted a large meta-analysis whose objective was not only to determine the overall success rate of in-hospital resuscitation, but also to identify any demographic and clinical characteristics that might affect these outcomes. They do a good job of using articles that only meet very strict criteria including having a common definition of cardiopulmonary arrest. The authors note that one limitation of prior studies is their small sample size-only 6 studies had more than 500 patients. Unfortunately this article is a little older than I would like and uses articles from 1980-1996, but the patients seem very similar to ours and the variables that they identified are ones that we would easily find in our own patients. One other conclusion the authors draw is that age>70 is a weak predictor of outcome (it was not statistically significant). Some other possible limitations of this study are that a lot of cardiac patients were probably in a monitored bed, not all the studies reported the same pre-arrest variables and it uses data that is 8-24 years old.

The Bowker and Stewart study applies three indices; the PAM (Pre Arrest Morbidity, 15 variables) the PAR (Prognosis After Resuscitation score, 7 variables) and the MPI (Modified PAM Index, 17 variables) retrospectively to 264 patients that underwent in-hospital CPR. The main outcome measured was survival to discharge after CPR. Specificity was 100% when using cutoffs of 6, 7, and 6. This means that no patients with a PAM >6, or a PAR>7, or a MPI>6 survived (your pt scored 3,7, and 3 respectively). Using this cutoff point had a great specificity, but sacrificed the sensitivity. The authors could change the cutoffs to raise the sensitivity, but at a cost to the specificity. The PAR had the highest sensitivity at 29%. When all 3 scores were combined on the same patient (i.e., the patient had any one of the scores greater than the cutoff) the sensitivity increased

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to 42%. Weaknesses of this study are that it was retrospective, it was done on British patients, which may or may not be similar to ours, and that they had a small sample size.

The George article is a 1989 prospective study on 140 patients that was the first to offer a clinical morbidity score to assess survival. The author brings up an interesting point in presenting this PAM index that uses 15 factors to come up with a score to determine prognosis. The results are that a PAM score of 7 or 8 was associated with a <15% chance of long-term survival (3 months) and no patients with a score of 9 or greater survived to discharge. Their study also found that hypotension, azotemia, and age >65 were associated with failure to survive their hospital stay. Limitations include: small sample size, more men than women, and the leading diagnosis was cardiovascular.

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Table 1
The three morbidity scores

Variable	PAM	PAR	MPI
Cancer	3		2
Metastatic		10	
Non-metastatic		3	
Sepsis (on admission)	1	5	1
Homebound	3	5	2
Pneumonia (on admission)	3	3	2
Creatinine			
Over 220 mmol/l	3		2
Over 130 mmol/l		3	
Age over 70		2	1
Acute MI	1	-2	
First 2 days			0
After day 2			1
Hypotension (<90 mmHg systolic)	3		3
Heart failure	1		1
Angina	1		1
Gallop rhythm	1		1
Oliguria	1		1
Ventilated	1		1
Coma	1		1
Acute stroke	1		2
Cirrhosis	1		
Dementia			2

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