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Awareness and knowledge of cardiopulmonary resuscitation (CPR) among the general public in West-Bank in Palestine

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Abstract

Background Sudden cardiac death (SCD) is a leading cause of cardiovascular-related deaths, often occurring outside hospitals in undiagnosed individuals. Our study aims to assess the baseline awareness and skills in performing CPR among the population in Palestine.

Methods A cross-sectional study was conducted using an online questionnaire to assess CPR knowledge among residents of the West Bank, Palestine. Convenience sampling targeted 300 participants via social media. Data were analyzed using descriptive statistics and chi-square tests to examine associations.

Results The study surveyed 555 participants, revealing that 58.2% lacked CPR training. Awareness of cardiac arrest signs varied, with chest pain being the most recognized 19%. CPR training significantly improved participants' recognition and response to cardiac emergencies.

Conclusion Addressing the fear of legal consequences is crucial to encourage bystander assistance. We recommend increasing first aid awareness through scientific conferences, free training courses, media campaigns, and incentivized competitions.

Keywords Sudden cardiac death, Cardiopulmonary resuscitation, Basic life support, Palestine, Automated external defibrillator

Background

Sudden cardiac death (SCD) is an unexpected sudden death due to a heart condition that occurs within one hour of symptoms onset. SCD is a significant contributor to mortality globally and the main cause of death in Western countries, accounting for the vast majority of cardiovascular-related deaths [1, 2]. SCD is estimated to account for 10–20% of all deaths in Europe, and 300,000 patients receive medical care in emergency departments each year for out-of-hospital cardiac arrest (OHCA) [3]. Unfortunately, the majority of incidents occur in the general community, outside of hospitals, in homes, and in

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persons who were not previously diagnosed with heart disease [4]. OHCA global incident range anywhere from 30 to 91.7 per 100,000 population per year, and leading to millions of deaths worldwide [5]. Its incidence and outcome vary across regions and gender, where it is found to be more in male [6]. The main cause of OHCA is cardiovascular disease, which is more in male than females and this explains the difference of incidence between sex [5]. OHCA can present with different cardiac rhythm; Initial shockable rhythm (IS), Initial non-shockable rhythm (INS) and converted shockable (CS), and this influenced by the etiology of OHCA and the time to start Cardiopulmonary Resuscitation CPR [7].

Confirming cardiopulmonary arrest requires carefully examining the patient's level of consciousness, skin color, breathing, and arterial pulse, and once confirmed, the immediate responsibility of the rescuer is to call emergency services and start Cardiopulmonary Resuscitation (CPR) [8]. CPR is an emergency critical technique aims to maintain perfusion and breathing until the identify the etiology and resolved [2]. Delaying CPR after a cardiac arrest generally leads to a poor outcome. Every minute without CPR, survival following witnessed ventricular fibrillation (VF) cardiac arrest reduces by 7–10% [9].

SCD occurs when the heart unexpectedly stops pumping blood, causing a loss of consciousness, gasping respirations, and the absence of circulation, which, without prompt treatment, can lead to sudden death. While some individuals may experience early warning signs such as chest pain, dyspnea, syncope, or seizures, these often go unnoticed. Research shows that 26–33% of young victims exhibit symptoms, sometimes up to 40 days before the event, with chest pain, dyspnea, and unexplained seizures being the most prevalent. Early recognition and seeking medical attention significantly improve survival rates (32%) compared to those who do not seek help (6%) [4]. During cardiac arrest, clinicians must quickly assess the patient's consciousness, skin color, breathing, and pulse to confirm the arrest, as reliance solely on the carotid pulse can lead to diagnostic errors [10]. Furthermore, there are notable differences in care and survival rates between different settings, with lower socioeconomic status being linked to lower survival rates. Additionally, geographic disparities between urban, suburban, and rural areas can also impact outcomes [11, 12].

In our study, we will demonstrate the lack of knowledge and skills in performing CPR among the population in Palestine, and the study aims to assess the baseline awareness about CPR in the community. The majority of cardiopulmonary arrests occur in patients with known coronary artery disease, which can be prevented by managing modifiable risk factors and through patient education by healthcare professionals on maintaining a healthy lifestyle. Additionally, in order to reduce mortality rates of SCD, either in hospital or OHCA, all populations either from the health sector or not should have access to the recurrent emergency protocol according to their scientific level.

Methods

A. Study design

This research is a descriptive cross-sectional study conducted to assess the awareness, knowledge, and attitudes regarding Cardiopulmonary Resuscitation (CPR) among the general population of the West Bank, Palestine. The cross-sectional design allows for the assessment of these variables at a single point in time across a representative sample of the population.

B. Study setting

The study conducted online through social media platforms widely used in the West Bank, such as Facebook, WhatsApp and etc. These platforms was used to disseminate the survey questionnaire, allowing for broad access to participants across different regions of the West Bank. The questionnaire used in this study was adapted from the work by Jarrah et al. (2018) titled *"Evaluation of public awareness, knowledge, and attitudes towards basic life support: A cross-sectional study,"* [13]. This instrument was selected for its relevance and prior validation in assessing awareness, knowledge, and attitudes toward basic life support (BLS) and cardiopulmonary resuscitation (CPR). Minor modifications were made to tailor the questionnaire to the objectives and context of the current research.

C. Study population

The target population for this study includes all residents of the West Bank aged 18 years and older who have access to social media and are willing to participate in the survey. Both male and female participants will be included to ensure a representative sample. Anyone under 18 years of age or any incomplete questionnaire will be excluded.

D. Sampling and sample size

A sample size calculator will be used to determine the required number of participants to achieve a 95% confidence level and a margin of error of 5%.

A power analysis was conducted using an online G*power sample size calculator to ensure that the sample size was enough. Descriptive statistics provided answers to research questions 1–3. The chi-squared test was used to address research question number 4. This data, along with the presumptions of a medium effect size, a power of.8, and a type 1 error of 0.05, indicated that 300 people were required for the sample. In order to account for attrition and dropout, we thus recruited 555 participants. The sampling method will be convenience sampling,

where participants who meet the inclusion criteria and are available online during the data collection period will be recruited.

E. inclusion and exclusion criteria

Inclusion criteria Individuals aged 18 years and older, residing in the West Bank, able to read and write, who have access to social media and consent to participate in the study.

Exclusion criteria Individuals under the age of 18, non-residents of the West Bank, not able to read and write, and any participants who submit incomplete questionnaires.

F. Data collection tool and technique

Data collected using an online self-administered questionnaire, which constructed based on previous validated surveys in the field. The questionnaire will consist of two sections:

- **Demographic Information**: Including age, gender, education level, occupation, and prior CPR training.
- **Knowledge**, **Awareness**, **and Attitudes Toward CPR**: Questions will assess participants' familiarity with CPR procedures, willingness to perform CPR, and perceived barriers to performing CPR.

The questionnaire will be bilingual, available in both Arabic and English, to ensure accessibility for all participants. Most questions will be close-ended, with "Yes," "No," or "Don't Know" response options, while some will be multiple-choice questions to capture detailed information.

G. Data analysis

Data was analyzed using R software, version 20.0. Descriptive statistics will be used to summarize the demographic characteristics and levels of CPR knowledge and awareness. Associations between demographic variables and CPR knowledge/attitudes will be examined using chi-square tests and t-tests, as appropriate. A p-value of <0.05 will be considered statistically significant. All statistically non-significant results were reported as not significant.

Table 1 Demographic characteristics of the participants ($N=555$)

Characteristic	Count	Percentage
Age 18–40	503	91%
Age > 40	52	9.4%
Single	389	70%
Married	153	28%
Divorced/Widowed	13	2.3%
Pre-college	128	23%
College/post-college	427	77%
Employed	160	29%
Student/Unemployed	395	71%
Male	147	26%
Female	408	74%

H. ethical considerations

Ethical approval for this study will be sought from Al-Quds University. Participants will be informed of the study's objectives, procedures, and their rights, including voluntary participation and confidentiality. Online informed consent will be obtained before participation, and all data will be anonymized and stored securely to protect participants' privacy. All research assistants met with the primary investigator, who gave them an explanation of the questionnaire and the study's objectives. Participants were given an explanation of the study by research assistants. Additionally, they gave the participants the assurance that they might withdraw at any time and not participate. Following this explanation, participants were asked to fill out a questionnaire and sign an informed consent form if they were willing to participate. No identification were needed, and the trial was entirely anonymous. Only the lead investigator and co-investigators had access to the password-protected computer where the coded data was stored.

Results

The study sample consisted of 555 participants, predominantly aged between 18 and 40 years (91%). The majority were single (70%), while 28% were married, and a small fraction were either divorced or widowed (2.3%). In terms of education, 77% of participants had attained college or post-college degrees, whereas 23% had only completed pre-college education. Regarding employment, 71% were students or unemployed, while 29% were employed. The gender distribution showed a higher proportion of females (74%) compared to males (26%). Overall, the demographic profile of the participants was characterized by a young, single, and highly educated population in Table 1.

232 (41.8%) of the 555 respondents said they had received CPR instruction, whereas 323 (58.2%) said they had not been trained. This study highlights the need for additional training activities to improve awareness and preparedness for cardiac emergencies by pointing to a significant gap in CPR training within the questioned group.

When it came to participant awareness of the symptoms of cardiac arrest, chest discomfort was the most commonly identified symptom, as stated by 19% (343 participants). Other noteworthy symptoms included loss of consciousness (14%; 264 subjects) and cessation of circulation 17% (307 participants). Additionally, cessation of breathing was recognized by 14% (251 participants). Less

Table 2 Identification of cardiac arrest

Characteristic	Do not received training (*n* %)	Received training (*n* %)	*p*-value
Consciousness Evaluation			0.003
No response when called	175 (36%)	163 (40%)	
No response when touched	152 (32%)	143 (35%)	
Not moving at all	123 (26%)	97 (24%)	
I don't know	32 (6.6%)	7 (1.7%)	
Circulation Evaluation			< 0.001
Not feeling a pulse in the vessels of the arm	111 (25%)	108 (29%)	
Not feeling a pulse in the vessels of the neck	146 (32%)	151 (40%)	
Lack of circulation signs such as numbness in the extremities	122 (27%)	99 (26%)	
I don't know	72 (16%)	18 (4.8%)	
Respiration Evaluation			0.004
Not coming air out of the mouth of individual	123 (23%)	126 (28%)	
Not having any respiratory movement	173 (33%)	149 (33%)	
Not having any respiratory sound	116 (22%)	96 (21%)	
Not steaming up a mirror placed in front of the mouth	82 (16%)	72 (16%)	
I don't know	33 (6.3%)	7 (1.6%)	

Table 3 Response to sudden cardiac death

Response	No training (*n* %)	training (*n* %)	*p*-value
Call an ambulance	255 (39%)	201 (35%)	< 0.001
Began cardiac massage	75 (11%)	85 (15%)	< 0.001
Cardiac massage and mouth-to-mouth	92 (14%)	130 (22%)	< 0.001
Called for help by phone	74 (11%)	47 (8.1%)	< 0.001
Mouth-to-mouth ventilation	29 (4.4%)	33 (5.7%)	< 0.001
Just watched and left	19 (2.9%)	4 (0.7%)	< 0.001
Told someone to call for help	115 (17%)	80 (14%)	< 0.001

frequently identified symptoms were cyanosis 9.9% (182 participants) and nausea 7.2%0 (133 participants). Notably, 1.5% (28 participants) did not recognize any signs of cardiac arrest. These findings suggest varied levels of awareness regarding key indicators of cardiac arrest.

Comparisons between participants who received CPR training and those who did not in terms of recognizing signs of cardiac arrest are shown in Table 2. There were significant differences in the evaluation of consciousness ($p=0.003$), with 36% ($n=175$) of untrained participants reporting no response to verbal stimulus compared to 40% ($n=163$) in the trained group. The circulatory assessment showed a highly significant difference ($p<0.001$), where 25% ($n=111$) of untrained participants were unable to detect a pulse compared to 29% ($n=108$) in trained individuals. Furthermore, 16% ($n=72$) of untrained participants did not recognize any signs of circulation, as opposed to only 4.8% ($n=18$) among trained participants. For respiratory evaluation, significant differences were also noted ($p=0.004$), with 23% ($n=123$) of untrained participants reporting no air exiting the mouth, in comparison to 28% ($n=126$) among those trained. These findings demonstrate how CPR training significantly improves participants' recognition of important signals related to breathing, circulation, and consciousness.

In Table 3 outlines the actions taken by participants upon witnessing a sudden cardiac event, stratified by CPR training status. 39% ($n=255$) of the untrained individuals said they would call emergency services, compared to 35% ($n=201$) of the trained group. This difference was significant ($p<0.001$). Furthermore, 11% ($n=75$) of the untrained group reported that they would perform chest compressions, compared to 15% (85) of the trained group. Compared to 22% ($n=130$) of trained individuals, 14% ($n=92$) of untrained participants said they would perform both mouth-to-mouth ventilation and chest compressions. Remarkably, compared to just 0.7% ($n=4$) in the taught group, 2.9% ($n=19$) of the untrained group said they would do nothing but observe. These findings highlight the crucial role of CPR training in influencing appropriate emergency responses.

Knowledge about CPR techniques among participants is detailed in Table 4. Significant differences were found across all areas ($p<0.001$). Only 6.8% ($n=22$) of participants without training correctly identified the recommended 30:2 compression-to-ventilation ratio, whereas 56% ($n=130$) of trained individuals did so. Regarding the appropriate site for chest compressions, 67% ($n=155$) of

Table 4 Practical application of CPR

Characteristic	N	Do not received training (n %)	Received training (n %)	p-value
Training of CPR				
What is the proper rate of cardiac massage artificial ventilation during cardiac massage?	555			< 0.001
1:5		22 (6.8%)	22 (9.5%)	
2:15		47 (15%)	42 (18%)	
2:30		32 (9.9%)	130 (56%)	
Other		17 (5.3%)	8 (3.4%)	
I don't know		205 (63%)	30 (13%)	
Which area must cardiac massage be applied on?	555			< 0.001
Upper part of the chest		58 (18%)	39 (17%)	
Middle of the chest		150 (46%)	155 (67%)	
Lower part of the chest		9 (2.8%)	22 (9.5%)	
Other		7 (2.2%)	8 (3.4%)	
I don't know		99 (31%)	8 (3.4%)	
What must be the rate of the cardiac massage?	555			< 0.001
At least 50 times per minute		50 (15%)	53 (23%)	
At least 100 times per minute		66 (20%)	115 (50%)	
At least 150 times per minute		21 (6.5%)	28 (12%)	
I don't know		186 (58%)	36 (16%)	
How much force must be applied during heart massage?	510			< 0.001
Enough that the rib cage moves down 1 to 2 cm		37 (12%)	32 (15%)	
Moderate force such that the rib cage moves down 5 to 6 cm		93 (31%)	125 (60%)	
High force such that the rib cage moves down 6 to 10 cm		22 (7.3%)	27 (13%)	
I don't know		151 (50%)	23 (11%)	
Unknown	20			

trained participants identified the middle of the chest, compared to 18% ($n=58$) of untrained participants. When questioned on the recommended rate of compressions, 50% ($n=115$) of the trained group indicated a rate of at least 100 compressions per minute, compared to 20% ($n=66$) of untrained individuals. Additionally, 60% ($n=125$) of trained participants recognized the need for adequate force to compress the rib cage, in contrast to 12% ($n=37$) of untrained participants. A significant proportion of untrained participants were uncertain about CPR guidelines, with 63% ($n=205$) unsure of the correct compression-to-ventilation ratio and 50% ($n=151$) unsure of the required compression force. These results underscore the vital role of CPR training in improving knowledge of cardiac arrest management.

For interventions involving strangers, the predominant concern was "making a mistake" 31% (387 participants), followed by fears of causing organ damage 12% (154 participants) and bone fractures 12% (149 participants). Additionally, concerns about contracting a contagious disease were reported by 10% (125 participants), and 11% (139 participants) feared halting a functional heart. Legal consequences were cited by 8.9% (110 participants), while 6.8% (84 participants) were worried about contamination from bodily fluids. When considering interventions for relatives, the primary concern was also "making a mistake" 36% (410 participants), with other notable worries including causing organ damage 15% (173 participants) and bone fractures 13% (150 participants). Concerns about halting a functioning heart were voiced by 11% (126 participants), and 6.5% (75 participants) cited fear of legal repercussions. These findings emphasize the barriers to emergency intervention, pointing to the need for targeted education and reassurance strategies.

Discussion

Our research highlights the level of awareness within the Palestinian community regarding sudden cardiac death (SCD) incidents and how to respond and handle such cases to save patients' lives. Previous studies have shown that the survival rate outside hospitals after a cardiac arrest ranges from 0 to 11.1%, while the survival rate of patients during their stay in the hospital until discharge ranges from 11.6 to 28.5% [14]. This underscores the importance of exploring awareness in all countries to take further measures to raise their culture about dealing with cases that require cardiopulmonary resuscitation (CPR). The survival rate increased nearly threefold in patients who received basic life support (BLS) from bystanders [15]. This significant increase underscores the critical importance of BLS training for the general public,

as immediate intervention can drastically improve outcomes in cardiac emergencies.

In a large and unique global review that included studies over two consecutive decades on the general population's knowledge of CPR principles, which included 29 countries, it is noteworthy that studies on this topic were significantly repeated in high-income countries such as the United Kingdom, China, and Australia. Despite this, the research results showed that people's knowledge is generally limited regarding CPR, with a rate of 40% for the prevalence of CPR training in various countries worldwide [16]. This highlights a global gap in CPR education, suggesting a need for widespread public health initiatives to enhance CPR training and awareness.

A cross-sectional study was conducted in southern China to assess knowledge and compare the awareness of relatives of people with and without heart disease towards CPR, it was striking and surprising that people with relatives suffering from heart disease had lower levels of CPR knowledge [17]. Meanwhile, Gao et al. reported a high rate of CPR proficiency and experience among more than half of the sample 67.4% of the 4450 Chinese public, showing a significant contradiction with previous studies conducted in various provinces of China. The authors explained this by noting that medical staff were included in the sample, unlike previous studies [18]. This finding suggests that having a relative with heart disease does not necessarily translate to better CPR knowledge, possibly due to a reliance on medical professionals rather than personal preparedness.

In our study, 41.8% had previously undergone CPR training, which is higher than the training and knowledge rate reported in Jordan 29% [13]. This indicates a relatively better awareness in our sample, yet still points to a significant portion of the population lacking essential life-saving skills. Even in studies limited to awareness among the medical sector in low- and middle-income countries, CPR knowledge was extremely low. Some recent studies have hypothesized that the lack of doctors' experience and awareness towards resuscitation may be due to insufficient training that prevents them from overcoming the fear barriers of performing resuscitation correctly [19]. Moreover, the doctor's self-confidence played an important role in influencing the leadership of resuscitation [20]. This emphasizes the need for continuous professional development and confidence-building among healthcare providers to ensure effective resuscitation efforts.

In a study conducted in Egypt, among 60 participating doctors, only 31.7% were aware of CPR principles, while among the 145 medical students in the sample, only 6.2% had sufficient knowledge of resuscitation [21]. Similarly, results from a study involving nurses in a teaching hospital in Namibia showed a significant decrease in their knowledge about the time required to check the pulse before starting resuscitation [22]. In the nursing profession, gender was a significant indicator in several previous studies, where males were more prepared than females to perform CPR and use an automated external defibrillator (AED). In contrast, in a study involving a sample of adults in the Syrian community from various educational levels, gender did not show any significant statistical indication of knowledge of first aid [23, 24].

The importance and necessity of awareness in performing CPR for a cardiac arrest patient immediately stem from the risk of brain damage occurring within a few minutes if CPR is not performed correctly and timely [25].

In our study, the fear of making a mistake in resuscitation was the main reason that made a person hesitate to perform CPR on a patient, whether the patient was a family member, friend, or even a stranger, which aligns with the study conducted by Jarrah et al. in Jordan [13]. Addressing this fear through comprehensive training and public awareness campaigns can empower individuals to act confidently in emergency situations, potentially saving more lives.

In the Chinese community, the main reason for men's hesitation to perform CPR on strangers was the fear of legal questioning if they failed, while women were primarily concerned about their insufficient knowledge of performing CPR on strangers and secondly about legal issues [26]. In the United Arab Emirates, the issue of touching female strangers in public places was also one of the main reasons for hesitation in resuscitation by the national ambulance crew, which may be due to the religious culture they were raised [27].

In a cross-sectional study in the United States, age was significantly associated with CPR knowledge, as the older a person was, the less likely they were to be trained in CPR [28]. Shaheen et al. reported in their study, which included 9 Arab countries including Palestine, that urban residents have a higher level of knowledge about basic life support compared to rural residents [29]. This is a natural result of the generally higher education levels and better access to educational resources in cities.

In Saudi Arabia, higher income among the population was associated with greater knowledge and expertise in basic life support [30]. All previous studies confirm that limited resources, whether in rural areas compared to cities, in low-income compared to high-income populations, or in developing countries compared to developed countries, also limit knowledge about resuscitation. In some areas of Sweden, the implementation of smartphone app responders (such as the Smartphone App Responder program) has begun, which may represent a qualitative revolution in resuscitation in the coming years [31].

Similarly, a mobile application in Turkey allows users to find the nearest first responder (ayaklı cankurtaran), which reduces the number of deaths or the likelihood of errors in resuscitation by bystanders [32].

The American Heart Association has recently worked hard to break down barriers to learning resuscitation principles by reducing the cost of CPR courses that rely on video learning [33]. Workshops and training courses on cardiopulmonary resuscitation have been an important tool that has significantly contributed to raising and improving awareness, particularly among medical students [34]. In most developed countries like Japan and Norway, CPR courses and training on how to use an AED have been incorporated into school curricula. This instills a sense of responsibility at a young age, which is crucial for overcoming fear and advancing in this field, thereby reducing the risks of cardiac arrest in these countries [35].

With the recent increase in conflicts and wars in several Middle Eastern countries such as Palestine, Lebanon, Syria, and Iraq, learning the principles of basic life support and cardiopulmonary resuscitation has become an urgent necessity for every individual.

Lebanon has taken an important step by amending the penal code to exempt anyone who attempts to perform CPR on another person who has suffered a cardiac arrest. Several plans have also been put in place to raise awareness among the Lebanese population about first aid, such as intensifying awareness campaigns, mandating CPR training in high schools, and promoting the training of the general population on the use of AEDs [36].

Limitations and future research

Despite the valuable insights provided by our study, there are several limitations that should be acknowledged. Firstly, the sample size was relatively small and may not be representative of the entire Palestinian community. Secondly, the study relied on self-reported data, which could be subject to bias. Future research should aim to include larger, more diverse samples and utilize objective measures of CPR knowledge and skills. Additionally, longitudinal studies could provide more information on the long-term impact of CPR training programs.

Conclusion

It is essential to implement measures similar to those adopted by Lebanon, as both our study and others have demonstrated that the fear of making mistakes and facing legal repercussions is a major factor preventing many individuals in various countries from providing help. To address this issue, we recommend several actions: increasing the number of scientific conferences to raise awareness about first aid, particularly in developing countries; organizing free training courses open to the general public to enhance their skills; leveraging social media and other media platforms to emphasize the importance of understanding resuscitation principles; and encouraging participation through competitions, incentives, and cash rewards for those who successfully complete Basic Life Support (BLS) and Cardiopulmonary Resuscitation (CPR) tests.

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Author contributions

Alhareth M. Amro: Conceptualization, Writing – original draft. Osama J. Makhamreh: Methodology, Writing – original draft. Hamdah Hanifa: Writing – original draft, Writing – review & editing. Tarek A. Owais: Formal analysis, Writing – original draft. Afnan W. M. Jobran: Supervision, Writing – review & editing. All authors have participated in writing the manuscript and reviewed the literature. All authors contributed to revision of the manuscript. All authors read and approved the final manuscript.

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Data availability

Data is provided within the manuscript.

Declarations

Ethics approval and consent to participate

All procedures performed in this study involving human participants complied with the institutional and/or national research committee ethical standards and the 1964 Helsinki declaration and subsequent amendments or equivalent ethical standards. The study was designed and conducted in accordance with the ethical principles established by Al-Quds University. Therefore, ethical approval was obtained from the Institutional Review Board Committee, Faculty of Medicine, Al-Quds University. ID number: 416/REC2024/. Written informed consent was obtained from all the participants for the participation of this study and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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