Surprise evaluation of basic life support competencies in health care personnel in the cardiology area of a tertiary hospital

Evaluación por sorpresa de las competencias en soporte vital básico del personal sanitario del área de cardiología de un hospital de tercer nivel

To the Editor,

The lack of compulsory continuing training in basic life support (BLS) and the absence of its routine monitoring, as well as the serious nature of a cardiopulmonary arrest (CPA) and the clinical magnitude of this problem would suggest that spot-testing of BLS competencies could be very useful to improve clinical care and health care professionals' training.

To determine the current level of BLS competencies of the health care professionals in the cardiology department of a tertiary hospital, we performed, without warning, an assessment of their knowledge and skills in this area.

The study population comprised 140 nursing professionals and 15 resident physicians, all from a cardiology department that is structured into specialized units (1 coronary care unit, 1 step-

Table 1
Sociodemographic data and scores for theoretical knowledge and practical skills

	Nurses (n = 90)			Residents (n = 11)
	Sociodemographic profile	Knowledge	Skills	Sociodemographic profile
Age				
< 40 y	46 (58.2)	7.65 ± 1.8	37.1 ± 25.3	27.7 ± 1
> 40 y	33 (41.8)	5.09 ± 2.7	19.1 ± 24.3	
P		< .001	.002	
Profession				
Nurse	58 (64.4)	7.47 ± 1.8	35.74 ± 25.96	73.3% of residents
Auxiliary nurse	32 (35.6)	5.19 ± 2.94	21.87 ± 25.45	
P		< .001	< .001	
Sex				
Male	12 (13.3)	6.8 ± 2.53	36.92 ± 22.68	4 (36.4)
Female	78 (86.7)	6.54 ± 2.63	29.24 ± 26.6	7 (63.6)
P		.74	.34	
Years worked at the hospital				
< 5	33 (36.7)	7.64 ± 2.36	39.58 ± 23.92	0 to 5
6-10	9 (10)	6.86 ± 2.26	40 ± 30.14	
11-15	16 (17.8)	6.75 ± 2.17	23.56 ± 26.67	
16-20	12 (13.3)	5.3 ± 2.98	28 ± 27.83	
> 20	20 (22.2)	5.41 ± 2.32	17.65 ± 23.28	
P		.014	.031	
Employment contract				
Temporary	37 (41.1)	7.53 ± 2.41	38.11 ± 28.1	Resident
Substitute	33 (36.7)	6.28 ± 2.45	30.52 ± 25.36	
Permanent	20 (22.2)	5.22 ± 2.75	16.22 ± 18.63	
P		.007	.014	
Unit				
Coronary care	55 (61.1)	7.24 ± 2.2	40.44 ± 27.8	All
Ward	35 (38.9)	5.6 ± 2.77	19.7 ± 20.61	
P		.005	< .001	
Last BLS course				
< 6 mo	14 (15.6)	6.86 ± 3	32.71 ± 26.9	2 (18.2)
6 m-1 y	18 (20)	7.29 ± 2.3	35.24 ± 31	3 (27.3)
1-2 y	27 (30)	6.38 ± 2.8	32.9 ± 28.6	5 (45.4)
> 2 y	31 (34.4)	6.29 ± 2.2	23.68 ± 18.7	1 (9.1)
P		.683	.391	
Last CPA attended				
< 6 mo	36 (40)	7.11 ± 2.2	40.89 ± 29	11 (100)
6 m-1 y	24 (26.7)	6.33 ± 3	26.9 ± 24.9	0
1-2 y	8 (8.9)	7 ± 1.7	20 ± 16.6	0
> 2 y	13 (14.4)	5.67 ± 1.9	20.83 ± 17	0
Never	9 (10)	4 ± 5.7	0.5 ± 0.7	0
P		.294	.025	

BLS, basic life support; CPA, cardiopulmonary arrest.
Sociodemographic values are expressed as No. (%) and scores for knowledge and skills, as mean ± standard deviation. Statistical analysis: Student *t* test or ANOVA.

Table 2
Comparison between nurses' and residents' knowledge and skills

	Nurses (n = 90)	Residents (n = 11)	P*
Chest compressions			
Number of compressions in 2 min	142.32 ± 35.15	156.63 ± 53.6	.23
Correct hand position	81.29	90.81	.35
Effective compressions	36.38	63.63	.009
Full re-expansion	73.18	71.72	.89
Mean depth, mm	44.37 ± 9.27	44.81 ± 16.41	.9
Depth 50-60 mm	26.87	30	.72
Compression rate (comp/min)	112.96 ± 29.44	109.81 ± 37.63	.73
Rate 100-120 comp/min	28.5	33.5	.63
Ventilation breaths			
Effective ventilation breaths	32.43	46.09	.23
Mean volume, mL	435.06 ± 486.6	526.27 ± 476.55	.52
Overall score with mannequin	30.28	58	.01
Knowledge score	6.55 ± 2.11	9 ± 1.05	.005

Values are expressed as mean ± standard deviation.
* For the comparison of percentages, chi-square test was used, and for comparison of quantitative variables, the Student *t* test.

down unit, 1 electrophysiology unit, 2 interventional units, and 2 general cardiology units). The study was authorized by the hospital ethics committee. Participants who did not give signed, informed consent were excluded.

The main variables studied were theoretical knowledge of BLS (assessed using a standardized test with questions scored from 0 to 10) and practical skills as reported by a smart mannequin (Resusci Anne QCPR, Laerdal, Norway),[1] to calculate, out of a possible score of 100, the overall quality of the cardiopulmonary resuscitation (CPR) according to the European Resuscitation Council 2015 guidelines.[1]

Data were collected over a 24-hour period to include all shifts and units. Without previous warning, the participants were directed to a room to work through a simulated case, performing 2 minutes of CPR. They undertook not to tell their colleagues about this simulation. Prior to this they completed a questionnaire with their demographic, professional, and employment details.

We obtained a sample of 101 health care professionals (table 1), composed of 90 nurses and 11 residents.

The nurses had a mean age of 39.19 ± 13.17 years and were mostly women (86.7%) with a temporary or substitute contract (77.8%), working in the coronary care or step-down unit (61.1%). In 64.4%, more than 1 year had passed since they last attended a BLS course and 90% had attended at least 1 CPA (66.7% within the last year). Most thought that they had sufficient training in CPR, were familiar with the hospital protocol, and thought that the hospital had the responsibility to train its employees.

The residents had a mean age of 27.7 years and were mostly women with 5-year training contracts. All had attended a CPA in the past 6 months and more than half had attended a BLS course more than 1 year prior.

The mean theoretical knowledge score for nursing staff was 6.57 (out of a maximum of 10 points). Those who had been working for less time at the hospital, who had nonpermanent contracts, and worked in the coronary care unit or step-down unit had higher scores, reaching statistical significance.

The total score for knowledge and skills in the residents group was significantly higher, particularly for chest compressions (table 2).

While the results for BLS theory in both groups were acceptable, the practical skills in the nurses group left room for improvement.

There was a correlation between knowledge scores and CPR skills and employment status: temporary and substitute staff scored higher than permanent staff. One possible reason for this could be a greater interest in continuing professional development courses to improve their curriculum vitae.

Significant differences were found according to the area in which the professional worked. Nurses who worked in the specialized units had better knowledge than those who worked in the general cardiology ward (7.24 ± 2.2 vs 5.6 ± 2.77; $P = .005$) and scored twice as high on practical skills (40.44 ± 27.8 vs 19.7 ± 20.61; $P = .001$). These results bear thinking about, since 50% of CPAs occur on general wards.[2]

There is little evidence on surprise assessment of BLS competencies. An Israeli study of an annual series of surprise simulations reported a progressive improvement in results. After the simulation, the participants received evaluation and feedback.[3,4] Surprise testing without warning may give a more realistic view of health professionals' competencies and can be a very useful tool to plan training.

When organizing training, effective[4] and efficient[5] methods should be used, and it may be helpful to carry out spot-testing, which gives a real perspective of the professionals' level of training and can serve to refresh and maintain their skills.[3]

Our results show that the BLS competencies of the nurses in the cardiology department of this tertiary hospital were modest. The best results were associated with being a resident physician and, among nursing staff, age < 40 years, < 10 years' professional practice, having a temporary contract, and working in a specialized unit.[4]

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AUTHORS' CONTRIBUTIONS

J. Castillo García: concept, methodology, formal analysis, investigation, results, data management, drafting the manuscript, review and editing of the manuscript, supervision, project management. M.I. Barrionuevo Sánchez: concept, methodology, drafting the manuscript, supervision, project management. J.C. Sánchez-Salado: concept, methodology, review and editing of the manuscript, supervision, project management. C-S. Molina Mazón and D. Arbonés Arqué: methodology, writing, review and editing. Albert Ariza-Solé: concept, methodology, drafting the manuscript and review and editing of the manuscript, supervision, project management.

CONFLICTS OF INTEREST

The authors declare no conflicts of interest.

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Spanish Cardiovascular Imaging Registry. Third Official Report from the Cardiovascular Imaging Association of the Spanish Society of Cardiology (2020)

Registro Español de Imagen Cardiaca. III Informe Oficial de la Asociación de Imagen Cardiaca de la Sociedad Española de Cardiología (2020)

To the Editor,

The Cardiovascular Imaging Association of the Spanish Society of Cardiology conducted a survey in 2017[1] and 2020[2] to collect data on cardiovascular imaging activity in Spanish hospitals. To ensure longitudinal continuity and add to the cardiovascular imaging registry, it conducted a third survey in June 2021 to collect data for the previous year. Ninety-four hospitals were contacted and 52 (55%) responded; 92% were public hospitals and all of Spain's autonomous communities except the Canary Islands were represented.

A summary of human and material resources and volume of cardiovascular imaging activity by modality is provided in table 1. In brief, 73% of attending physicians spent more than 50% of their working hours on cardiovascular imaging activities. Sixty-eight percent of the echocardiography systems were less than 10 years old and more than 59% of those in large hospitals (> 500 beds) had advanced analysis capabilities (strain and 3D imaging). In total 48% of echocardiography laboratories kept records of indications, 58% of events, and 60% of internal quality control procedures. Of the physicians who performed echocardiography, 46% were accredited in transthoracic echocardiography, 26% in transesophageal echocardiography, and 7% in transesophageal echocardiography. The studies were performed outside the laboratory in the vast majority of hospitals; 88% of hospitals, for example, performed echocardiograms in outpatient clinics; 55% prepared a semiquantitative/standard report and 52% stored data on a DICOM server. Focused cardiac ultrasounds were performed by other departments in 73% of hospitals. In departments supervised by cardiology, the level of diagnostic agreement was good (84%). In total, 89% of hospitals included a written report on findings in the patients' medical records.

Fifty hospitals (96%) performed cardiac computed tomography (CT) and 8 performed more than 500 studies a year. A cardiologist was involved in 60% of cases (mean time spent, 5.4 h/wk). All the scanning systems used at least 64 detectors and were on average 4 years old; 78% of hospitals recorded radiation doses but only 46% kept a record of results. Twenty-eight percent of cardiologists who participated in cardiac CT scanning had completed the European accreditation process (available since 2019).

Forty-nine hospitals (94%) offered cardiac magnetic resonance imaging (MRI) and 9 performed than 500 studies a year; cardiologists were involved in 65% of acquisitions (mean time spent, 6.1 h/wk). Stress cardiac MRI was available at 17 hospitals (11%), 4 of which performed more than 100 studies a year. Field intensity was 1.5 T in 76% of cases and 3.0 T in 24%; the machines was on average 6 years old. Sixty percent of cardiologists performing cardiac MRI had international accreditation.

Thirty-seven hospitals (71%) performed cardiac nuclear medicine studies, with 5 hospitals performing more than 500 studies a year; a cardiologist was involved in 36% of cases. Overall, 43% of hospitals recorded radiation doses and 27% results. Just 3 of the cardiologists had European accreditation in cardiac nuclear medicine.

Data from the 50 hospitals that participated in the surveys to collect data for 2019 and 2020 are compared in table 2.

In relation to the impact of coronavirus disease 2019 (COVID-19) on activity in 2020, 60% of hospitals had at least 1 cardiovascular imaging staff member infected by severe acute respiratory syndrome coronavirus 2 during the first wave of the pandemic. The respective percentages for the second and third waves were 38% and 37%. During the initial phases of the pandemic, 25% of hospitals experienced a shortage of surgical masks (25%), 63% of filtering face