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## Expectations of Survival Following Cardiopulmonary Resuscitation. Predictions and Wishes of Patients With Heart Disease

### *Expectativas de supervivencia tras la reanimación cardiopulmonar. Predicciones y deseos de los cardiópatas*

**To the Editor,**

After an in-hospital cardiorespiratory arrest, fewer than 25% of patients survive until hospital discharge, and substantial neurological sequelae are present in around 30% of survivors.[1] Patients' preferences regarding cardiopulmonary resuscitation (CPR) are tied to their perception of the chances of a successful outcome.[2,3] An excessive optimism in our patients with regard to maneuvers such as CPR in the context of cardiovascular disease may have an impact on their expectations, thereby influencing whether they opt for do not resuscitate orders or advance directives.

Our main objective was to determine the prognosis of cardiology patients after cardiorespiratory arrest and to assess whether this may have an impact on their desire for resuscitation. To this end, we conducted a descriptive study based on a voluntary and anonymous survey (Figure), administered during a private face-to-face interview with a single cardiologist (J. Ruiz-García) in a consecutive series of patients after their visit to the cardiologist in a general hospital.

In total, 130 consecutive cardiology patients were included in the study (Table). No patient refused to participate and only 2 preferred not to answer a question about do not resuscitate orders.

The predicted mean survival at hospital discharge (question 1A) according to the responses of our group of patients was 75.6% ± 23.0% (median 80%, interquartile range 60%-94%). The predicted mean survival free of substantial neurological deterioration (question 1B) was 64.5% ± 26.2% (median 70%, interquartile range 50%-86%).

With these expectations, 116 patients (89%) wished to be resuscitated in their current state, 1 would refuse CPR, and 12 (9%) had never considered this question. In the event of a change in their clinical condition and diagnosis with a chronic disease with a life expectancy less than 12 months, this number was significantly reduced (71 patients, 55%; $P < .01$) while the number of patients who would refuse CPR or who had never considered this question increased to 22 (17%; $P < .01$) and 34 (26%; $P < .01$), respectively.

Twenty-eight patients (22%) reported never having seen or been present at a CPR; of those who had, most (86%) had seen it in a film or television series.

Only 1 patient had deposited an advanced directives document or living will. However, 89 (69%) wanted to be the ones who took the decision about end-of-life care, compared with 28 (22%) and 12 (9%) who wanted the physician or a family member, respectively, to take that decision.

The cardiology patients interviewed have a highly optimistic outlook of the outcomes of CPR in the context of in-hospital cardiorespiratory arrest. It is highly likely that these expectations so far removed from reality have influenced the desire of the majority to be resuscitated in their current clinical conditions, and even in the case of a disease that would significantly shorten their life expectancy.

The professionals who treat cardiology patients should be conscious of this situation and encourage decision-making based on desired, objective, real, and current information. If we do not provide appropriate information, patients may make their decisions based on false expectations and a much more hopeful outlook than is actually the case, thereby detracting from their right to provide an informed consent. Of particular note is that the optimism shown by our cardiology patients, which although common to most patients, exceeds that observed in another analyses. For example, in the study by Jones et al,[4] the overall survival rate was cited as 65%. More recently, the mean survival at discharge after cardiorespiratory arrest in a healthier and younger

**Table**
Demographic Characteristics of Patients Included in the Study

| | Cardiology patients (n = 130) |
|---|---|
| *Age, y* | 64.6 ± 15.1 |
| *Female sex* | 58 (45) |
| *Marital status* | |
| Single | 10 (8) |
| Married | 81 (62) |
| Separated | 6 (5) |
| Divorced | 9 (7) |
| Widow/er | 19 (15) |
| *Religion* | |
| Nonbeliever | 28 (19) |
| Catholic | 94 (72) |
| Other | 8 (6) |
| *Level of education* | |
| No schooling | 15 (12) |
| Primary school | 53 (41) |
| Secondary school | 19 (15) |
| Vocational training | 23 (18) |
| Higher education | 17 (13) |

Data are expressed as n (%) or mean ± standard deviation.

SURVEY on CARDIOPULMONARY RESUSCITATION in CARDIOLOGY

Voluntary survey for patients
(Administered to all who wish to participate)

PATIENT

Sex (Male / Female): ..... Age: ..... years
Marital status: Married / Single / Separated / Divorced / Widow(er)
Living will: Yes/No
Religion: Nonbeliever / Catholic / Other ……..
Level of education: No schooling / Primary / Secondary / Vocational training / Higher education

1. In the event that 100 patients had a cardiorespiratory arrest (your heart stops beating) while in hospital and these patients underwent cardiopulmonary resuscitation:

A) How many do I think would survive and be discharged from hospital?

…… (From 0 to 100)
*From 0 patients (none survive) to 100 patients (all survive)*

B) How many do you think would survive and be discharged from hospital without suffering significant neurological decline (*for example, would remain conscious, able to work, would not need help for basic daily activities*):

…… (From 0 to 100)
*From 0 patients (none survive without significant neurological effects) to 100 patients (all survive without significant neurological effects)*

2. In your current medical and personal situation, in the event of suffering a cardiorespiratory arrest (your heart stops beating), would you wish to be resuscitated?
Select ☑ only one reply:

□ Yes □ No □ I have never thought about it
□ I prefer not to answer that question
□ I am not sure what cardiopulmonary resuscitation consists of

3. Imagine that your medical situation changes and you develop a chronic disease with a life expectancy less than 12 months. In this case, if you have a cardiorespiratory arrest (your heart stops beating), would you wish to be resuscitated?
Select ☑ only one reply:

□ Yes □ No □ I have never thought about it
□ I prefer not to answer that question
□ I am not sure what cardiopulmonary resuscitation consists of

4. Where do you mainly obtain information about health (*eg, What does a particular disease, treatment, or prognosis mean*)?
Select ☑ as many replies as applicable:

□ Doctor □ Friends □ Family members
□ Newspapers or magazines □ Television □ Internet

5. Have you ever been present at or seen cardiopulmonary resuscitation?
Select ☑ as many replies as applicable:

□ No □ Yes, in hospital/clinic □ Yes, in the street
□ Yes, on the news □ Yes, in TV series or films □ Yes, in the Internet

6. Imagine that you need to take a decision about end-of-life care (*for example, initiate sedation, withdraw treatments*), who would you like to make that decision?

□ Myself □ My family members □ My doctor □ My legal representative

**Figure.** Questionnaire used in the cardiology clinic.

population than ours was 54%,[5] still rather distant from reality but closer to the 76% survival predicted by our cardiology patients.

Overestimation of the chances of survival and recovery after CPR is relevant, as it may lead many patients to decide to refuse, for example, a do not resuscitate order in situations in which the chances of survival are low or the risk of neurological complications is high, thereby often hindering fluid dialogue between cardiologist and patient about the end of life. It is known that when patients are actually aware of the chances of successful CPR, many change their wish and give a do not resuscitate order. In fact, when a group of patients was questioned about their wishes after a cardiorespiratory arrest, 41% opted for resuscitation before knowing the probability of survival on discharge after CPR, whereas after being made aware of the prognosis, the percentage of patients who still wished to be resuscitated decreased to 22%.[2]

Our findings show that, for the first time, the predicted survival after in-hospital CPR in Spanish cardiology patients differs significantly from reality. With these expectations, a large majority would wish in their current medical condition to be resuscitated in the event of cardiorespiratory arrest. Many of these would not change their wishes even if they had a disease that clearly limited their life expectancy.

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## Iron Deficiency in Patients With Acute Coronary Syndrome: Prevalence and Predisposing Factors

### *Déficit de hierro en pacientes con síndrome coronario agudo: prevalencia y factores predisponentes*

**To the Editor,**

Iron deficiency (ID), with or without anemia, is a prevalent comorbidity in patients with chronic heart failure that confers a worse outcome.[1,2] There are no data on the prevalence of ID development or its associated factors in acute coronary syndrome (ACS).

Here, we present a descriptive analysis of patients admitted to our center for ACS. This analysis forms part of a prospective registry of patients with ACS that will be used, once patient inclusion and follow-up have been completed, to analyze the prognostic implication of this comorbidity in this clinical setting. The following patients were excluded: those who refused to provide informed consent, those referred to another center during admission, those who died in the first 5 days after the ACS, and those who had major bleeding or received treatment with blood derivatives or iron. Inflammatory parameters (ultrasensitive C-reactive protein and interleukin-6 [IL 6]) and iron metabolism data were determined at 5 and 30 days. In line with the international consensus, ID was defined as ferritin $< 100$ ng/mL or as ferritin $< 800$ ng/mL if transferrin saturation was $< 20\%$. After patient inclusion, data were collected on demographic and clinical variables potentially involved in ID development.

A total of 139 patients (age, 67 ± 14 years; 32% women) were included between November 2012 and June 2014. Of these, 85 (61%) had ID and 39 (28%) had anemia. These rates decreased to 54% and 23% among the 119 patients whose analytical determinations were performed at 30 days. Patients with ID had higher blood glucose, lower hemoglobin (Hb), and higher C-reactive protein and IL-6 concentrations ($P \leq .01$) (Table). No differences were found in the proportion of ACS with ST elevation, distribution of coronary lesions, and treatment received during hospitalization.

Multivariable logistic regression analysis showed that IL-6 ($P = .011$), Hb on admission ($P = .001$), and pretreatment with aspirin ($P = .021$) were independent predictors of ID.

**Table**
Clinical and Treatment Characteristics of Patients With Acute Coronary Syndrome With and Without Iron Deficiency

| | Without ID (n = 54) | With ID (n = 85) | *P* |
|---|---|---|---|
| *Men* | 42 (78) | 53 (62) | .06 |
| *Age, y* | 64 ± 13 | 70 ± 14 | .02 |
| *Cardiovascular risk factors* | | | |
| Diabetes mellitus | 9 (17) | 29 (34) | .03 |
| Hypertension | 28 (52) | 67 (79) | .01 |
| Dyslipidemia | 28 (52) | 45 (57) | .60 |
| Smoking | 23 (42) | 18 (21) | < .01 |
| *Medical history* | | | |
| Previous coronary heart disease | 10 (19) | 23 (27) | .17 |
| Previous heart failure | 1 (2) | 3 (4) | .23 |
| COPD | 5 (9) | 14 (17) | .31 |
| Anemia | 2 (4) | 12 (14) | .04 |
| Renal failure | 5 (9) | 14 (17) | .31 |
| *Chronic treatment* | | | |
| Aspirin | 7 (13) | 31 (37) | < .01 |
| Other antiplatelet agents | 3 (6) | 4 (5) | .56 |
| Anticoagulants | 5 (9) | 6 (7) | .44 |
| Beta-blockers | 8 (15) | 20 (24) | .28 |
| ACEIs | 13 (24) | 30 (35) | .11 |