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Research Article

From Customary to Canny Academic Advising: The AI Panorama

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Abstract:

Academic advising is a service expected to provide students with the needed information and support for crafting academic plans attuned with their individual, educational, and professional goals; meeting institutional and graduation requirements; and getting ready for a life of change. Higher Educational Institutions (HEIs) world over are emphasizing on academic advising as a tool to familiarize students with the possible learning opportunities as well as for meeting the challenges of student retention. The teams that deal with student affairs and the academic advisors face a myriad of student queries across different channels on a regular basis, which cannot be instantly responded to, prompting in dissatisfaction with regard to the offered services. To commendably handle this challenge, it is essential to embrace pioneering systems and procedures. The increasing inclination on Artificial Intelligence and Natural Language Processing technologies in academics can enhance the academic advising systems at HEIs. The methodology used includes identifying, configuring, and deploying an AI-powered chatbot that aligns with the requirements of the existing AdTrac system at the University of Technology and Applied Sciences – Ibra. The chatbot interacts with students in both English and Arabic languages, serving as an intuitive user interface in answering the advisees' Frequently Asked Questions (FAQs) round the clock thereby providing guidance and support to help them accomplish their academic goals.

1. Introduction

The modern-day curriculum in Higher Educational Institutions (HEIs) offers varied programs and courses [1]. It is important to ensure that students get required information to make better academic decisions. Students must be aware of academic regulations, prerequisite and elective courses to prepare a perfect academic plan [2].

Academic advising is a service intended to provide students with the needed information and support for crafting academic plans attuned with their individual, educational, and professional goals. Specialized departments or staff members are employed by HEIs to guide students in their academic journey [3]. Most HEIs have the system of making academic staff as advisors to ensure academic wellbeing of a student. Apart from this, there are counsellors to interact with students who have personal problems which become a hurdle in the academic life of a student. Students at academic

risk are given a clear plan to achieve required grades and advance in their academic endeavors [4].

Academic advising is an integral function of HEIs and is a widely accepted strategy to satisfy the requirements of students. Academic advising has several challenges, and one important challenge is to provide sufficient and appropriate information to the advisees for their smooth travel during the period of study and beyond. If timely information is not provided, students are not satisfied with the advising services provided by the institution. To provide required information, more interaction with advisees is needed. As teaching faculty are given the task of academic advising, allotting a satisfied amount of time both by students and faculty is difficult. As current day students of HEIs are very much familiar with technological advancement, a chatbot can provide enormous advantages to all the stakeholders involved in the process.

The University of Technology and Applied Sciences – Ibra (UTAS – Ibra) has nearly 3,800 students studying in various departments. Each teaching faculty is assigned 25-30 advisees who are advised throughout their academic career in the institution. Meeting these large number of advisees and providing them support is a challenging task. The university has an existing Academic Advising System (AdTrac) which is used to record the discussion by each advisor after every meeting with their advisees. This has to a certain extent reduced paperwork and is supportive in getting details of a student by the administration like class attendance, academic performance, exam related issues, health issues, etc. This study is an attempt to integrate an AI-powered chatbot with the existing AdTrac system, which significantly contributes to reduced workload for advisors, shortened waiting time for personal interactions and better documentation for administrative purposes. By leveraging Artificial Intelligence and Natural Language Processing (NLP) technologies the planned bilingual chatbot interacts with students in the English and Arabic languages, thereby answering their queries as well as providing them with the needed information to help accomplish their academic goals.

Objectives of the study

The current study is aimed to achieve the following objectives.

1. To design a chatbot for answering students' academic advising related FAQs.
2. To use AI for recommending personalized study plan for advisees at academic risk.
3. To automate workflows and free up academic advisors from repetitive tasks.

2. Literature Review and Theoretical Background

Technology in academic advising

Numerous researchers have investigated the use of machine learning algorithms to create automated intervention systems that interface with learning management systems (LMS). Early course outcome prediction can be made using students' participation in the online learning environment and their current academic standing [5]. Moreover, research has demonstrated that prompt interventions and assistance are beneficial in helping low-achieving students to regulate their study habits [6]. The researchers found that their project will find a successful conclusion as some universities in the UAE have already adopted this method of academic advising and can be matched with the requirements in Oman as well.

Chatbots in education

There are various studies that have proved that NLP technology can be used to develop rule-based approach to solve student queries in an educational institution using chatbot [7, 8]. A conversational agent can be created to respond to the questions. A chatbot with frequent intent pattern can be created using a dataset of academic rules of the institution. A retrieval based chatbots can be used to answer the questions of students using AI and NLP techniques. This can be supportive in answering questions based on academics. Researchers developed a chatbot-based pattern using Artificial Intelligence Markup Language (AIML) and Latent Semantic Analysis (LSA) [9]. Further studies have been conducted to open a chatbot that answers Frequently Asked Questions (FAQs) [10]. Several studies have developed chatbots to answer students' academic queries, policies and procedures to move to higher level, academic advising queries. However, only a few have used neural networks with NLP techniques to process the user input.

Chatbots in Arabic and other Languages

Studies show that multilingual chatbots are developed in support of education. NLP and chatbot development in Arabic language has not been given much importance by researchers in the past studies. One study proposed BOTTA, an Arabic Egyptian dialect female public chatbot [11]. This is a user-friendly chatbot with retrieval-based model for open conversations and responses. Another study stated that, the University of Jordan introduced ArabChat which is a conversational agent to solve student's

queries and reduce the workload of academic advisors [12]. A further study proposed a conversational chatbot for students at King Saud University using Saudi Arabic dialect [13]. This serves as an academic advisor and counsellor to answer queries of students related to academics, probation and much more.

The existing literature disclosed the increasing role of AI-powered chatbots in transforming academic advising by extending personalized, measurable, and accessible support to students of HEIs. One researcher highlighted the role of chatbots in providing tailored guidance to higher education students [14]. Also, students using a chatbot-based advising system reported higher satisfaction due to the chatbot's interactivity and responsiveness [15]. Another study underscored the students' acceptance of chatbots in academic advising due to their ease of use [16].

The effectiveness of AI in academic advising depends on its integration with the existing institutional systems. Henceforth, this study emphasizes on deploying an AI-powered chatbot that aligns with the requirements of the existing AdTrac system at the University of Technology and Applied Sciences – Ibra. As this chatbot interacts with students in both English and Arabic languages, it serves as an intuitive user interface in answering their Frequently Asked Questions (FAQs), thereby providing the much needed information and support to help students achieve their academic goals.

Background of academic advising

The procedure of academic advising and role played by the advisor may differ between institutions. This section describes the procedure followed at the UTAS-Ibra.

The University of Technology and Applied Sciences is one of the largest universities in the Middle East region. It has eleven branches covering all the regions of the country. This study is currently initiated at the Ibra branch of the university. The branch has 3 post-foundation colleges offering various programs at Diploma, Advanced Diploma, and Bachelor level with multiple specializations. The branch also has one foundation department offering English language education to the students. Academic advising concept is introduced to the students once they move to the post-foundation colleges. Each student is allotted with an academic advisor who will take care of a student's academic progress throughout their stay in the institution. The advisor provides basic assistance like explaining program overview, courses in each level, prerequisite courses, grades to move to next level, IELTS score to move to next level and probation status. The role of advisor can be segmented into three parts. First – preparing a customized study plan for each advisee to have a steady academic progress. Second – providing guidance and answering queries, providing suggestions for personal and career growth. Third – monitoring academic progress and guiding students at risk. As mentioned in the introduction paragraphs, each academic advisor is allotted with 25-30 advisees. The task assigned to advisors is consistent across all the colleges at this university branch.

The biggest challenge in academic advising arises when an advisor leaves and a new advisor is allotted to a specific student. This requires complete knowledge on previous actions/activities conducted for each advisee. AI and related technologies can support proper documentation of the data that can be retrieved as and when required by advisors, advisees and the administration of the university.

3. Methodology

Research Design

The study used a technical implementation and integration-based research design, with emphasis on deploying an AI-powered chatbot within the existing AdTrac system to enhance academic advising. The study involved identifying, configuring and integrating an AI chatbot to provide instant and automated replies to student queries both in English and Arabic languages.

System Integration and Implementation

The integration process is as follows:

1. **Requirement Analysis:** Recognizing student advising needs and outlining chatbot functionalities.
2. **Selection of AI Chatbot:** Deploying an appropriate AI-powered chatbot that aligns with the existing AdTrac system.
3. **Configuration and Customization:** Defining chatbot interactions, refining responses, and confirming bilingual support.
4. **System Integration:** Integrating the chatbot into the AdTrac system for seamless user interaction.
5. **Testing and Initial Deployment:** Preliminary testing to ensure functionality.

Planned Evaluation / Analysis

The effectiveness of integration will be evaluated from time to time through:

1. **User Interaction Data:** Chatbot usage monitoring, number of queries handled and accuracy of responses.
2. **Feedback:** Gathering student and advisor feedback to measure system functionality and user satisfaction.
3. **Performance Assessment:** Measuring chatbot efficacy in handling advising queries compared to manual advising methods, etc.

System design / conceptual framework

The three major elements connected to academic advising are the people involved, the process of advising and the technology adopted. There are several limitations in the current system of academic advising that is used at the researcher's institution which are listed below.

People involved

Academic advising involves people from three dimensions namely students, advisors and the administration both at the college and university level. The major challenge here is the availability of time for the advisors to provide personalized guidance for each advisee. As all the advisors' are teaching faculty who are allotted with 16-18 hours of teaching load per week along with administrative, committee and research tasks. Also finding a common free time for both advisor and advisee is challenge as all advisees are not at the same level of study. These great impacts the students at academic risk as enough time could not be allocated by the advisor.

Process of advising

UTAS-Ibra has an existing academic advising system (AdTrac) which enables each advisor to record the discussion with their advisees in the portal and an email sent to both the parties. The recorded information can be accessed by the administration in case of need. The challenge here is the time for advisor to record the information on a timely basis. Also, policies and program requirements for each advisee must be ready in hand for an advisor who has 25-30 advisees who may be studying at different levels, specialization, and academic performance.

Technology adopted

The current advising system at UTAS-Ibra is designed in a way that repeated topics are discussed with advisees during one-to-one meetings and are recorded. The work of an advisor becomes repetitive. More time is spent in gathering information from different services available in the university website and the challenge here is that the applications are not integrated.

To overcome the above challenges, this research study has adopted a model which can integrate all applications and making it time effective.

Adopted model

The below is a representation of the adopted model that this study is aiming to use to overcome the challenges of academic advising [17]. The model is aimed to find solution to the challenges of academic advising based on three segments:

- Creating study plans using AI
- Identifying students at risk using AI
- Digital assistant using AI

This project has implemented a chatbot system that will enable the students to get answers to their queries 24/7. Those questions which are repetitive in nature and do not need physical meeting with the

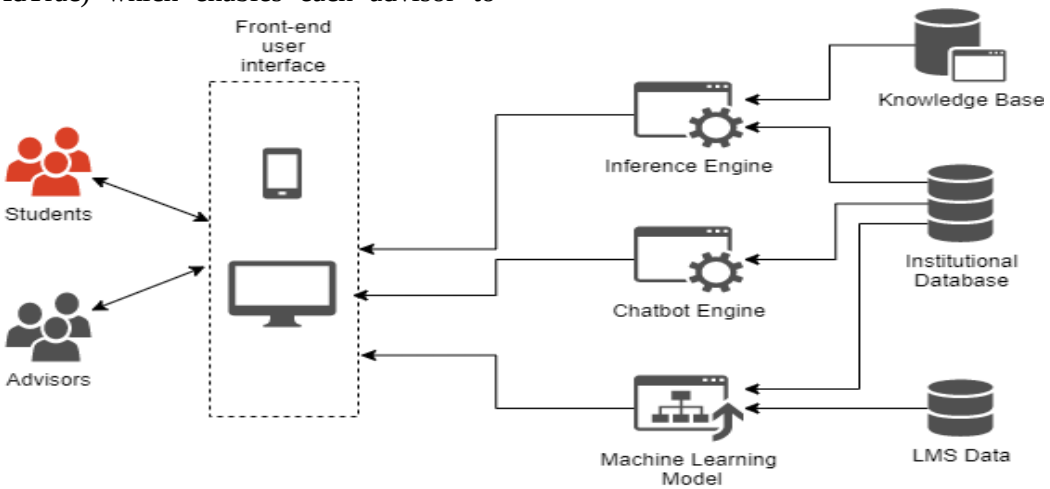

Figure 1. *Adopted Model*

advisor can be answered through this chatbot. The major advantage of this tool is that it can provide answers to the users in both Arabic and English. Currently the chatbot has 20 questions collected from the advisors of various departments at UTAS – Ibra. Further questions can be added based on the feedback received from the users and up to 100 questions can be added free of charge.

The following are the screenshot images of the implemented chatbot tool:

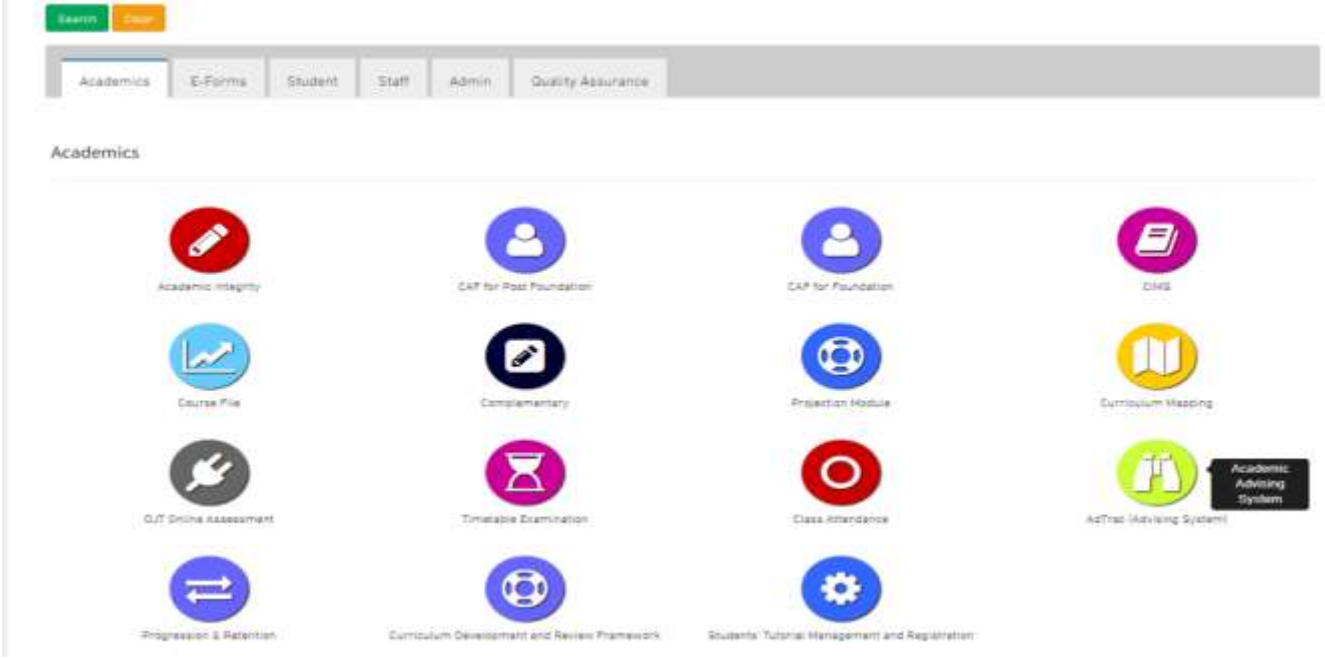

Figure 2. *UTAS – Ibra portal page showing AdTrac system*

Figure 3. *Question page of chatbot tool*

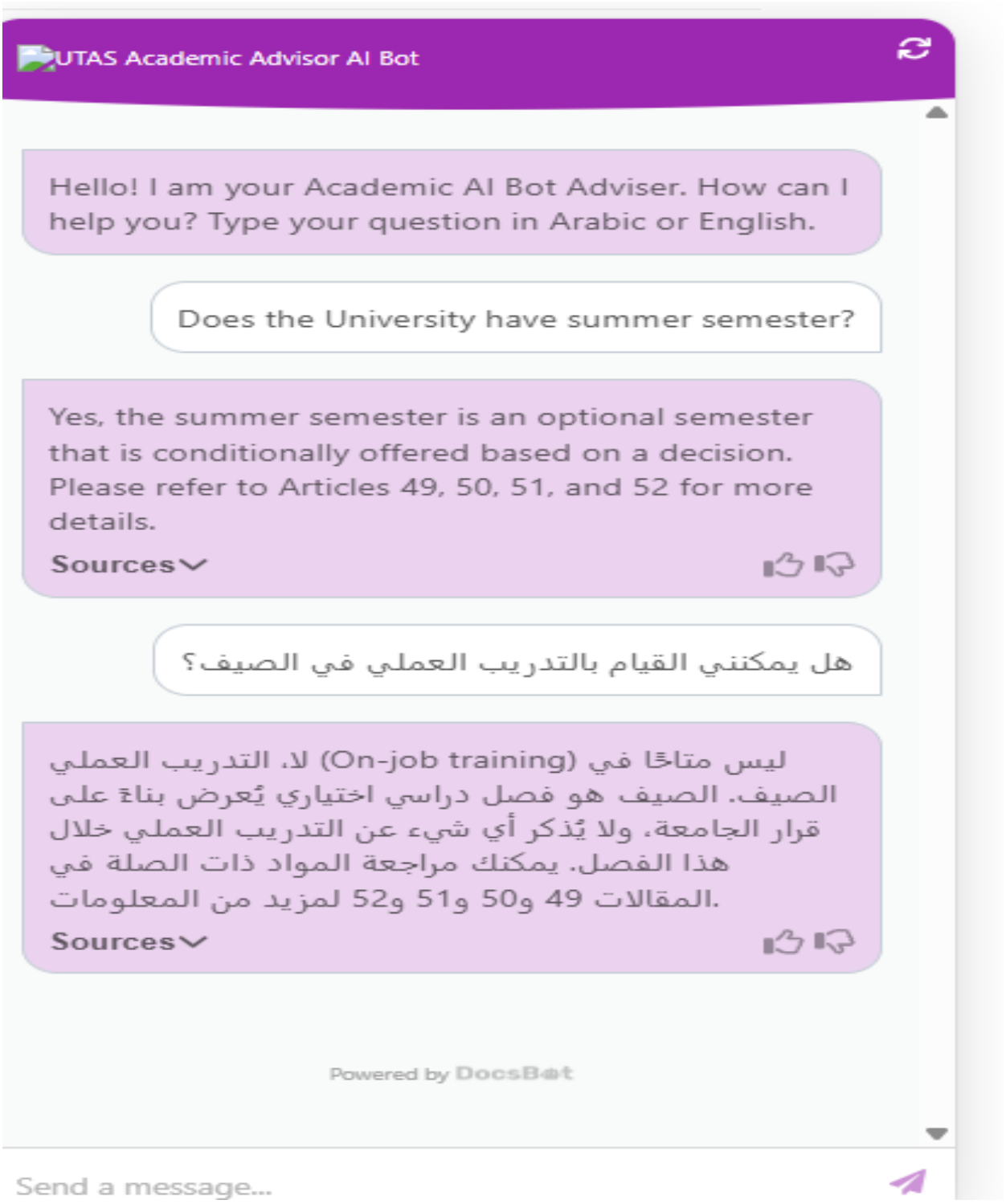

Figure 4. *Bilingual answers by chatbot tool*

4. Results And Discussion

This section addresses how the objectives of the project have been achieved. The following are the objectives of the project with a detailed explanation of their achievement.

Objective 1:
To design a chatbot for answering students' academic advising related FAQs.

The team members collected 20 FAQs from academic advisors of three academic departments of UTAS – Ibra. These questions and answers were loaded into the chatbot tool, and a trial was done to see if answers are given correctly. There is an option to add questions up to 100. Additional questions can be added as requested by the users of the tool.

Objective 2:

To use AI for recommending personalized study plans for advisees at academic risk.
This tool is now in the initial stage where it answers only questions in bilingual mode. In future, if a paid version of this chatbot is purchased, advanced features like study plan preparation and mentoring services can also be added.

Objective 3:
To automate workflows and free up academic advisors from repetitive tasks.
This chatbot will reduce repetitive tasks of academic advisors, answering FAQs raised by different advisees during their personal visit. Now the advisees can get answers to their queries anytime and need not wait for a reply from their advisor. This has certainly reduced the workload of academic advisors.

5. Conclusion & Future Research Direction

Chatbots have been recognized as effective tools for tailored academic advising and support for higher education students [18]. The role of chatbots in enhanced student experience, offering deeper engagement and more nuanced conversations between users and the advising system is unavoidable [19]. Using chatbots in academic advising has the promising potential to respond to student inquiries with greater accuracy [20]. They provide timely assistance to students, resulting in improved academic performance [14]. Chatbots not only provide access to advising services 24/7, but also foster an inclusive learning environment for diverse student populations [21], [22], [15]. The increasing acceptance of AI powered chatbots in academic advising can be attributed to the positive perceptions of students towards AI and related technologies [16]. This underscores that students of HEIs are interested in AI-driven solutions, which could either supplement or replace the traditional human advising roles [23]. However, concerns regarding data privacy and confusion regarding the extent to which chatbots can fully replace human interactions emphasizes on using chatbots for initial support while sustaining manual interactions with advisors for complex advising situations [24]. One study highlighted the importance of a balanced approach in academic advising that combines human expertise with AI efficiency [25].
This study examined the constraints that fall under the purview of knowledge management as well as the advisory procedure. Ultimately an all-encompassing solution that automates advising tasks is suggested using AI-based technology. AI-based systems can help students navigate their journeys with little assistance from advisors thus freeing advisors up to concentrate on more important advising duties like discussing about students' career planning and development. Moreover, AI-based advisory systems offer equal access to information and services for every student and can be tailored to meet their specific needs.
Overall, the benefits of using AI-powered chatbots in academic advising or plenty, but its success will depend on how well these technologies and existing systems are integrated into the educational framework and how the students and HEIs adopt to these innovations.

This study concentrates solely on the researchers' institution and can be further modified according to the requirements of other HEIs. The future research can focus on enhancing chatbots by adding personal information like sports and other activities the student is interested and preparing a daily work schedule to allot time for both academic and extracurricular activities for all-round development of students.

Author Statements:

- **Ethical approval:** The conducted research is not related to either human or animal use.
- **Conflict of interest:** The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper
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- **Data availability statement:** The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

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