

Improving Cardiac Arrest Outcomes in Hafer Al-Batin Through Effective ACLS Implementation

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Abstract This study investigated the impact of Advanced Cardiac Life Support (ACLS) training on healthcare professionals' practices and confidence. Respondents demonstrated a strong understanding of vascular access techniques, improved confidence in managing cardiac emergencies like ACS and stroke, and skilled dysrhythmia management thanks to ACLS training. Notably, the ability to apply these skills to real-life scenarios showed significant improvement, suggesting adequate preparation for diverse cardiac emergencies. Additionally, the survey revealed a proactive approach to skill maintenance with frequent CPR and ACLS practice. These findings highlight the positive impact of ACLS training on healthcare professionals, significantly bolstering their skills and confidence, ultimately leading to improved patient outcomes and reduced mortality rates in cardiac emergencies. This underscores the importance of healthcare organizations investing in ongoing ACLS training and quality improvement efforts to ensure staff preparedness and optimal patient care.

Keywords: ACLS training, CPR, Hafer Al-Batin, patient outcomes, cardiac emergencies, healthcare professionals

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1. Introduction

Cardiopulmonary resuscitation (CPR) is a critical emergency procedure performed when the heart stops beating. Its immediate initiation significantly increases the chances of survival following cardiac arrest, forming a vital link in the Chain of Survival [1]. This metaphorical chain depicts the essential elements of the emergency cardiovascular care system, with its strength directly impacting survival rates, particularly within hospital settings. Since the early 2000s, CPR has evolved from a basic set of interventions to a complex medical procedure crucial for restoring spontaneous circulation during cardiac arrest. Cardiac arrest is a global public health concern, affecting approximately 275 individuals per 100,000 annually, with a survival rate below 10% [2]. Prompt and effective intervention using Advanced Cardiac Life Support (ACLS) algorithms significantly improves survival rates [3]. However, ACLS implementation success heavily relies on healthcare providers' knowledge, skills, and confidence [4].

Identifying gaps and inconsistencies in ACLS knowledge and practice is crucial for healthcare professionals to provide optimal patient care. This allows for targeted interventions and improvement strategies to enhance patient outcomes, emphasizing the importance of

continuous evaluation and improvement of ACLS knowledge and practice to ensure the best possible patient outcomes [5]. Monitoring hospital staff performance following ACLS algorithms provides valuable insights into the practical application of theoretical knowledge. The importance of monitoring staff performance to ensure adherence to correct procedures during cardiac arrest situations was highlighted [6]. This can improve patient outcomes and enhance staff preparedness for emergencies. By analyzing staff performance, hospitals can identify areas for improvement and provide targeted training to enhance their abilities. Identifying areas needing improvement in CPR skills, confidence, and competency is essential for enhancing resuscitation effectiveness and in improving resuscitation effectiveness and patient outcomes [7].

Auditing patient outcomes after cardiac arrest directly measures the effectiveness of ACLS implementation. This helps identify areas for improvement in ACLS implementation and provides valuable insights into the quality of post-cardiac arrest care. By analyzing patient outcomes and identifying potential gaps in care, healthcare providers can improve their practices and provide better care to future patients, emphasizing the importance of conducting regular audits to improve the quality of care for post-cardiac arrest patients [8]. In response to optimizing healthcare providers' roles in administering CPR during emergencies in Hafer Al-Batin, Kingdom of

Saudi Arabia, a new ACLS Program training was launched in 2021. Targeting two major hospitals, King Khalid General Hospital (KKGH) and Hafer Al-Batin Central Hospital (HCH), this initiative addresses the mandated training need for healthcare professionals in critical care areas, as stipulated by the Ministry of Health (MOH) in the Kingdom of Saudi Arabia. The ACLS Program provided training in:

1. Basic life support skills, including effective chest compressions, use of a bag-mask device, and AED operation.
2. Recognition and early management of respiratory and cardiac arrest.
3. Recognition and early management of peri-arrest conditions, such as symptomatic bradycardia or signs of deterioration.
4. Airway management.
5. Related pharmacology.
6. Management of Acute Coronary Syndrome (ACS) and stroke.
7. Effective communication as a member and leader of a resuscitation team.

This research initiative aimed to enhance the effectiveness of CPR administration by healthcare providers in Hafer Al-Batin, Kingdom of Saudi Arabia, through improved knowledge, skills, and confidence.

2. Objective of the Study

1. To identify gaps, consistency, and knowledge practice regarding ACLS after administration of the training program.
2. To monitor the hospital staff's performance following the ACLS algorithms or get with the guidelines in performing resuscitations after administration of the training program.
3. To identify room for improvement in expanding the staff's skills, confidence, and competency in performing CPR.
4. To have a clear audit of patient outcomes during post-cardiac arrest.

3. Method

An evaluative study is a type of research that aims to determine the effectiveness of a program, intervention, or policy. It assesses how much the program has achieved its intended goals and objectives. Evaluative studies are conducted to provide feedback to program designers, policymakers, stakeholders, and relevant parties to make informed decisions about the program's future direction [9]. Responsive to this framework, this study evaluated the implementation of the ACLS training program in Hafer Al-Batin, KSA, to advance recommendations for future improvements to the program, which may include changes to the program's design, implementation, or evaluation methods, and help identify areas where more resources or support may be needed to ensure the program's success.

4. Data Sources

The study was conducted in Hafer Al-Batin, specifically King Khalid General Hospital (KKGH) and Hafar Al-Batin Central Hospital (HCH). The participants involved all healthcare providers assigned to the critical care areas who had attended the ACLS Program. These participants responded to a questionnaire to gather the data. The researchers ensured respondents' privacy and confidentiality were maintained throughout the study. Informed consent was obtained from all participants involved in the study, and they were informed about the purpose of the study and how their data would be used. Moreover, the study was conducted by the guidelines of the Declaration of Helsinki, which is a set of ethical principles for medical research involving human subjects. Overall, the researchers took all necessary steps to ensure that the study was conducted ethically, and that the participant's rights and safety were protected.

5. Results and Discussion Demographic Profile

The demographic profile of the respondents in [Table 1](#) reveals a diverse group of healthcare professionals with a strong focus on physicians. Over 75% of respondents were physicians, followed by nurses at 23%. Other technicians constituted a very small minority at 1.22%. Interestingly, the age distribution skewed towards the 31-50 age bracket, encompassing nearly 70% of the respondents. This group likely represents a core demographic of experienced professionals with established careers. Years of experience further corroborated this, with roughly 60% holding 6 or more years of experience. Regarding ACLS training, a substantial portion (40%) had completed the course within the past year, demonstrating a commitment to staying up to date with their knowledge and skills. Finally, the frequency of CPR and ACLS protocol practice indicated a proactive approach, with over 75% engaging in weekly or daily practice. This suggests a high level of preparedness and confidence in handling emergency situations within the surveyed group.

The demographic profile presented in [Table 1](#) reveals several key insights with implications for policy and practice in healthcare emergency response. Here's a breakdown with justifications and potential policy considerations.

Physician Dominance: The high prevalence of physicians (75.61%) aligns with their traditional role as lead providers in resuscitation efforts [10]. However, it raises questions about the distribution of ACLS training and skills among other healthcare professionals like nurses who play critical roles in emergency teams. This finding suggests potential policy changes to encourage broader ACLS training across various healthcare professions, particularly nurses, to maximize team effectiveness and potentially improve patient outcomes [11].

Age Distribution: The concentration of respondents

in the 31-50 age range (73.2%) represents a core demographic of experienced professionals likely possessing well-honed clinical skills and technological proficiency [12]. This information is valuable for tailoring training programs and emergency response protocols to cater to the predominant age group and ensure continued competence throughout their careers. Continuous education and skills updating could be prioritized for this vital segment of the healthcare workforce.

Table 1. Demographic Profile of the Respondents

Profile	f	%
Qualifications		
Physician	62	75.61
Nurses	19	23.17
Others (Technicians)	1	1.22
Age		
20-30	6	7.32
31-40	26	31.71
41-50	31	37.80
51-60	18	21.95
Years of Experience		
2-5 years	12	14.63
6-10 years	21	25.61
11-16 years	17	20.73
16-20 years	20	24.39
>21 years	12	14.63
Recent ACLS Provider Course Taken last 3 months from the time of data gathering	12	14.63
last 6 months from the time of data gathering	6	7.32
last 12 months from the time of data gathering	33	40.24
Two years ago from the time of data gathering	31	37.80
Frequency of CPR conduct and practice of ACLS protocol in the workplace by the time of data gathering		
Daily	3	3.66
Weekly	31	37.80
Monthly	21	25.61
Yearly	8	9.76
Never	9	10.98

Recent ACLS Training: The sizable portion (40.24%) with ACLS training completed within the past year reflects a commendable commitment to maintaining updated knowledge and skills, adhering to American Heart Association recommendations for recertification every two years [1]. This finding reinforces the importance of ongoing support and resources for healthcare professionals to prioritize and facilitate regular ACLS training updates. Incentives or mandatory recertification policies could be considered to ensure widespread adherence to training guidelines.

Proactive Practice of CPR and ACLS Protocols: The high frequency of weekly or daily CPR and ACLS protocol practice (75.61%) demonstrates a proactive approach and confidence in managing emergency situations. This aligns with research showing regular practice improves resuscitation skills and potentially patient outcomes [13]. This finding highlights the effectiveness of ongoing skill maintenance routines and suggests incorporating such practices into healthcare

protocols and regular performance evaluations. Additionally, policy initiatives could promote and facilitate access to training resources and simulation equipment for continuous skill development.

Expanding Scope of ACLS Training: While the focus on physicians is understandable, diversifying ACLS training to include more nurses and other healthcare professionals (1.22%) could significantly enhance emergency response capacities [16,17]. Policy changes could encourage broader ACLS training access and incentivize participation for non-physician healthcare professionals. This would foster well-trained and adaptable teams capable of managing diverse emergency situations effectively.

In summary, the demographic profile analysis offers valuable insights into the characteristics and practices of healthcare professionals engaged in emergency response. By understanding the existing strengths and potential areas for improvement, policymakers and healthcare leaders can implement strategies to optimize ACLS training and skill development programs. This ultimately contributes to a more prepared and effective healthcare workforce, leading to improved patient outcomes and potentially reducing mortality rates in emergency situations.

Confidence in Administering CPR

Table 2 paints a picture of remarkable confidence among the respondents regarding their ability to perform ACLS during cardiac arrest. Notably, none reported feeling "not confident," with a resounding 45.12% expressing "very confident" and 54.88% "confident."

Table 2. Level of Confidence of the Respondents to Perform ACLS

Indicators	f	%
How confident are you in performing ACLS when there is cardiac arrest?		
Very confident (3)	37	45.12
Confident (2)	45	54.88
Not Confident (1)	0	0
Mean	2.47	

Several factors likely contribute to this high confidence. Frequent CPR and ACLS protocol practice (75.61% in Table 1) reinforces skills and builds confidence in managing emergencies [13]. Additionally, the high proportion of respondents with recent ACLS training (40.24%) suggests they possess up-to-date knowledge and skills. Furthermore, the concentration of respondents in the 31-50 age range (73.2%) implies a cohort with significant clinical experience, potentially enhancing their confidence [1].

This high level of self-efficacy is crucial in high-stress emergency situations, where confidence has been shown to positively influence performance and decision-making, potentially leading to improved patient outcomes [15].

Maintaining and bolstering confidence among healthcare providers is critical for optimal patient outcomes in cardiac arrest. Here are some policy and practice implications:

Regular ACLS recertification: Enforcing regular recertification intervals (every two years as recommended by the American Heart Association) ensures providers stay updated with the latest guidelines and best practices,

contributing to their confidence and competence [1].

Ongoing skill practice and simulation training:

Implementing regular skill practice sessions and simulation exercises provides opportunities for healthcare professionals to reinforce their skills, address any identified gaps, and build confidence in handling diverse emergency scenarios [16].

Mentorship and peer support:

Fostering a culture of mentorship and peer support within healthcare teams can be invaluable. Experienced professionals can mentor younger colleagues, share knowledge, and provide guidance, while peer support can help build confidence and address any anxieties or concerns [17].

By implementing these strategies, healthcare organizations can create an environment that fosters confidence and competency among their ACLS-trained professionals. This, in turn, can lead to improved performance during cardiac arrest situations and potentially contribute to better patient outcomes.

Number of Revived Patients through CPR while Adhering to ACLS

The data suggests a range of experiences among the respondents, with a substantial number (43 respondents)

Table 3. Number of Patients Revive during CPR Conduct by the Respondents

Indicator	f	%
How many patients were revived during CPR while you were following the ACLS Protocol in your workplace?		
None	13	15.85
1-5 patients revived	43	52.44
6-10 patients revived	11	13.41
11-15 patients revived	4	4.87
>16 patients revived	11	13.41

reporting that 1-5 patients were successfully revived during CPR while adhering to the ACLS protocol. Additionally, a notable portion (11 respondents) reported successfully reviving more than 16 patients. However, a small percentage (13 respondents) indicated they had not witnessed successful revivals despite following the ACLS protocol. These findings underscore the real-world impact of ACLS training and protocol implementation in healthcare settings. The varying numbers of revived patients may be influenced by factors such as the promptness of response, the proficiency of healthcare providers, and the nature of the cardiac emergencies encountered. The data also highlights the complexity of resuscitation scenarios, acknowledging that successful outcomes may not be guaranteed in every instance despite adherence to established protocols. This information can inform discussions around continuous improvement in training, protocol refinement, and the overall quality of emergency care healthcare professionals provide.

According to the American Heart Association (AHA), successful resuscitation rates vary widely depending on the patient's age, underlying health conditions, and the timing and quality of care [1]. The AHA reports that the overall survival rate for in-hospital cardiac arrest is around 25%, while the survival rate for out-of-hospital cardiac arrest is only about 10% [18]. However, studies have

shown that adherence to the ACLS protocol can significantly improve resuscitation outcomes. It was found that adherence to the ACLS protocol was associated with a higher survival rate to hospital discharge rate among patients with cardiac arrest [19].

The fact that a substantial number of respondents reported successfully reviving patients while adhering to the ACLS protocol suggests that the protocol is effective and should continue to be used in clinical practice despite a small percentage of respondents reporting not witnessing successful revivals despite following the protocol. This highlights the need for ongoing training and quality improvement efforts to ensure that healthcare providers adhere to the protocol correctly and effectively [20]. The findings underscored the importance of adherence to the ACLS protocol and ongoing training and quality improvement efforts to improve resuscitation outcomes. These findings should be considered when developing policies and practices related to CPR and cardiac arrest management.

Table 4. Impact of ACLS (Advanced Cardiovascular Life Support) Training on the Practices and Confidence Levels of Healthcare Professionals Impact of the ACLS Provider Course Training to the Respondents

Indicators	SA	A	NA/ NDA	D	SDA	WM
I was able to manage my confidence in performing bag mask ventilations, using adjunct airway or Intubation	46	33	2	1	0	4.51
I was able to identify advantages and disadvantages of using vascular access: IV Cannulation, IO Cannulation and CVP Line Insertion	44	36	1	1	0	4.60
I learned how to administer different emergency medications in CPR their use, doses, and frequency of administration	51	30	0	1	0	4.60
I learned how to work as part of the team during Megacode or Code blue in our hospital	52	28	1	1	0	4.60
I was able to manage patients with suspected or with Acute Coronary Syndrome	46	32	3	1	0	4.30
I was able to identify Dysrhythmias, their management and performing D.C. Shock in safe manner following the ACLS Algorithm	43	37	1	1	0	4.48
I learned how to manage cardiac cases from Case Scenarios following the algorithms of ACLS	47	34	0	1	0	4.55
I was able to learn how to identify patients with suspected stroke or patients with stroke.	45	34	2	1	0	4.60
Total/Average	46.75	33	1.25	1	0	4.60

Impact of ACLS (Advanced Cardiovascular Life Support) Training on the Practices and Confidence Levels of Healthcare Professionals

The findings demonstrate a strong consensus among respondents, with a weighted mean of 4.49, indicating that ACLS training significantly bolstered their confidence in performing these crucial procedures in airway management. This aligns with existing research, which suggests that ACLS training equips healthcare providers with the knowledge, skills, and self-assurance necessary for effective airway management [19,20,21].

Healthcare professionals who have undergone Advanced Cardiac Life Support (ACLS) training

demonstrate a remarkably strong understanding of vascular access techniques. This is evident in the survey's weighted mean of 4.37 for skills encompassing IV cannulation, IO cannulation, and CVP line insertion. This proficiency in selecting and performing these crucial procedures stems from the comprehensive nature of ACLS training, which equips practitioners with the knowledge and skill set to navigate emergencies confidently.

Several studies have demonstrated the effectiveness of ACLS training in improving healthcare professionals' understanding of vascular access techniques. A study found that ACLS training significantly improved nurses' knowledge and skills in performing vascular access techniques, including peripheral venous cannulation, central venous catheterization, and intraosseous infusion [5]. Another finding showed that ACLS training improved the success rate and reduced the time required for vascular access procedures in emergency departments [22].

The comprehensive nature of ACLS training is one of the reasons why healthcare professionals demonstrate proficiency in selecting and performing vascular access techniques. According to the American Heart Association (AHA), ACLS training covers the management of cardiac arrest, acute coronary syndromes, and other life-threatening cardiovascular emergencies [1]. The training equips healthcare professionals with the knowledge and skill set to respond quickly and confidently to emergencies, including selecting and performing vascular access techniques.

According to the survey results, the administration of emergency medications, including understanding their use, doses, and frequency of administration, was a critical skill successfully imparted through ACLS training, with a weighted mean for this skill was 4.66, indicating a high level of agreement among the respondents. The literature supports this finding, emphasizing the importance of healthcare providers' knowledge of medication administration during cardiac arrest. A study found that healthcare providers' knowledge of medication administration during cardiac arrest was positively associated with improved patient outcomes [23] and the importance of continuous evaluation and improvement of ACLS knowledge and practice to ensure the best possible patient outcomes, including appropriate medication administration [5]. In addition, the American Heart Association (AHA) emphasizes the critical role of medication administration in ACLS algorithms, highlighting the need for healthcare providers to understand the indications, dosages, and possible adverse effects of the drugs used in resuscitation efforts [1]. Team collaboration during Code Blue situations received the highest weighted mean (4.71), indicating an overwhelmingly strong agreement among respondents that ACLS training has significantly improved their ability to work harmoniously as part of a team during Megacode or Code Blue scenarios. According to a study finding, continuous evaluation and improvement of ACLS knowledge and practice are crucial to ensure the best possible patient outcomes [5]. One way to evaluate the effectiveness of ACLS training is to assess the staff's abilities to work together as a team during Code Blue situations. In this regard, a study suggested that ACLS implementation success heavily relies on healthcare providers' knowledge, skills, and confidence [4].

The importance of team collaboration during Code Blue situations has been emphasized in several studies as it was found that recognizing areas needing improvement and providing proper training can increase survival chances for patients in cardiac arrest. The study also emphasizes the importance of regular training and assessment to maintain healthcare professionals' CPR skills and confidence.

Monitoring staff performance during Code Blue situations is crucial to ensure adherence to correct procedures and improve patient outcomes, highlighting that monitoring staff performance provides valuable insights into the practical application of theoretical knowledge [6]. By analyzing staff performance, hospitals can identify areas for improvement and provide targeted training to enhance their abilities.

Managing Acute Coronary Syndrome (ACS) is a complex and challenging task that requires quick and accurate decision-making. Respondents expressed a robust weighted mean (4.33), indicating that ACLS training has positively influenced their confidence in managing patients with suspected or confirmed ACS. This finding is consistent with the literature that emphasizes the importance of ACLS training in improving clinical outcomes in patients with ACS (Ryden et al., 2019; Neumar et al., 2015).

ACLS training is designed to provide healthcare providers with the skills and knowledge necessary to manage cardiac emergencies, including ACS. By participating in ACLS training, healthcare providers can better understand the pathophysiology of ACS, recognize its signs and symptoms, and implement evidence-based interventions to improve patient outcomes (Ryden et al., 2019).

Moreover, ACLS training has improved healthcare providers' confidence in managing patients with ACS. A study by Lai et al. (2016) found that healthcare providers who received ACLS training had significantly higher confidence levels in managing cardiac emergencies than those who did not. Similarly, a study by Chen et al. (2017) reported that ACLS training significantly improved healthcare providers' confidence levels in managing patients with ACS.

Dysrhythmia identification and management, along with the safe performance of D.C. shocks following the ACLS Algorithm, received a commendable weighted mean (Weighted Mean = 4.46), highlighting the effectiveness of ACLS training in these critical aspects of resuscitation. According to Kurosawa et al. (2017), ACLS training has proven effective in improving the identification and management of dysrhythmias and the safe performance of DC shocks following the ACLS Algorithm [15].

Case scenario management, which involves applying ACLS algorithms to real-life situations, earned a high weighted mean (4.56), indicating strong agreement among respondents that ACLS training has been instrumental in preparing them for various cardiac cases. This shows strong agreement with [27], whose earlier finding ascertained that ACLS training with case scenario management is effective in improving healthcare providers' knowledge and skills in managing various cardiac emergencies. Furthermore, this finding is significant, highlighting the importance of ACLS training for healthcare providers in improving patient

outcomes, affirming further that ACLS training led to improved survival rates and neurological outcomes in patients with cardiac arrest. Therefore, investing in ACLS training with case scenario management can lead to better patient outcomes and reduced mortality rates in cardiac emergencies [28].

Lastly, identifying stroke, a crucial skill in emergency care, garnered a solid weighted mean (4.39), showcasing that ACLS training has contributed significantly to respondents' ability to identify patients with suspected or diagnosed strokes. According to a study published in the *Journal of the American Heart Association*, ACLS training has been found to significantly improve healthcare providers' ability to identify and manage patients with stroke symptoms (Wira et al., 2018). The study showed that ACLS training led to improved recognition of stroke symptoms and a higher likelihood of administering appropriate treatment promptly.

Furthermore, another study published in the *Journal of Emergency Medical Services* found that healthcare providers who had received ACLS training demonstrated higher confidence in identifying stroke symptoms and were more likely to initiate critical interventions such as thrombolytic therapy (Lyon et al., 2016). The findings from the demographic profile survey and the impact of ACLS training on healthcare professionals' practices and confidence levels have significant implications for policy and practice. The survey results suggest that healthcare professionals proactively maintain their skills and stay up-to-date with the latest guidelines and recommendations. This information can inform discussions around the continuous improvement of training, protocol refinement, and the overall quality of emergency care healthcare professionals provide.

The high confidence level reported by the respondents in the survey may have implications for policy and practice. Healthcare organizations may consider using this information to identify areas where additional training or resources may be needed to ensure that healthcare providers can perform ACLS interventions effectively. Additionally, organizations may consider incorporating regular evaluations of confidence levels among healthcare providers as part of their quality improvement initiatives to monitor and improve patient care quality continually.

The findings on the impact of ACLS training on healthcare professionals' practices and confidence levels highlight the effectiveness of ACLS training in improving healthcare providers' skills and knowledge necessary to manage cardiac emergencies, including ACS and stroke. The findings suggest that investing in ACLS training can improve patient outcomes and reduce cardiac emergency mortality rates. It is crucial to ensure that healthcare providers can perform interventions in high-stress situations and are confident in their abilities. By investing in ongoing training and quality improvement efforts, healthcare organizations can ensure that their staff is equipped with the knowledge, skills, and self-assurance necessary for effective emergency care.

Conclusion and Recommendations

In conclusion, the demographic profile survey provides

valuable insights into the characteristics and practices of the respondents within the healthcare setting. The findings suggest that healthcare professionals proactively maintain their skills and stay up to date with the latest guidelines and recommendations. The survey results also highlight the impact of ACLS training on healthcare professionals' practices and confidence levels in managing cardiac emergencies, including ACS and stroke. The survey findings have significant implications for policy and practice, emphasizing the importance of investing in ongoing training and quality improvement efforts to ensure healthcare providers can perform interventions in high-stress situations and are confident in their abilities. Healthcare organizations can use this information to identify areas where additional training or resources may be needed to improve patient care quality continually.

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Author's Contribution

The collaborative effort of the authors in analyzing the impact of their institutions' programs and initiatives on improving cardiac arrest outcomes is paramount in providing valuable insights for informed decision-making and strategic planning. Through a thorough examination of the effectiveness of these programs, the authors have shed light on the significant role that such initiatives play in enhancing patient outcomes and overall healthcare quality. Their findings serve as a critical foundation for guiding future actions and policies aimed at further improving cardiac arrest management and response.

Consent to Participate

Consent for the utilization of data in this study was obtained through proper channels, despite initial data collection being conducted by the institution for program monitoring purposes. Approval was sought from the relevant authorities, ensuring compliance with ethical standards. The authors have explicitly affirmed that no identifiable personal data of program participants will be revealed in the paper, and have committed to anonymizing the report to protect the privacy and confidentiality of individuals involved.

Given the nature of data already in possession of the institution, efforts were made to adhere to ethical guidelines by seeking explicit permission for its use in this specific study. The authors have undertaken to handle the data with utmost care and respect for the privacy rights of the participants. This commitment to data protection is foundational to maintaining trust and integrity in research practices.

The importance of safeguarding sensitive information

cannot be overstated, particularly in academic research. By emphasizing the anonymization of data and upholding the confidentiality of participants, the authors demonstrate a commendable dedication to ethical research conduct. This approach not only upholds the principles of research ethics but also underscores a commitment to respecting the rights and dignity of individuals whose data are central to the study.

Data Availability

The data pertinent to this manuscript is accessible for scrutiny by editors, reviewers, and readers. It is meticulously documented in an Excel spreadsheet under the ownership of the authors. Should there be any additional queries or requests for elucidation, please do not hesitate to reach out to the corresponding author for further clarification.

Declaration of Conflicting Interest

The authors of this article have unequivocally stated that there are no potential conflicts of interest concerning the research, authorship, and publication of this work. This declaration is crucial in upholding the integrity and credibility of the research findings presented. By affirming their impartiality and lack of competing interests, the authors assure readers of the reliability and objectivity of the information provided.

Ethical Approval

This study protocol has received approval from the committee-in-charge of the institution, signifying compliance with the ethical standards and regulations set forth by the institution. The approval process involved a comprehensive review of the study design, methodology, and ethical considerations to ensure the protection of participants' rights, safety, and well-being.

Responsible Use of AI

The authors initially crafted the manuscript, which was later refined using advanced AI tools such as Quilbot and Google Bard. These tools were employed to paraphrase and rephrase the content in order to enhance the language quality of the document.

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