


# BLS courses for refugees are feasible and induce commitment towards lay rescuer resuscitation

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## Abstract

**Background:** High-quality Basic Life Support (BLS), the first step in the Utstein formula for survival, needs effective education for all kinds of population groups. The feasibility of BLS courses for refugees is not well investigated yet.

**Methods:** We conducted BLS courses including automated external defibrillator (AED) training for refugees in Austria from 2016 to 2019. Pre-course and after course attitudes and knowledge towards cardiopulmonary resuscitation (CPR) were assessed via questionnaires in the individuals' native languages, validated by native speaker interpreters.

**Results:** We included 147 participants (66% male; 22 [17-34] years; 28% <18 years) from 19 countries (74% from the Middle East). While the availability of BLS courses in the participants' home countries was low (37%), we noted increased awareness towards CPR and AED use after our courses. Willingness to perform CPR increased from 25% to 99%. A positive impact on the participants' perception of integration into their new environment was noted after CPR training. Higher level of education, male gender, age <18 years and past traumatizing experiences positively affected willingness or performance of CPR.

**Conclusion:** BLS education for refugees is feasible and increases their willingness to perform CPR in emergency situations, with the potential to improve survival after cardiac arrest. Individuals with either past traumatizing experiences, higher education or those <18 years might be eligible for advanced life support education. Interestingly, these BLS courses bear the potential to foster resilience and integration. Therefore, CPR education for refuge should be generally offered and further evaluated.

## KEYWORDS

basic life support, chain of survival, medical education, migrants, refugees

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## 1 | INTRODUCTION

Out-of-hospital cardiac arrest (OHCA), a major international healthcare problem, still has low survival rates and poor neurological outcome.<sup>1-3</sup> Effective Basic Life Support (BLS) is an integrative step in the 'chain of survival'<sup>4</sup>: early recognition and call for help, early high-quality cardiopulmonary resuscitation (CPR) and early automated external defibrillation (AED) increased survival in the past years.<sup>3,5-8</sup> Layperson BLS saves lives due to reduction of intervention times, bridging until healthcare professionals arrive on scene.<sup>3,9-12</sup> However, not all potential lay rescuers witnessing OHCA are willing or well-enough trained to perform effective BLS.<sup>13</sup> Moreover, such 'first responders' might not be available in less-populated areas, or AEDs may not be immediately at hand.<sup>14</sup> Despite all healthcare-related educative efforts, general population awareness of OHCA, BLS and AED use was found to be surprisingly low.<sup>15</sup> To increase awareness and a local implementation of the 'formula for survival',<sup>16</sup> special educative programmes were delivered to non-medical professionals like police forces, fire brigades, or children.<sup>5,17-20</sup>

Most European countries are faced with increasing numbers of refugees, who are usually not in the scope of life-saving education programmes. Interestingly, persons with recent traumatic experiences can well be prepared for future extreme situations.<sup>21</sup> Medical education in general can pave the way for better understanding of the approach towards health and disease in new cultural environments.<sup>5,22</sup> It promotes faster integration of population groups with different ethnic and socio-economic backgrounds<sup>23-25</sup> and is cost-effective.<sup>26</sup> Our study aimed to evaluate the feasibility of BLS courses for refugees. Specifically, details concerning difficulties during the courses and the potential to improve willingness to perform CPR were evaluated.

## 2 | METHODS

### 2.1 | Study population

In this prospective population-based cross-sectional study, refugees seeking asylum in Austria and receiving BLS education by the study team were enrolled between December 2016 and December 2019. Inclusion criteria were an officially registered Austrian refugee status, living in either governmental refugee camps or in private accommodations and voluntary agreement to take part in the study (not dependent on taking part in the BLS course). Exclusion criteria were age <6 years, refusal of informed consent or insuperable language barriers.

Any study data obtained were recorded entirely anonymous, and no data were shared with local or national authorities at any stage.

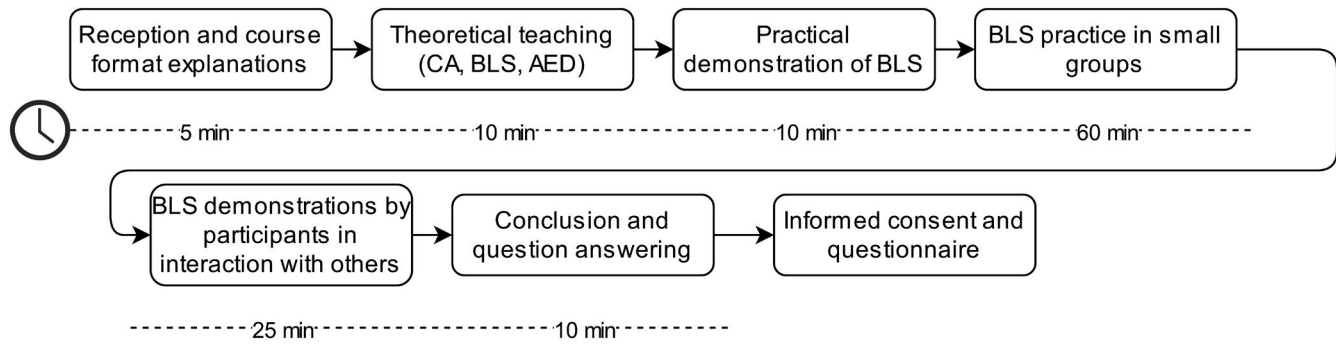
### Highlights

- High-quality Basic Life Support needs effective education for all population groups
- Refugees are a growing part of modern societies
- Basic Life Support courses were successfully conducted in refugees' native languages
- Willingness to perform cardiopulmonary resuscitation increased by 74%
- Courses had a positive impact on participants' perception of social integration

The Ethical Committee of the Medical University of Vienna, Austria, approved the study (N° 2349/2016) and granted documented oral informed consent as valid. The study protocol complies with the Declaration of Helsinki, and data reporting was performed according to the EQUATOR guidelines including STROBE.

### 2.2 | BLS Course details and data acquisition

BLS courses were held for refugees in sufficiently large room equipped with a projector and screen. Medical professionals (physicians, nurses and medical students who had been trained in the course format) taught BLS theory and practice, using standard BLS mannequins (MedX5, Friedberg, Germany). The instructors to participants ratio was always  $\geq 1:5$ . Certified translators assisted the medical staff in communicating in the participants' native languages whenever English was not sufficiently understood (German was not mainly used because the participants did not have sufficient previous knowledge of German). The 2 hours BLS course was composed of a general reception, theoretical explanations, demonstrations, practice and a conclusion (Figure 1). Chest-compression-only CPR was taught. After the course, participants were asked if they would take part in the study. If affirmative, oral informed consent was obtained with the help of the translators. All data were collected prospectively: A structured questionnaire (having undergone psychometric evaluation including objectivity, validity, reliability and expert focus group discussions) in English or their native languages (according to the participant's preference) was answered, with the aim of identifying baseline characteristics and aspects of knowledge and awareness concerning BLS and AEDs. Any unclarities were resolved with the help of the translators. All questions were answered after the course because informed consent was also given afterwards,



**FIGURE 1** Timetable of the utilized BLS course format. AED, Automated external defibrillator; BLS, Basic life support; ca, cardiac arrest

and from an ethical viewpoint, we had to ensure everyone would receive the CPR training. The used questionnaire in English is provided as electronic Supplement S1. A specialized questionnaire version for participants of minor age was used, which had been adapted for understandability, but still produced the same data. Finally, anonymized data were extracted with the help of native speakers of the respectively used language and transferred into a password-protected database.

### 2.3 | Statistical analysis

Continuous data are presented as medians and interquartile ranges (IQR). Mann-Whitney *U* test compared continuous data between subgroups. Categorical data are presented as counts and percentages and compared using chi-square test where appropriate. Logistic regression was applied to elucidate the impact of baseline characteristic parameters on various questionnaire variables. Continuous variables were log-transformed prior to regression analysis when applicable to ensure conformity of normal distribution. Data were reported as crude and adjusted odds ratio (OR) for uni- and multivariate regression analyses and as their respective 95% confidence intervals (CI). The multivariate model was adjusted for potential confounders as follows: age, gender, time staying in the current country, primarily used language, higher education, past traumatic experience and known chronic illness in the social environment. Statistical significance was defined by two-tailed *P*-values of  $<0.05$ . Data analysis was performed using SPSS 22.0 (IBM, USA).

## 3 | RESULTS

Out of 147 included participants, 66% were male aged 22 (17-34) years. About two-thirds were adults ( $<18$  years: 41 [28%];  $>18$  years: 106 [72%]). All participants joining the BLS course also agreed to take part in the study. Translation and interpretation were not reported to interfere with the flow of teaching. Course instructors reported that often, basic

anatomy or physiology facts had to be explained in detail (eg the heart being responsible for blood flow).

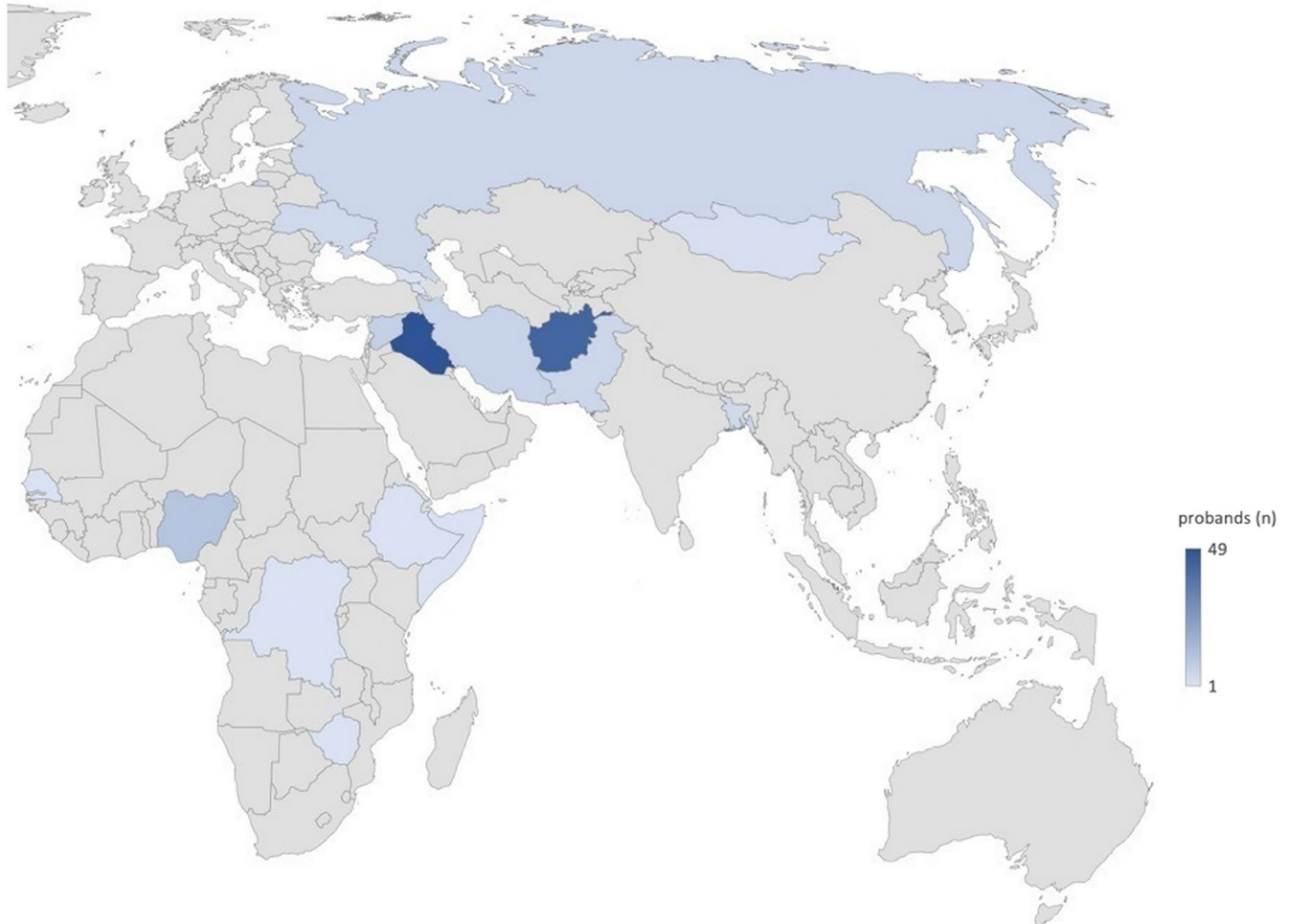
With the help of interpreters, the participants were taught CPR and the study questions were assessed in Arabic ( $n = 59$ ; 40%), Farsi ( $n = 46$ , 31%), English ( $n = 14$ ; 10%), Russian ( $n = 9$ ; 6%), Urdu ( $n = 5$ ; 3%), Bengali ( $n = 3$ ; 2%), Chinese ( $n = 3$ ; 2%), French ( $n = 2$ ; 1%), Kurdish ( $n = 2$ ; 1%), Mongolian ( $n = 2$ ; 1%), Armenian ( $n = 1$ ; 1%) and Somali ( $n = 1$ ; 1%). The participants' countries of origin were grouped (Figure 2): Middle East ( $n = 108$ ; 74%), Africa ( $n = 17$ ; 12%), Asia ( $n = 13$ ; 9%) and Eastern Europe ( $n = 9$ ; 6%).

### 3.1 | Opinions and knowledge on basic life support

Between before and after the BLS course, the willingness to perform CPR increased from 25% to 99% ( $P < .001$ ). Participants' questionnaire answers are displayed in Table 1. The distributions concerning age and gender appeared to be mostly balanced. Interestingly, more participants  $<18$  years stated that they would have helped in a CPR situation before having had the course training. In contrast, adults were more likely to have known how to help in a CPR situation in the past. Also, more adults stated they would have already known at least parts of the course's contents beforehand, and adults were more satisfied with the training in terms of points from 1 to 10 (10 being the best score).

### 3.2 | Past experiences, education and time of stay in the current country

Differences between subgroups of individuals with past traumatizing experiences, with higher education and concerning the duration of stay in Austria are displayed in Table 2. Participants with past traumatizing situations showed more willingness to perform CPR before the course (41% vs. 12%,  $P < .001$ ; crude OR 3.20 [1.99-4.27],  $P = .021$ ; adjusted OR 2.90 [2.00-3.89],  $P = .028$ ). They also stated to have already



	Middle East (n=108)	Africa (n=17)	Asia (n=13)	Eastern Europe (n=9)
<18 years, n (%)	37 (34)	2 (12)	1 (8)	1 (11)
age, years [IQR]	20 [17-32]	25 [22-30]	35 [31-39]	30 [18-45]

**FIGURE 2** Participants' distribution in terms of regions of origin with the respective numbers and age details. IQR, Interquartile range

been in a CPR situation (no further details available) in their home countries (67% vs. 26%,  $P < .001$ ; crude OR 4.17 [1.81-9.61],  $P = .001$ ; adjusted OR 7.21 [3.20-16.28],  $P < .001$ ), and during their recent flight or travel to Austria (64% vs. 31%,  $P < .001$ ; crude OR 1.90 [0.83-4.36],  $P = .130$ ; adjusted OR 4.53 [2.09-9.82],  $P < .001$ ). More participants with higher education reported that BLS courses in their home countries are easily accessible (42% vs. 6%,  $P < .001$ ; crude OR 3.90 [2.13-6.74],  $P = .011$ ; adjusted OR 4.07 [2.48-5.83],  $P = .009$ ). Also, they performed better in various measures of CPR knowledge after the course (chain of survival: 94% vs. 82%,  $P = .046$ ; crude OR 1.88 [0.40-8.820],  $P = .421$ ; adjusted OR 8.25 [1.76-38.59],  $P = .007$ /check for breathing, efficient chest compressions, starting and termination rules: 95% vs. 85%,  $P = .044$ ; crude OR 1.78 [0.32-10.06],  $P = .512$ ; adjusted OR 5.45 [1.17-25.51],  $P = .031$ ). Of

note, participants thinking that the BLS course contributes to more understanding between refugees and locals had stayed longer in Austria (4.0 [± 4.9] months vs. 0.5 [± 0.0] months,  $P = .040$ ; crude OR 5.94 [1.29-9.66],  $P = .032$ ; adjusted OR 4.59 [1.09-13.83],  $P = .041$ ).

## 4 | DISCUSSION

This study presents data about excellent feasibility of BLS courses for refugees. After the course, awareness towards BLS and AED use, as well as willingness to perform CPR if necessary, increased substantially. Participants suggested a positive impact on their integration into their new environment as an effect of the BLS course. The postulated desired general educational outcomes of BLS courses<sup>16</sup> were

**TABLE 1** Participants' background, knowledge and opinions on CPR courses and CPR situations in their home countries and in the current country

Table 1	Total	Male	Female	P-value	<18 y	>18 y	P-value
	N = 147	N = 97	N = 50		N = 41	N = 106	
Before course							
Would perform CPR or other measures if necessary, n (%)	37 (25.2)	28 (28.9)	9 (18.0)	.049	13 (31.7)	24 (22.6)	.021
Has taken part in a BLS course in the current country, n (%)	41 (27.9)	31 (32.0)	10 (20.0)	.126	13 (31.7)	28 (26.4)	.521
Has taken part in a BLS course in their home country, n (%)	45 (30.6)	32 (33.0)	13 (26.0)	.084	12 (29.3)	33 (31.1)	.099
Has ever taken part in a course on another medical topic, n (%)	6 (4.1)	5 (5.2)	1 (2.0)	.360	1 (2.4)	5 (4.7)	.531
Has had any school education, n (%)	117 (79.6)	77 (79.4)	40 (80.0)	.438	33 (80.5)	84 (79.2)	.867
Considers themselves a medical professional, n (%)	1 (0.7)	0 (0.0)	1 (2.0)	.162	0 (0.0)	1 (0.9)	.533
Known chronic illnesses in their family or friends that could make CPR necessary, n (%)	40 (27.2)	19 (19.6)	21 (42.0)	.004	9 (22.0)	31 (29.3)	.373
Has been in a CPR situation in their home country, n (%)	65 (44.2)	45 (46.4)	20 (40.0)	.460	18 (43.9)	47 (44.3)	.962
If yes, states they knew what to do, n (%)	12 (8.2)	10 (10.3)	2 (4.0)	.186	0 (0.0)	12 (11.3)	.025
Has been in a CPR situation in the current country, n (%)	12 (8.2)	7 (7.2)	5 (10.0)	.559	6 (14.6)	6 (5.7)	.075
If yes, states they knew what to do, n (%)	2 (1.4)	1 (1.0)	1 (2.0)	.631	0 (0.0)	2 (1.9)	.376
Has been in a CPR situation during their journey to the current country, n (%)	67 (45.6)	43 (44.3)	24 (48.0)	.672	17 (41.5)	50 (47.2)	.533
If yes, states they knew what to do, n (%)	3 (2.0)	2 (2.1)	1 (2.0)	.735	0 (0.0)	3 (2.8)	.048
States there are BLS courses in their home country, n (%)	54 (36.7)	38 (39.2)	16 (32.0)	.393	11 (26.8)	43 (40.6)	.121
If yes, states that they are easily accessible, n (%)	31 (21.1)	20 (20.6)	11 (22.0)	.462	6 (14.6)	15 (14.1)	.473
If yes, states that they are held in schools, n (%)	42 (28.6)	28 (28.9)	14 (28.0)	.912	8 (19.5)	34 (32.1)	.131
If yes, states that they are held when acquiring a driving license, n (%)	45 (30.6)	31 (32.0)	14 (28.0)	.622	12 (29.3)	33 (31.1)	.826
States they came to the current country alone, n (%)	74 (50.3)	55 (56.7)	19 (38.0)	.028	21 (51.2)	53 (50.0)	.894
States they underwent a traumatizing episode during their journey to the current country, n (%)	66 (44.9)	41 (42.3)	25 (50.0)	.372	17 (41.5)	49 (46.2)	.603
After course							
Feels better prepared for a medical emergency, n (%)	145 (98.6)	96 (99.0)	49 (98.0)	.631	41 (100)	104 (98.1)	.376
Would perform CPR or other measures if necessary, n (%)	145 (98.6)	96 (99.0)	49 (98.0)	.631	41 (100)	104 (98.1)	.376
Knows the correct order and process of the chain of survival, n (%)	128 (87.1)	86 (88.7)	42 (84.0)	.425	36 (87.8)	92 (86.8)	.870
Knows the emergency call number of the current country, n (%)	139 (94.6)	94 (96.9)	45 (90.0)	.080	38 (92.7)	101 (95.3)	.533
Knows when to check for breathing, n (%)	131 (89.1)	88 (90.7)	43 (86.0)	.384	35 (85.4)	96 (90.6)	.364
Knows correct details of efficient chest compressions, n (%)	131 (89.1)	88 (90.7)	43 (86.0)	.384	35 (85.4)	96 (90.6)	.364
Knows starting and termination rules of BLS, n (%)	131 (89.1)	87 (89.7)	44 (88.0)	.490	34 (82.9)	97 (91.5)	.399
Knows about the use of an AED, n (%)	116 (78.9)	80 (82.5)	36 (72.0)	.140	35 (85.4)	81 (76.4)	.233

(Continues)



TABLE 1 (Continued)

Table 1	Total	Male	Female	P-value	<18 y	>18 y	P-value
	N = 147	N = 97	N = 50		N = 41	N = 106	
Would teach BLS to others, n (%)	144 (98.0)	95 (97.9)	49 (98.0)	.980	41 (100)	103 (97.2)	.276
States that they would have already known what they learned in the course, n (%)	13 (8.8)	11 (11.3)	2 (4.0)	.138	0 (0.0)	13 (12.3)	.019
Thinks that BLS training should be taught at school, n (%)	137 (93.2)	93 (95.9)	44 (88.0)	.072	39 (95.1)	98 (92.5)	.564
Thinks the course was lasting too long, n (%)	5 (3.4)	3 (3.1)	2 (4.0)	.774	1 (2.4)	4 (3.8)	.689
Thinks the course was lasting too short, n (%)	29 (19.7)	19 (19.6)	10 (20.0)	.953	7 (17.1)	22 (20.8)	.615
Thinks the course met their expectations, n (%)	137 (93.2)	92 (94.8)	45 (90.0)	.269	39 (95.1)	98 (92.5)	.564
Thinks the course contributes to more understanding between refugees and locals, n (%)	146 (99.3)	97 (100.0)	49 (98.0)	.162	41 (100)	105 (99.1)	.533
Thinks they could practice English or German language skills during the course, n (%)	136 (92.5)	90 (92.8)	46 (92.0)	.864	39 (95.1)	97 (91.5)	.455
Would like to attend an advanced course, n (%)	137 (93.2)	92 (94.8)	45 (90.0)	.269	39 (95.1)	98 (92.5)	.564
Overall course evaluation, points from 1-10 (SD)	9.7 (± 0.8)	9.7 (± 0.9)	9.7 (± 0.7)	.784	9.4 (± 1.2)	9.8 (± 0.6)	.019
Estimate of importance of BLS courses, points from 1-10 (SD)	9.8 (± 0.7)	9.8 (± 0.7)	9.7 (± 0.7)	.599	9.8 (± 0.6)	9.8 (± 0.7)	.613

Note: Continuous data are presented with their means and standard deviation (SD) and were compared by Mann-Whitney *U* test. Discrete data are presented as counts and percentages and were compared using chi-square test.

Abbreviations: AED, Automated external defibrillator/defibrillation; BLS, Basic life support; CPR, Cardiopulmonary resuscitation.

achieved. The study showed that refugees feel positively about being educated in BLS and that they can learn the required competencies.

#### 4.1 | A highly heterogeneous population

The multicultural and multilingual course participants, including a broad range of age groups, represent the typical challenge in such projects and were to be expected when engaging education of refugees. While this heterogeneity can hardly be avoided, it also poses a strength of our investigation as we could demonstrate the feasibility of conducting BLS courses among this broad variety of participants.

An important learning point for the researchers was that the assumption of English serving as a universal language was insufficient, as 12 languages alone were needed to achieve the goals of our rather small study. In future BLS courses, special emphasis should therefore be put on handling multilingualism: Interpreters for various languages must accompany the teaching, which is definitely a potential cost factor for such projects; video-based interpreters could contribute here. Grouping participants in language cohorts can be suggested, but this would interfere with the aspect of integrating all individuals into the new, multiethnic society where collaboration and mutual communication are seen as key factors of integration.<sup>24</sup>

Participants with any kind of higher education reported more often that BLS courses in their home countries are easily accessible, which might be a by-product of their already-received education. Without much surprise, they outperformed other participants. This subgroup might be asked to act as BLS facilitators in future courses, with additional training provided.

Interestingly, men were more willing to perform CPR before having attended the course than females, but the difference vanished after the course. This might be due to the well-known higher self-confidence of men towards BLS,<sup>27</sup> or the also-known gender gap in healthcare education of low-resource environments.<sup>28</sup>

#### 4.2 | Past experiences and new resilience

Traumatizing situations during the refugees' flight or journey seem to increase willingness to perform CPR or first aid, and participants reported a higher likelihood of having been in a CPR situation before. This result is of interest as course organizers were concerned about confronting traumatized individuals with topics like life-threatening disease or death. However, it seems that experiencing helping others in the past could positively influence people's willingness to also help in the future.<sup>21</sup> Of note, such interventions need sensitive approaches to people's cultural and individual backgrounds.<sup>29</sup>

**TABLE 2** Participants' data of the subgroups of past traumatizing experience, higher education and duration of stay in the current country

Table 2	Traumatizing experience <sup>a</sup> n (%)		Higher education <sup>b</sup> n (%)		Time in current country months (±SD) <sup>c</sup>		P-value
	Yes (N = 66)	No (N = 81)	Yes (N = 62)	No (N = 85)	Yes (answer to statement in column 1)	No (answer to statement in column 1)	
Before course							
Would perform CPR or other measures if necessary	27 (40.9)	10 (12.4)	18 (29.0)	19 (22.4)	3.7 (±2.5)	3.3 (±3.8)	.723
Has taken part in a BLS course in the current country	20 (30.3)	21 (25.9)	19 (30.7)	22 (25.9)	5.1 (±5.4)	3.6 (±4.6)	.088
Has taken part in a BLS course in their home country	23 (34.9)	22 (27.2)	28 (45.2)	17 (20.0)	3.8 (±2.9)	4.1 (±3.5)	.691
Has ever taken part in a course on another medical topic	2 (3.0)	4 (4.9)	4 (6.5)	2 (2.4)	3.8 (±4.7)	4.0 (±4.9)	.915
Has had any school education	51 (77.3)	66 (81.5)	62 (100)	55 (64.7)	3.5 (±4.3)	5.9 (±6.3)	.060
Considers themselves a medical professional	1 (1.5)	0 (0.0)	1 (1.6)	0 (0.0)	7.0 (±0.0)	4.0 (±4.9)	.538
Known chronic illnesses in their family or friends that could make CPR necessary	24 (36.4)	16 (19.8)	20 (32.3)	20 (24.3)	2.8 (±3.3)	4.5 (±5.3)	.066
Has been in a CPR situation in their home country	44 (66.7)	21 (25.9)	41 (66.1)	24 (28.2)	3.3 (±4.7)	4.4 (±4.9)	.172
If yes, states they knew what to do	8 (12.1)	4 (4.9)	5 (8.1)	7 (8.2)	3.8 (±5.4)	4.0 (±4.8)	.893
Has been in a CPR situation in the current country	8 (12.1)	4 (4.9)	3 (4.8)	9 (10.6)	5.5 (±5.2)	3.8 (±4.8)	.191
If yes, states they knew what to do	1 (1.5)	1 (1.2)	1 (1.6)	1 (1.2)	12.5 (±7.8)	3.9 (±3.8)	.012
Has been in a CPR situation during their journey to the current country	42 (63.6)	25 (30.9)	26 (41.9)	41 (48.2)	3.5 (±4.7)	4.4 (±5.0)	.299
If yes, states they knew what to do	2 (3.0)	1 (1.2)	2 (3.2)	1 (1.2)	3.7 (±3.1)	3.9 (±2.5)	.381
States there are BLS courses in their home country	25 (37.9)	29 (35.8)	22 (35.5)	32 (37.7)	5.7 (±5.8)	3.6 (±4.2)	.204
If yes, states that they are easily accessible	16 (24.2)	15 (18.5)	26 (41.9)	5 (5.9)	3.9 (±3.1)	4.0 (±3.7)	.730
If yes, states that they are held in schools	18 (27.3)	24 (19.6)	21 (33.9)	21 (24.7)	3.8 (±5.1)	4.1 (±4.8)	.728
If yes, states that they are held when acquiring a driving license	17 (25.8)	28 (34.6)	20 (32.3)	25 (29.4)	4.5 (±6.1)	3.8 (±4.3)	.416
States they came to the current country alone	43 (65.2)	40 (49.4)	22 (35.5)	52 (61.2)	4.2 (±5.4)	3.9 (±4.3)	.714

(Continues)

TABLE 2 (Continued)

Table 2	Traumatizing experience <sup>a</sup>		Higher education <sup>b</sup>		Time in current country months (±SD) <sup>c</sup>		P-value
	Yes (N = 66)	No (N = 81)	Yes (N = 62)	No (N = 85)	Yes (answer to statement in column 1)	No (answer to statement in column 1)	
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	
States they underwent a traumatizing episode during their journey to the current country	n.a.	n.a.	26 (41.9)	40 (47.1)	5.1 (±5.8)	3.1 (±3.8)	.061
After course							
Feels better prepared for a medical emergency	65 (98.5)	80 (98.8)	61 (98.4)	84 (98.8)	4.0 (±4.9)	5.5 (2.1)	.663
Would perform CPR or other measures if necessary	65 (98.5)	80 (98.8)	61 (98.4)	84 (98.8)	4.0 (±4.9)	3.0 (±2.8)	.771
Knows the correct order and process of the chain of survival	59 (89.3)	69 (85.2)	58 (94.0)	70 (82.4)	4.2 (±5.1)	2.5 (±2.8)	.160
Knows the emergency call number of the current country	65 (98.5)	74 (91.4)	60 (96.8)	79 (92.9)	4.1 (±5.0)	3.2 (±2.6)	.639
Knows when to check for breathing	60 (90.9)	71 (87.7)	59 (95.2)	72 (84.7)	4.2 (±5.1)	2.1 (±1.1)	.099
Knows correct details of efficient chest compressions	60 (90.9)	71 (87.7)	59 (95.2)	72 (84.7)	4.2 (±5.1)	2.1 (±1.1)	.099
Knows starting and termination rules of BLS	60 (90.9)	71 (87.7)	59 (95.2)	72 (84.7)	4.2 (±5.1)	2.1 (±1.1)	.099
Knows about the use of an AED	56 (84.9)	60 (74.1)	50 (80.7)	66 (77.7)	4.0 (±4.8)	4.0 (±5.1)	.978
Would teach BLS to others	65 (98.5)	79 (97.5)	61 (98.4)	83 (97.7)	4.0 (±5.0)	3.3 (±2.1)	.811
States that they would have already known what they learned in the course	4 (6.1)	9 (11.1)	7 (11.3)	6 (7.1)	3.9 (±4.9)	4.0 (±4.9)	.940
Thinks that BLS training should be taught at school	62 (93.9)	75 (92.6)	57 (91.9)	80 (94.1)	4.1 (±5.0)	2.3 (±2.3)	.240
Thinks the course was lasting too long	3 (4.6)	2 (2.5)	2 (3.2)	3 (3.5)	1.1 (±0.8)	4.1 (±5.0)	.182
Thinks the course was lasting too short	12 (18.2)	17 (21.0)	10 (16.1)	19 (22.4)	4.1 (±4.4)	4.0 (±5.0)	.892
Thinks the course met their expectations	63 (95.5)	74 (91.4)	59 (95.2)	78 (91.8)	4.1 (±5.0)	3.3 (±3.4)	.638
Thinks the course contributes to more understanding between refugees and locals	65 (98.5)	81 (100)	61 (98.4)	85 (100)	4.0 (±4.9)	0.5 (±0.0)	.040
Thinks they could practice English or German language skills during the course	62 (93.9)	74 (91.4)	60 (96.8)	76 (89.4)	4.1 (±5.0)	2.6 (±3.4)	.246
Would like to attend an advanced course	64 (97.0)	73 (90.1)	58 (93.6)	79 (92.9)	4.1 (±5.0)	2.7 (±3.2)	.392

(Continues)



TABLE 2 (Continued)

Table 2	Traumatizing experience <sup>a</sup> n (%)		Higher education <sup>b</sup> n (%)		Time in current country months (±SD) <sup>c</sup>		
	Yes (N = 66)	No (N = 81)	Yes (N = 62)	No (N = 85)	Yes (answer to statement in column 1)	No (answer to statement in column 1)	P-value
Overall course evaluation, points from 1-10 (SD)	9.6 (±0.8)	9.8 (±0.8)	9.8 (±0.8)	9.7 (±0.9)	n.a.	n.a.	n.a.
Estimate of importance of BLS courses, points from 1-10 (SD)	9.7 (±0.7)	9.9 (±0.7)	9.7 (±0.9)	9.8 (±0.6)	n.a.	n.a.	n.a.

Note: Continuous data are presented with their means and standard deviation (SD) and were compared by Mann-Whitney *U* test. Discrete data are presented as counts and percentages and were compared using chi-square test.

Abbreviations: AED, Automated external defibrillator/defibrillation; BLS, Basic life support; CPR, Cardiopulmonary resuscitation.

<sup>a</sup>As subjectively stated by the participant.

<sup>b</sup>defined as any training beyond compulsory education.

<sup>c</sup>duration of the current stay in the current country.

Pre- and post-migration factors like perceived discrimination or social and language support have in the past been stressed to influence refugees' mental health. Various sources of resilience have been identified, for example social support, acculturation, education, hope or religion.<sup>30,31</sup> Health-related education with the possibility of positive interaction with locals as a life-saver can cover at least the first four aspects.

### 4.3 | Adaptation and integration

Participants with previous BLS knowledge reported having stayed in Austria longer than those who did not know how to help. They also mentioned that BLS courses contribute to more understanding between refugees and locals. We do not know if this is an effect of successful adaptation to the new environment or based on the underlying cultural approach to others. Usually, refugees are faced with extraordinary difficulties navigating through organizational necessities when arriving in a new country.<sup>24</sup> Concerning BLS teaching, sufficient time needs to be given to refugees before offering healthcare-related courses; this may open up greater readiness to learn and engage. Once a connection of trust and a learning environment is established, basic healthcare-related topics like hygiene (Eisenhauer), but also more advanced contents such as first aid,<sup>32,33</sup> will positively influence refugees' health literacy, which has been reported to be low in the past.<sup>34-36</sup>

Our findings show that about 37% of participants have BLS courses in their home countries, and only 31% had actually participated in one, which matches past reports of scarce BLS courses in low-resource environments.<sup>36,37</sup> In addition, resuscitation outcomes in these countries are potentially less favourable than in high-resource settings.<sup>38</sup> Educating refugees in CPR could therefore have an indirect multiplication effect in case refugees are returning to their home countries, impressively demonstrated by the increase of willingness to perform CPR from 25% before to 99% after the BLS courses. In addition, the high overall willingness to perform CPR might have been positively influenced by the fact of receiving chest-compression-only CPR training, a known effect<sup>13</sup> that can be leveraged in future courses.

### 4.4 | Limitations

The findings of our observational study are pilot results but create awareness for teaching BLS to refugees. This serves as a stepping stone for future research, which might focus more on the cultural background lead to possible adaptations to already-established BLS curricula. Our study definitely lacks CPR quality data, which might show educational successes

even better. With a 100% consent rate to participate in the study part of the course, reported feelings and attitudes could have been biased in a positive direction. The 'pre-course' part of the questionnaire was completed after the course in order to avoid ethical difficulties and ensure everyone joined the CPR training. However, this might have influenced results. Moreover, a certain selection bias might have occurred when certain refugee centres agreed to CPR courses and others did not, and we were not able to report more detailed epidemiologic data on the refugee situation due to legal reasons.

## 5 | CONCLUSION

Basic life support training for refugees is feasible, increases willingness to perform cardiopulmonary resuscitation in emergency situations and may improve resilience and integration. Individuals with past traumatizing experiences, younger and higher-educated refugees especially improved in basic life support competencies and could be eligible for advanced training. We therefore suggest further conduction of basic life support courses for refugees, with additional scientific supervision. Our first results need further evaluation of improvement in CPR quality measures before broader implementation.

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### CONFLICTS OF INTEREST

Robert Greif is ERC director of training and education, and ILCOR EIT Task Force Chair. Sebastian Schnaubelt is ILCOR EIT Task Force Member. None of the other authors declare to have any conflicts of interest. No funding was obtained.

### AUTHOR CONTRIBUTIONS

SS, BS, AP, EY and PS contributed to data acquisition and study design. All authors contributed to manuscript drafting. SS, BS and JO crafted the manuscript and executed data analyses, CS, FE, MK, RaG, AN, RoG and HD additionally revised the manuscript. SS, HD and PS supervised the study process and amended the manuscript. All authors critically revised and approved the final version of the manuscript.


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### PATIENT AND PUBLIC INVOLVEMENT

Patients or the public have not participated in the design of this study due to its pilot character and local law preventing to do so.

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## SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section.

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