

# Enabling Factors for the Successful Implementation of the CBAHI Accreditation Program

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**Background:** Healthcare organizations worldwide tend to implement hospital accreditation programs to improve the quality of care they provide. However, the literature shows inconsistent findings on the impact of such programs on the quality of care due to improper implementation of accreditation programs.

**Purpose:** This study explored the enabling factors for the effective implementation of the Saudi Central Board for Accreditation of Healthcare Institutions (CBAHI) program in the Ministry of Health (MOH) hospitals in Madinah, Saudi Arabia.

**Methods:** This qualitative study involved 22 professionals from five CBAHI-accredited MOH hospitals in Madinah, Saudi Arabia. A purposive sampling technique was applied, and data were collected through in-depth, semi-structured interviews. A thematic analysis approach was applied to the interview transcripts.

**Results:** Four themes and 11 subthemes emerged. The emerging themes included the development of human capital, resolving quality management issues, ensuring the availability of resources, and strategizing CBAHI-specific solutions.

**Conclusion:** The current study fills this knowledge gap by identifying the factors leading to the effective implementation of the CBAHI accreditation program in the MOH hospitals. Only the effective execution of the CBAHI will increase healthcare quality and, as a result, justify the significant resources and efforts invested in these programs. Future research should replicate similar study in other governments or private hospitals.

**Keywords:** hospital accreditation, enabling factors, CBAHI, quality of care

## Introduction

Healthcare organizations are concerned about improving the quality of the care provided.<sup>1</sup> In response to this demand, healthcare accreditation programs are used worldwide to enhance quality and patient safety.<sup>2</sup> The interest of healthcare organizations in accreditation programs is increasing.<sup>3</sup>

Accreditation is defined as “a recognition by accreditation bodies that healthcare organizations have met the accreditation standards, as determined by an assessment of the level of performance against these standards by external peers.”<sup>4</sup> The assessment of healthcare organizations requires a multidisciplinary team of health professionals who often conduct on-site visits, peer review interviews, documentation review, equipment checking, and review of key clinical and non-clinical indicators.<sup>5</sup> As can be seen, accreditation programs differ from one another. For example, some programs are voluntary, while others must be implemented.<sup>6</sup>

In 2005, the Saudi Central Board for Accreditation of Healthcare Institutions (CBAHI) established a voluntary accreditation program.<sup>7</sup> The CBAHI is a national not-for-profit accrediting body authorized to evaluate public and private healthcare organizations operating in Saudi Arabia and grant accreditation certificates to those meeting its standards.<sup>7</sup> In 2013, the Cabinet of Ministers Decree called for mandatory access to all healthcare facilities existing in Saudi Arabia, whether public or private.

Various studies were found in the literature that were conducted to measure the impact of healthcare accreditation programs on the quality of care, with no conclusive results on their effectiveness. Many studies have been conducted using different methods and concluded that accreditation has a positive impact on quality of care, such as,<sup>3,8–11</sup> while other studies revealed a null impact, such as.<sup>12–14</sup> In contrast, some studies have reported both positive and null impacts.<sup>15–20</sup> Moreover, other studies have shown a negative impact of healthcare accreditation on some indicators that represent the quality of care.<sup>21,22</sup> The conflicting results on the impact of healthcare accreditation programs on the quality of care might be related to the lack of evidence on the factors affecting their successful implementation.<sup>6,23</sup>

Since the CBAHI accreditation is still relatively new program, only few studies have been conducted to evaluate its effectiveness and impact of the quality of care. Moreover, few studies have focused on identifying the factors that might facilitate the successful implementation of accreditation programs. A literature review showed that there was no study conducted in Saudi Arabia to explore factors that enabled the effective implementation of the CBAHI accreditation program. Despite the increasing adoption of healthcare accreditation programs internationally, the current study intended to supplement previous studies by exploring factors that enable the successful and effective implementation of the CBAHI accreditation program in the Ministry of Health (MOH) hospitals in Madinah, Saudi Arabia.

## Materials and Methods

The phenomenological approach was employed using primary data derived from semi-structured in-depth interviews. Five MOH hospitals in the Madinah region of Saudi Arabia fulfilled the selection criteria and operated during the study period. No sample size calculation was required, wherein the interviewing of new participants ceased when no new information emerged and themes were saturated.<sup>24</sup>

## Inclusion and Exclusion Criteria

Healthcare professionals who were Arabic speakers who had participated in the CBAHI preparation for at least one year before the final survey were included. One year experience ensure that participants well aware of the hospital and CBAHI implementation, and enhance the study findings eventually. Those whose tasks were not related to the CBAHI were excluded.

## Sampling Method and Subject Recruitment

No sample size is required for the qualitative studies, so, the participants were purposively selected from different professionals. The Human Resources Department in each hospital was contacted to provide the researcher with the following information: position title, employee name, mobile number, email, and nationality of hospital directors, managers, and heads of departments who fulfilled the inclusion and exclusion criteria. While the list of nursing staff was obtained from the nursing department, nurses were selected conveniently.

## Research Tool

An interview guide consisting of open-ended questions was used as a research tool. It was developed based on a literature review and many discussions with the supervisory research team members. The interview questions were pilot-tested during mock interviews, and the final version consisted of six questions: 1) reasons underlying inconsistent results or no effect on quality dimensions associated with CBAHI accreditation; 2) strengths and weaknesses during the last preparation for CBAHI accreditation; 3) suggestions for hospitals to improve the selected quality dimensions; 4) suggestions for the CBAHI agency to maintain improvements in selected quality dimensions in MOH hospitals; 5) potential enabling factors for effective and successful implementation of CBAHI accreditation; and 6) suggestions to maintain continuous improvement for the selected quality dimensions.

## Data Collection

Semi-structured, in-depth interviews were conducted between November 2019 and March 2020 within the hospitals' premises by the researcher. The participants received emails containing information about the study, and the location and time of the interview session were arranged in advance.

They were asked to fill out a consent form before the interviews began. The interview sessions began with warm-up questions and proceeded with the main questions. The interview sessions stopped when saturation was achieved and no new issues were raised. All interviews were conducted in Arabic and were immediately transcribed by the researcher. All the interviews were audio-recorded interviews immediately after each interview sessions.

## Data Analysis

A thematic analysis was used in this study. Data analysis was conducted by the researcher and co-supervisor based on the framework developed by Denscombe (2010), which consists of the following five stages: data preparation; 2) initial data exploration; 3) data analysis; 4) data presentation and display; and 5) data validation.

The first stage involved the transcription of all audio-recorded interviews immediately after each interview session. Transcriptions were then entered into the MAXQDA software version 20.4.1. In the third stage, the interviews were repeatedly read and analyzed using an iterative approach by the researcher and co-researcher, who independently coded the interviews. The emerging codes, subthemes, and themes were then discussed and agreed upon by the researcher and his co-supervisor to ensure consistency and minimize judgement bias. The interview analysis continued until saturation was reached.

In the fourth stage, emergent sub-themes and themes were shown to make them easier to understand. The fifth stage was devoted to ensuring that the data were correct. Participants were sent the final report of the thematic analysis for review and comment. These comments concluded the final version of the qualitative data analysis report. Then, the results were shown and talked about with the rest of the team to come up with the final version. In the final report, all subthemes, themes, and quotations were translated from Arabic to English.

## Ensuring Trustworthiness of the Study

The four criteria developed by Lincoln and Guba<sup>24</sup> were used: credibility, dependability, transferability, and confirmability, to ensure the quality and validity of qualitative studies.

### Credibility (Validity)

Four strategies were adopted to ensure credibility. First, prolonged engagement, which reflects the researcher's involvement in the field of the study, where the researcher has more than ten years of experience, which supports his understanding of the context of the study, and the long time allocated for literature review and the time interval between interviews strengthened this strategy.

Second, there was a peer debriefing where the members of the research team spent a lot of time talking about how they did their work. Furthermore, the interview guide underwent many revisions before the final draft was approved. Third is triangulation, in which qualitative data analysis was performed by both the researcher and co-supervisor separately. In addition, the researcher tried to answer the main questions in a pilot study before conducting the real interviews. The fourth was member checking, which was performed by emailing back the participants with their answers and asking them to reply with their feedback on the transcript.

### Dependability (Consistency)

The methodological description of the research design and its implementation are clearly described, along with the process of data collection and analysis. The data analysis process was performed by both the researcher and her co-supervisor, who is an expert in qualitative data analysis. Initially, the findings were discussed several times. Themes and subthemes were compared to arrive at the final draft of the themes and subthemes.

## Transferability (Applicability)

A diverse and heterogeneous group of participants was interviewed. Therefore, study participants were purposively selected. Four to five participants, including providers from different levels, were interviewed at each hospital. All interviews were audio-recorded and transcribed by the researcher before the member-checking process. Next, all transcripts confirmed by the interviewees were entered immediately into the MAXQDA software.

## Confirmability (Neutrality)

In this study, in-depth interviews were audio-recorded and then transcribed, which were reviewed many times by both the researcher and co-researcher. In addition, field notes were taken during the interview sessions to document any notes related to the conversations, emotions, and responses of the participants. All field notes were considered during data analysis.

## Results

### Characteristics of Participants

We anticipated that we might need interview between 20 and 25 participants to reach data saturation. We reached saturation with 22 participants and ceased recruiting at this point. The participants were hospital leaders and staff members who met the inclusion and exclusion criteria. On average, the semi-structured in-depth interview sessions ranged from 27–44 to minutes, using the pre-developed interview guide. Of the 22 participants, there was one hospital director, one medical director, two quality management directors, 13 department heads, and five nurses in the study.

The majority of participants were male (15 participants). Regarding a nationality, 19 participants were Saudi, and the rest (three participants) were non-Saudi. Most of the people who took part were department heads (13), followed by nursing staff (5), two quality management directors (2), and one person from each medical director and hospital director job.

Most participants had 11–16 years of work experience, followed by those who had 6–10 years of experience, and those who had more than 16 years of experience. The majority of participants have 10-year experience with CBAHI. Additionally, the table shows that most participants were from H1 and H2 (five participants/each), while the rest of the hospitals had the same number of participants (four participants/each).

The analysis of in-depth interviews revealed four main themes and eleven sub-themes (Table 1), which explained how the implementation of the CBAHI accreditation program be more effective.

### Theme I: Development of Human Capital

Many participants emphasized human capital as an important enabling factor for the successful implementation of CBAHI accreditation standards. They found that human capital development and participation in accreditation are crucial. This first theme was divided into three sub-themes.

**Table 1** Background Information on the Five CBAHI-Accredited Hospitals in Madinah

No.	Themes	Sub-Themes
1	Development of human capital	Leadership commitment and support. Improving staff competencies and engagement.
2	Resolving quality management issues	Enhancing quality culture hospital-wide. Improving the performance system. Developing and adherence to policies and procedures. Simplifying the documentation in the medical records.
3	Ensuring availability of Resources	Maintaining continuous medical supplies. Providing non-medical supplies.
4	Strategizing CBAHI-specific solutions.	Simplification of the standards' requirements. Giving intensive training to hospitals. Voluntarily enrolment in the CBAHI accreditation.

The first is a leadership commitment and support. Participants pointed out that leadership intention and commitment to improve the quality of care resulting from accreditation had a positive influence on the implementation of CBAHI accreditation. Participants stated:

The main goal of getting accredited by CBAHI is only to have that certificate, which is not the science that could be followed. The hospital is aiming only to get accredited, and then everything will go back to normal (P19, 2)

The second sub-theme was an improvement in the staff competency and engagement. According to the participants, having the right staff in terms of quality and quantity will enable effective implementation of accreditation. For example, the participants stated the following:

For the success of any schemes, either accreditation program or other, in the beginning, they have to pay more attention to the human resources and utilize them properly for this issue. Human resources are the foundation for any success. (P.1, 15)

## Theme 2: Resolving Quality Management Issues

The role of the quality management department has increased, leading to an enhancement in the implementation of accreditation in MOH hospitals. The following sub-themes were emerged from the interview sessions. One participant mentioned:

Hospital management should take care of the Quality Management department and widely activate its role hospital-wide. Because it is the most responsible department for implementing and monitoring quality standards in the hospital and has to educate staff and follow-up them. (P.12, 30)

The first sub-theme was to enhance hospital-wide quality culture. Accordingly, participants reported that poor quality culture negatively affected the preparation for CBAHI accreditation; therefore, it should be enhanced for proper implementation of accreditation. The participants stated the following:

Part of the problem is that quality is still new at all hospitals in KSA, and the quality culture, especially MOH hospitals, is a new culture (P.1, 2)

The hospital must focus on continuous education regarding quality concepts, patient safety, and performance improvement culture (P.3, 18)

The second was to improve the performance management system. Participants talked about the importance of measuring and reporting performance indicators, especially those related to CBAHI, to ensure that CBAHI standards are being properly implemented. They stated that:

One of the major weaknesses that were behind the poor level of performance is the poor monitoring for these indicators by departments. (P.18, 18)

The hospital should provide staff with the current level of performance regularly, where this will improve their enthusiasm and performance (P.15, 22)

The third was the development of and adherence to policies and procedures. The participants emphasized existing policies, protocols, and clinical practice guidelines that are linked to CBAHI standards and are well known by staff will lead to deliver higher-quality care. The following quotes are examples of participants' responses:

Most of the policies and medical records forms in the hospital are in English. We faced some challenges with Arabic staff in understanding these policies and correctly filling up medical records forms because of the English barrier (P.12, 7)

All Systems in the Hospital Should Be Linked to the CBAHI Standards (P.18, 27)

One of these challenges that we face as nurses is the plenty of medical records forms required by nurses (P.13, 10)

### Theme 3: Ensuring Availability of Resources

Many participants reported that unavailability of resources is one of the challenges in maintaining the proper delivery of desired patient care and implementing CBAHI standards. The thematic analysis revealed two sub-themes. The first was the maintenance of a continuous medical supply. Participants mentioned that medical supplies were available only during CBAHI accreditation. For example, the participants stated the following:

Also, one of the reasons for the indicators not being affected by the CBAHI standards is the availability of supplies during the accreditation period only, either financial or other supplies. Once the accreditation ends, all support ends too (P.8, 6)

The second was the provision of non-medical supplies. In addition to medical supplies, participants were suffering from the discontinuance of providing non-medical supplies such as forms and stationaries, which directly affect the implementation of accreditation. For instance, the aforementioned

Some supplies must be provided permanently in the department, such as medical file forms, etc., and other office tools that help accomplish both medical and administrative work and contribute to achieving standards (P.11, 23)

### Theme 4: Strategizing CBAHI-Specific Solutions

Regarding the fourth theme, many participants raised influential issues related to CBAHI, which were classified into three sub-themes. The first was the simplification of standards' requirements. Participants, especially nurses, were frustrated by the long list of standards and workload required to meet them. For example, participants mentioned the following:

CBAHI standards are very long, especially the standards of nursing. Working on them requires a long time and more effort. Achieving these standards also requires documentation and filling up many forms. If the standards were shorter and the needed documents fewer, it would be better. (P.5, 29)

The large number of forms required by CBAHI to be filled out in the medical file was one of the challenges we faced while working on the CBAHI accreditation standards. (P.11, 11)

The second was the provision of intensive training to hospitals, where many participants raised the ambiguity of certain standards and how they should be met. Moreover, participants suggested sharing other hospitals' experiences in achieving CBAHI standards. For example, participants clearly stated the following:

There Was Ambiguity in the Standards and Their Requirements During the Preparation for CBAHI (P.18, 40)

I hope that CBAHI surveyors share their expertise with hospitals under accreditation to overcome the existing weakness they have (P.22, 25)

Thirds were voluntarily enrolled in the CBAHI accreditation program. A group of people talked about how the mandatory nature of the CBAHI program had a negative effect on the hospital's behavior when it came to following rules. For example, Participant (P.15) stated the following:

Yes, it is the behavior of CBAHI itself that makes people take this path. As long as obtaining the CBAHI certification is mandatory, the hospital will work to meet its requirements. If the enrolment is left optional, and the hospital can choose whether to obtain accreditation or not, then the CBAHI implementation will be different

## Discussion

The current study was conducted to fill up the gap in the literature by identifying the factors that enable the effective implementation of CBAHI accreditation. The thematic analysis revealed four themes involving 11 sub-themes, leading to the successful implementation of CBAHI accreditation in the MOH hospital in Madinah, Saudi Arabia.

Human capital development is the first emerged theme. It is commonly mentioned as an essential factor (theme) for the effective implementation of CBAHI accreditation. Leadership commitment and support and improving staff competencies and engagement were the sub-themes constituting the main theme. According to the study's findings, leadership



commitment and support were similar to the results reported by Farah et al<sup>25</sup>. They found that leadership and top management support play a vital role in the accreditation journey and ensure that accreditation is correctly implemented at all organizational levels. This result is also supported by Reisi et al,<sup>26</sup> who revealed that management support is one of the enablers of the proper implementation of accreditation. This is in accordance with the concept of leadership, which refers to how a person leads a group toward a common goal.<sup>27</sup>

The second sub-theme, that is, improving staff competencies and engagement, was raised by the majority of participants, which is also similar to the findings of other studies.<sup>28–30</sup> A study by El-Jardali et al,<sup>31</sup> who investigated the perception of healthcare professionals and directors in Lebanon, also found that if the staff were kept up to date on their training, accreditation could be implemented appropriately. The result is similar to the study of Katoue et al,<sup>29</sup> who explored the perception of healthcare professional about the challenges to implementing accreditation and how to overcome them. They reported that staff education is one of the factors that lead to implement accreditation programs properly.

Resolving quality management is the second theme, which has four subthemes. First, enhancing the quality culture hospital-wide that is consistent with,<sup>6</sup> who proved that the lack of staff awareness of quality negatively affects the implementation of standards. This can be explained by the fact that when staff learn more about accreditation and its benefits, they become more confident and willing to meet accreditation standards.<sup>26</sup>

Second, improving the performance measurement system was consistent with the study by,<sup>32</sup> which emphasized that performance measurement provided the required feedback on the impact of accreditation and was necessary for better implementation. Similarly, in a study by Yousefinezhadi et al,<sup>33</sup> a high number of measures were found to negatively affect the implementation of accreditation. Having too many performance measures causes work overload and triggers staff dissatisfaction, which affects healthcare service delivery.<sup>26</sup>

Third, the development and adherence to policies and procedures led to standardized processes that enhanced the proper implementation of accreditation. This was supported by Gichuhi,<sup>34</sup> who demonstrated that adherence to policies and procedures would achieve desired healthcare outcomes. In contrast, the results were inconsistent with those of the study by Suliman et al<sup>35</sup>. They revealed that nurses did not adhere to policies and procedures because of a lack of resources, heavy workload, and poor organizational culture.

Fourth, simplifying the documentation in medical records is required, considering that the adoption of CBAHI standards increased nurses' overload in completing medical record forms. This is consistent with the study by Algunmeeyn et al<sup>28</sup> who proved that staff, especially nurses, were overloaded with documentation procedures. Evidence shows that focusing on documentation rather than clinical findings is a challenge that affects the implementation of accreditation.<sup>36</sup> This result is consistent with the study of Vilet et al<sup>37</sup> of who conducted case studies across different countries including Australia, Botswana, Denmark, and Jordan. They explore that the clarity and simplicity of standards expedite the proper implementation of such accreditation programs. This can also be explained by the fact that the CBAHI accreditation program is relatively new compared to other international accreditation programs such as the Joint Commission International (JCI).

The third theme, ensuring the availability of resources, was captured as participants raised the lack of medical and non-medical resources to sustain compliance with the CBAHI accreditation standards. This result is similar to the study by Yousefinezhadi et al<sup>28</sup> which showed that a lack of resources was one of the main challenges to the effective implementation of accreditation. According to Tashayoei et al<sup>36</sup> the availability of resources is essential for maintaining the effective implementation of accreditation. Similarly, the study by Katoue et al<sup>29</sup> showed that interviewees focused on providing the needed supplies and infrastructure to meet standards. The maldistribution and discontinuation of resources may explain the current results.

The fourth and final theme of strategizing CBAHI-specific issues included three subthemes. First, simplification of the standards' requirements was also recommended by Tashayoei et al,<sup>36</sup> who found that having too many requirements interfered with the effort for hospitals to obtain accreditation. Yousefinezhadi et al<sup>33</sup> also reported that nurses and doctors agreed that fewer standards and requirements lead to better accreditation implementation. Interestingly, reducing the number of papers on international accreditation programs, such as the Joint Commission International standards, was also found to improve the quality of care at a university hospital in Saudi Arabia.<sup>32</sup> Moreover, Nekoei-moghadam et al<sup>38</sup> reported that participants were frustrated by the extra workload to meet standards, and they paid less attention to patients' care accordingly. The high amount of paperwork in CBAHI accreditation might be because the standards were written

based on the documentation that the hospitals already had to improve the quality of care. If healthcare providers are busy with documentation, the quality of care is negatively affected.

Second, intensive training was provided to the hospitals. This is in line with the findings of Nekoei-moghadam et al<sup>38</sup> who reported that American and Canadian accreditation standards were difficult for staff to understand. Staff required more education and explanation for accreditation to be adequately implemented. According to them, participants reported that what they understood was different from what surveyors mean. Staff awareness of standards was identified as a challenging factor for hospitals to implement accreditation effectively.<sup>6</sup>

Third, participants reported that the mandatory nature of CBAHI accreditation negatively influenced staff behavior toward implementing standards. Moreover, participants stated that MOH hospitals were forced to enroll in the CBAHI accreditation program. This arrangement caused negative effects and shifted the accreditation goal from improving quality to accreditation.<sup>39</sup> This result is consistent with the study by Tashayoei et al<sup>36</sup> who reported that the mandatory nature of accreditation programs is one of the challenges facing developing countries, and it does not lead to the effective implementation of accreditation standards in the quality of care. This result is supported by a study by Almasabi and Thomas,<sup>19</sup> who concluded that the CBAHI accreditation program is an inspection process rather than a continuous process of quality improvement.

The four emerged themes reflect the challenges that MOH hospitals wish to overcome in order to implement the CBAHI standards efficiently and effectively. Where these themes represent the MOH hospitals' feedback and could not be generalized to other governmental or private hospitals.

Finally, the current study had the following limitations. First, the MOH began implementing the JCI accreditation programs in some hospitals, which might have affected the study findings. Second, the current study was applied only to MOH hospitals, where the results cannot be generalized to other government and private hospitals in the KSA. Third, only MOH hospital staff were included, whereas if CBAHI surveyors were included, they might have explored more enablers.

## Conclusions

Where the literature shows conflicting findings on the impact of the accreditation programs due to the improper implementation of its standards. The current study explored the enabling factors for the successful implementation of CBAHI accreditation from the perspective of the MOH staff in Madinah. The present study identified four themes and 11 important sub-themes for the effective implementation of CBAHI accreditation in MOH hospitals in Madinah, Saudi Arabia. Therefore, the study bridged the research gap on the factors enabling the effective implementation of accreditation through the MOH hospitals' experience about the CBAHI program in the Saudi context.

## Strengths

The study used phenomenological approach to deeply explore enablers that effectively influence the implementation accreditation standards. The selection of five major hospitals and including different positions of participants strengthen the study's findings. Furthermore, the results will inform MOH policymakers and the CBAHI regarding the areas of improvement, improving the implementation of standards by adopting the emerged themes and sub-themes.

## Limitations

The current study was applied only at MOH hospitals. Therefore, the findings might not reflect hospitals in other governmental organizations or the private sector.

## Recommendations

The following recommendations are suggested for the MOH, the Saudi CBAHI, and future scholars.

## The Saudi MOH

The current study encourages the MOH to ensure the provision of required supplies, either financial or non-financial, to both hospitals under and after accreditation. Furthermore, the implementation of accreditation should be supported by our selected leadership and quality management, who are qualified to drive the accreditation journey.



## The CBAHI

The study recommends that CBAHI accreditation be used to conduct intensive training programs for MOH hospitals registered for accreditation and to make all survey visits unannounced.

## Future Researchers

For future researchers, replicating this study in other governmental and private hospitals might explore additional enabling factors for the successful implementation of accreditation.

## Abbreviations

CBAHI, Central Board for Accreditation on Healthcare Institutions; MOH, Ministry of Health.

## Ethical Approval and Informed Consent

This study was conducted in accordance with the principles of the Declaration of Helsinki. Participants were approached individually and the details of the study methods and procedures were explained verbally. The participation in the study was voluntary, where not incentives were provided. A Written consent was obtained from all participants included publication of anonymized response.

Ethical approval for this study was granted by both the Human Research Ethics Committee of Universiti Sains Malaysia (reference number: USMJEPeM\18080384, date: February 21, 2019) and the Ethical Review Committee (IRB) of the General Directorate of Health Affairs, Madinah, Saudi Arabia (reference number: H-03-M-084, date: March 18, 2019).

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## Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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