DEVELOPING STRATEGIES TO INCREASE THE USAGE OF EVIDENCE-BASED PRACTICE IN CUENCA, ECUADOR

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An Interactive Qualifying Project Report Submitted to the Faculty of WORCESTER POLYTECHNIC INSTITUTE in partial fulfillment of the requirements for the Degree of Bachelor of Science

Developing Strategies to Increase the Use of Evidence-Based Practice in Medical Centers in Cuenca, Ecuador

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Date:
13 May 2021

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Abstract

Evidence-based practice (EBP) is a process that incorporates the best available medical evidence to improve the daily practices of physicians and patient care. Our goal was to develop strategies to increase EBP in Cuenca, Ecuador. To accomplish this goal, we interviewed and surveyed physicians from the US and Ecuador to identify current usage of EBP in their medical centers. Our research with Cuenca doctors showed that EBP was limited primarily due to a lack of necessary resources. We used our findings to create recommendations to help medical professionals and administrators in Cuenca hospitals to adapt EBP into their daily activities and draw attention to the lack of EBP resources.

Resumen

La práctica basada en la evidencia es un proceso que incorpora la mejor evidencia médica disponible para mejorar las prácticas diarias de los médicos y la atención al paciente. Nuestro objetivo fue desarrollar estrategias para aumentar las prácticas en Cuenca, Ecuador. Para lograr este objetivo, entrevistamos y encuestamos a médicos de los Estados Unidos y de Ecuador para identificar el uso actual de la práctica basada en la evidencia en sus centros médicos. Nuestra investigación con médicos de Cuenca mostró que las prácticas estaban limitadas principalmente debido a la falta de los recursos necesarios. Usamos nuestros hallazgos para crear recomendaciones para ayudar a los profesionales médicos y administradores de los hospitales de Cuenca a adaptar estas prácticas en sus actividades diarias y llamar la atención sobre la falta de recursos de las prácticas basadas en la evidencia.

Executive Summary

The Problem

A study conducted in 2016 by the John Hopkins Institute found that medical errors, such as poorly coordinated care, absence or underuse of protocols, and variation in physicians' practice patterns, are one of the leading causes of death worldwide (Makary & Daniel, 2016). Evidence-based practice (EBP) is the combination of the best research available and individual clinical expertise to make judicious medical decisions and has been associated with significant improvements in clinical practice (Montori & Guyatt, 2008; Sackett et al, 1996).

Dr. Jaime Moreno, a physician in Cuenca, has observed that a high number of physicians in Cuenca, Ecuador struggle to incorporate evidence-based practice into their daily medical activities. This has resulted in a lack of knowledge of updated medical practices among physicians, which affects the quality-of-care patients receive. To improve patient care in Ecuador, our group worked with Dr. Moreno and his team in Ecuador, as well as with US physicians and EBP experts, to learn more about successful evidence-based practice methods and the current attitudes and usage of EBP in Cuenca, Ecuador.

Project Goal

The goal of this project was to devise strategies to help physicians incorporate evidence-based practice in hospitals in Cuenca, Ecuador. We achieved this goal through three primary objectives, listed below:

Objective 1: Investigate the presence & usage of EBP in the United States
Objective 2: Investigate the presence & usage of EBP in Cuenca, Ecuador
Objective 3: Develop & evaluate a plan to increase the usage of EBP in Cuenca hospitals

Methods & Results

To accomplish this goal, we interviewed 11 physicians and EBP experts from the US and 8 physicians from Ecuador to get a sense of their attitudes towards and usage of evidence-based practice. We then sent out two surveys, one tailored to physicians in the US and one to physicians in Cuenca, to validate the information we learned from the interviews on larger sample sizes. We obtained 19 responses from US physicians and 14 from Cuenca physicians. Our research revealed three major findings about evidence-based practice in the US and Cuenca, which are briefly described below.

1. Physicians in both the US and Cuenca have a solid understanding of the evidence-based practice and its benefits

We found that both populations had a strong grasp on the concept of evidence-based practice and the benefits it can present in healthcare. Most interview participants from both the US and Cuenca identified EBP as the incorporation of the current best evidence to make the most informed medical decisions for each patient. Many of the physicians from the US explained that the process of evidence-based practice is done on both an individual basis and a community basis. Individually, physicians work to keep themselves updated on the latest medical studies, and as a community, physicians collaborate with colleagues about new and challenging patient

cases and new relevant research. Many US physicians also identified that their medical centers have created a standardized system for the most used procedures and treatment plans. Physicians in Ecuador explained that hospitals do not facilitate or incentivize any EBP-promoting activities, meaning that any motivation for physicians to incorporate evidence-based practice into their medical activities is completely individual. Physicians from both populations recognize that evidence-based practice can improve overall patient care and decrease medical error.

2. Unlike physicians in the US, physicians in Cuenca do not have the necessary resources to integrate the current-best evidence into their daily activities

The research revealed a discrepancy in the resources available to doctors in the US versus Cuenca in relation to literature, technology and medications, and patient time. In relation to literature there were three constraints: availability, relevancy, and language. While none of the physicians in the US cited access or applicability of medical literature as an issue, physicians in Ecuador voiced this as one of their primary barriers to practicing EBP. The Cuenca physicians that we surveyed all stated that their medical centers do not provide any free access to medical databases, though the Ecuador survey indicated that some medical centers may provide access to medical databases. In both the interviews and the survey, though, almost all the Ecuador physicians stated that they must find alternative methods of accessing medical literature, such as through illegally sourcing and downloading articles. Physicians in Ecuador also stated that even then, a large percent of the medical literature is written in English, and it is difficult to translate the medical terminology appropriately via an online translator such as Google Translate so that the physicians can comprehend the evidence and apply it in their practice. Even if physicians in Ecuador had free access to properly translated literature, most modern medical research is performed in higher-income countries that have state-of-the-art medicine and machinery, which Ecuador does not have. Any evidence that utilizes this newer technology therefore becomes inapplicable in Ecuador due to a lack of these resources. Ecuador physicians also explained that they do not have enough time in their workday to meet with patients while also reading through medical literature to help diagnose and treat a patient. This is different from the US doctors we spoke to who expressed that their hospitals allocate more time for their staff to access literature throughout the workday to stay updated.

3. The current system in Cuenca health centers does not promote activities such as continuing medical practices or recertifications, which leads to a lack of focus on prioritizing or encouraging EBP

Physicians in the US stated that activities that help them stay up-to-date with the latest medical research, such as continuing medical education (CME) programs and recertification requirements are extremely helpful in evidence-based practice. Many of the US physicians that we talked to indicated that their medical centers provide funding for these recertification and CME initiatives, further promoting the importance of EBP. Physicians in Ecuador stated that there are no requirements for recertification in Ecuador, and many agreed that these requirements would make it easier to practice EBP and stay up-to-date with the most current evidence. Additionally, while some of the physicians stated that there are programs like CME, there are no regular requirements for these, and most medical centers do not help cover the costs of these programs or provide paid time for physicians to complete them. Therefore, physicians who choose to stay up-to-date with the most current practices are forced to do so with their own time and money.

Recommendations & Conclusions

After gaining a better understanding of the presence and attitude of EBP in Ecuador, as well as the resources they have available, we developed a list of recommendations for different populations in the medical community of Cuenca to help the healthcare system increase these practices.

- **Doctors**: Subscribe to email aliases and online journals that send regular updates on the latest practices and studies.
- **Hospital departments**: Allocate time for the department to meet and discuss regularly and create standardized practices for common procedures.
- **Medical centers**: Devote resources into doctor training and seminars and encourage medical students to train under physicians.
- **Government & Ministry of Health**: Increase access to medical training and requirements for continuing medical education.

This project demonstrated how evidence-based practice can be applied into daily medical activities and showed that certain resources are vital in incorporating these practices. This study can be used as a baseline which future research can build upon to develop refined strategies on the individual level through the national level that incentivize the use of EBP. Future groups that can travel to Ecuador can also observe EBP in medical centers to add depth to the study and further tailor strategies for the Cuenca physicians and medical centers.

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Resumen ejecutivo

El Problema

Un estudio realizado en 2016 por el Instituto John Hopkins encontró que los errores médicos, como la atención deficientemente coordinada, la ausencia o infrautilización de protocolos y la variación en los patrones de práctica de los médicos, son una de las principales causas de muerte en todo el mundo (Makary y Daniel, 2016). La práctica basada en la evidencia es la combinación de la mejor investigación disponible y la experiencia clínica individual para tomar decisiones médicas acertadas, y se ha asociado con mejoras significativas en la práctica clínica (Montori y Guyatt, 2008; Sackett et al, 1996).

El Dr. Jaime Moreno, médico de Cuenca, ha observado que un gran número de médicos en Cuenca, Ecuador, luchan por incorporar la práctica basada en la evidencia en sus actividades médicas diarias. Esto ha resultado en una falta de conocimiento de las prácticas médicas actualizadas entre los médicos, lo que afecta la calidad de la atención que reciben los pacientes. Para mejorar la atención al paciente en Ecuador, nuestro grupo trabajó con el Dr. Moreno y su equipo en Ecuador, así como con médicos estadounidenses y expertos en estas prácticas, para aprender más sobre los métodos de práctica exitosos basados en la evidencia y las actitudes y el uso actuales de las prácticas en Cuenca, Ecuador.

Nuesta meta

El objetivo de nuestro proyecto fue diseñar estrategias para ayudar a los médicos a incorporar la práctica basada en la evidencia en los hospitales de Cuenca, Ecuador. Logramos nuestro objetivo a través de tres objetivos principales, que se enumeran a continuación:

Objetivo 1: Investigar la presencia y el uso de las prácticas basadas en la evidencia en los Estados Unidos
Objetivo 2: Investigar la presencia y el uso de las prácticas basadas en la evidencia en Cuenca, Ecuador
Objetivo 3: Desarrollar y evaluar un plan para incrementar el uso de las prácticas basadas en la evidencia en los hospitales de Cuenca.

Métodos y resultados

Para lograr este objetivo, entrevistamos a 11 médicos y expertos en la práctica basadas en la evidencia en los Estados Unidos y 8 médicos de Ecuador para tener una idea de sus actitudes y el uso de la práctica basada en la evidencia. Luego enviamos dos encuestas, una adaptada a médicos en los Estados Unidos y otra a médicos en Cuenca, para reforzar la información que obtuvimos de las entrevistas en tamaños de muestra más grandes. Obtuvimos 19 respuestas de médicos estadounidenses y 14 de médicos de Cuenca. Nuestra investigación reveló tres hallazgos importantes sobre la práctica basada en la evidencia en los Estados Unidos y Cuenca, que se describen brevemente a continuación.

1. Los médicos tanto en los Estados Unidos. Como en Cuenca tienen un conocimiento sólido de la práctica basada en la evidencia y los beneficios de la misma.

Descubrimos que ambas poblaciones tenían una sólida comprensión del concepto de práctica basada en la evidencia y los beneficios que puede presentar en la atención médica. La mayoría de los participantes de la entrevista tanto de los Estados Unidos y en Ecuador identificaron la

práctica basadas en evidencia como la incorporación de la mejor evidencia actual para tomar las decisiones médicas más informadas para cada paciente. Muchos de los médicos de los Estados Unidos. Explicaron que el proceso de la práctica basada en la evidencia se realiza tanto a nivel individual como comunitario. De manera individual, los médicos trabajan para mantenerse actualizados sobre los últimos estudios médicos y, como comunidad, los médicos colaboran con sus colegas sobre casos de pacientes nuevos y desafiantes y nuevas investigaciones relevantes. Muchos médicos estadounidenses también identificaron que sus centros médicos han creado un sistema estandarizado para los procedimientos y planes de tratamiento más utilizados. Los médicos de Ecuador explicaron que los hospitales no facilitan ni incentivan ninguna actividad que promueva la práctica basadas en evidencia, lo que significa que cualquier motivación para que los médicos incorporen la práctica basada en la evidencia en sus actividades médicas es completamente individual. Los médicos de ambas poblaciones reconocen que la práctica basada en la evidencia puede mejorar la atención general del paciente y disminuir los errores médicos.

2. A diferencia de los médicos de los Estados Unidos, los médicos de Cuenca no cuentan con los recursos necesarios para integrar la mejor evidencia actual en sus actividades diarias.

La investigación encontró una discrepancia en los recursos disponibles para los médicos en los Estados Unidos versus Cuenca en relación con la literatura, la tecnología y los medicamentos, y el tiempo de los pacientes. En relación con la literatura, había tres limitaciones: disponibilidad, relevancia y lenguaje. Si bien ninguno de los médicos en los Estados Unidos. Citó el acceso o la aplicabilidad de la literatura médica como un problema, los médicos en Ecuador expresaron esto como una de sus principales barreras para practicar la práctica basadas en evidencia. Todos los médicos de Ecuador que encuestamos declararon que sus centros médicos no brindan acceso gratuito a bases de datos médicas, aunque la encuesta de Ecuador indicó que algunos centros médicos pueden brindar acceso a bases de datos médicas. Sin embargo, tanto en las entrevistas como en la encuesta, casi todos los médicos ecuatorianos manifestaron que tienen que encontrar métodos alternativos para acceder a la literatura médica, como la obtención y descarga ilegal de artículos. Los médicos en Ecuador también afirmaron que incluso entonces, un gran porcentaje de la literatura médica está escrita en inglés, y es difícil traducir la terminología médica de manera adecuada a través de un traductor en línea como Google Translate para que los médicos puedan comprender la evidencia y aplicarla. en su práctica. Incluso si los médicos en Ecuador tuvieran acceso gratuito a literatura debidamente traducida, la mayoría de la investigación médica moderna se realiza en países de ingresos más altos que cuentan con medicina y maquinaria de última generación, que Ecuador no tiene. Por lo tanto, cualquier evidencia que utilice esta nueva tecnología se vuelve inaplicable en Ecuador debido a la falta de estos recursos. Los médicos de Ecuador también explicaron que no tienen suficiente tiempo en su jornada laboral para reunirse con los pacientes y al mismo tiempo leer la literatura médica para ayudar a diagnosticar y tratar a un paciente. Esto es diferente de los médicos estadounidenses con los que hablamos, quienes expresaron que sus hospitales asignan más tiempo para que su personal acceda a la literatura durante la jornada laboral para mantenerse actualizado.

3. El sistema actual en los centros de salud de Cuenca no promueve actividades, como prácticas médicas continuas o renovación de licencia, lo que lleva a una falta de enfoque en priorizar o incentivar las prácticas basadas en la evidencia.

Los médicos en los Estados Unidos declararon que las actividades que los ayudan a mantenerse al día con las últimas investigaciones médicas, como los programas de educación médica continua y los requisitos de recertificación, son extremadamente útiles en la práctica basada en la evidencia. Muchos de los médicos estadounidenses con los que hablamos indicaron que sus centros médicos proporcionan fondos para estas iniciativas de recertificación y educación médica continua, promoviendo aún más la importancia de las prácticas basadas en evidencia. Los médicos en Ecuador declararon que no existen requisitos para la recertificación en Ecuador, y muchos estuvieron de acuerdo en que estos requisitos facilitan la práctica de las prácticas y estar al día con la evidencia más actualizada. Además, si bien algunos de los médicos afirmaron que existen programas similares a educación médica continua, no existen requisitos regulares para estos y la mayoría de los centros médicos no ayudan a cubrir los costos de estos programas ni brindan tiempo pagado para que los médicos los completen. Por lo tanto, los médicos que optan por mantenerse al día con las prácticas más actuales se ven obligados a hacerlo con su propio tiempo y dinero.

Recomendaciones y conclusiones

Luego de conocer mejor la presencia y actitud de la PBE en Ecuador, así como los recursos que tienen disponibles, desarrollamos una lista de recomendaciones para diferentes poblaciones de la comunidad médica de Cuenca para ayudar al sistema de salud a incrementar estas prácticas.

- **Médicos:** Suscríbase a alias de correo electrónico y revistas en línea que envían actualizaciones periódicas sobre las últimas prácticas y estudios.
- **Departamentos del hospital:** Asigne tiempo para que el departamento se reúna y discuta regularmente y cree prácticas estandarizadas para procedimientos comunes.
- **Centros médicos:** Dedique recursos a la formación de médicos y seminarios y anime a los estudiantes de medicina a formarse con médicos.
- **Gobierno y Ministerio de Salud:** Aumentar el acceso a la formación médica y los requisitos para la educación médica continua.

Este proyecto demostró cómo la práctica basada en la evidencia se puede aplicar a las actividades médicas diarias y mostró que ciertos recursos son vitales para incorporar estas prácticas. Este estudio se puede utilizar como línea de base sobre la que se pueden basar las investigaciones futuras para desarrollar estrategias refinadas a nivel individual a nivel nacional que incentiven el uso de las prácticas. Los grupos futuros que puedan viajar a Ecuador también pueden observar la práctica basada en la evidencia en los centros médicos para agregar profundidad al estudio y adaptar aún más las estrategias para los médicos y centros médicos de Cuenca.

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Acknowledgements

Our project was possible due to the wide range of support we received. First, we would like to thank our sponsor, Dr. Jamie Moreno, and his team. Dr. Moreno developed the idea for our project through his observation of the use of evidence-based practice (EBP) at his hospital, Santa Inez, as well as surrounding medical centers. His insight in the topic and passion to improve patient care was a motivating factor for our team to help find solutions to the issue. Additionally, we would like to thank his team: Juan Francisco, Domenica Palacios, and Dr. Pedro Pablo Arias. These three people helped us find Ecuadorian physicians to interview and at least one of them attended each interview, where they helped us translate and interpret. They also were instrumental in helping us revise and send out our survey questions to the Ecuador population.

We would also like to thank our advisors, Dr. Courtney Kurlanska and Dr. Melissa Belz. The two of them devoted their time to help us develop our project and work through the writing process. On top of that, they provided insightful ideas and suggestions to help us progress in our work.

The information we acquired from our interviews was pivotal in our ability to propose suggestions of how EBP can be better integrated into physicians' daily practice. We would like to thank all the US and Cuenca doctors and experts who participated in these interviews.

Finally, we would like to thank our university, Worcester Polytechnic Institute, for making this experience possible. While the Covid-19 pandemic made it impossible for us to do our project in Cuenca, they worked to provide us with the resources and accommodations we needed to perform the research remotely. This experience has been invaluable in our development as researchers and writers, and we are extremely grateful for the opportunity we were presented with. Despite being remote, we were able to make new connections and expand our reach as members of our global community.

Agradecimientos

Nuestro proyecto fue posible gracias al amplio apoyo que recibimos. Primero, nos gustaría agradecer a nuestro patrocinador, el Dr. Jamie Moreno, y su equipo. Dr. Moreno desarrolló la idea de nuestro proyecto a través de sus observaciones del uso de la práctica basada en la evidencia en su hospital, Santa Inez, así como en los centros médicos circundantes. Su conocimiento del tema y su pasión por mejorar la atención al paciente fue un factor de motivación para nuestro grupo a buscar soluciones. Además, queremos agradecer a su equipo: Juan Francisco, Domenica Palacios y Dr. Pedro Pablo Arias. Estos tres nos ayudaron a encontrar médicos ecuatorianos para entrevistar y al menos uno de ellos asistió a cada entrevista, donde nos ayudaron a traducir e interpretar. También fueron fundamentales para ayudarnos a revisar y enviar las preguntas de nuestra encuesta a la población de Ecuador.

También nos gustaría agradecer a nuestros asesores, Dra. Courtney Kurlanska y Dra. Melissa Belz. Los dos dedicaron su tiempo a ayudarnos a desarrollar nuestro proyecto y trabajar en el proceso de escritura. Además de eso, proporcionaron ideas y sugerencias interesantes para ayudarnos a progresar en nuestro trabajo.

La información que obtuvimos de nuestras entrevistas fue fundamental para nuestra capacidad de proponer sugerencias sobre cómo la práctica basada en la evidencia puede integrarse mejor en la práctica diaria de los médicos. Queremos agradecer a todos los médicos y expertos de Estados Unidos y Cuenca que participaron en estas entrevistas.

Finalmente, nos gustaría agradecer a nuestra universidad, Worcester Polytechnic Institute, por hacer posible esta experiencia. Aunque la pandemia Covid-19 hizo imposible que hiciéramos nuestro proyecto en Cuenca, trabajaron para brindarnos los recursos y las adaptaciones que necesitábamos para realizar la investigación de forma remota. Esta experiencia ha sido invaluable en nuestro desarrollo como investigadores y escritores, y estamos extremadamente agradecidos por la oportunidad que se nos presentó. A pesar de ser remotos, pudimos establecer nuevas conexiones y expandir nuestro alcance como miembros de nuestra comunidad global.

Authorship

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Finalizing the Recommendations	Silvana Reid
Knowledge, Understanding, & Attitudes of Evidence-Based Practice	Silvana Reid
Medical Center Investments	Alexandra Scariati
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Recommendations	Jordan Wynn & Alexandra Scariati
Limitations	Jordan Wynn
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Introduction

A study conducted in 2016 by the John Hopkins Institute found that medical errors are one of the leading causes of death worldwide, contributing to 250,000 deaths per year in the United States alone. Some examples of medical errors include poorly coordinated care, absence or underuse of protocols, and variation in physicians' practice patterns (Markary & Daniel, 2016). Ensuring that physicians keep up-to-date on the latest medical research improves patient care and leads to successful healthcare practices (Portney, 2020).

Evidence-based practice (EBP) is the use of the best research and clinical trials available to make judicious medical decisions and reinforce the fundamental principle that quality healthcare should be based on the most current and applicable scientific data. The use of EBP has demonstrated significant improvement in clinical practice, as it provides physicians with more information about the most up-to-date practices (Montori & Guyatt, 2008). This leads to more effective patient diagnoses, which allows physicians to devise the best possible individualized treatment plan (Sackett et al, 1996). Many countries have systems in place that require healthcare professionals to keep up-to-date with the latest medical research, however, there is an inconsistency with the use of EBP among physicians and countries (Trinder, 2006).

Our project sponsor, Dr. Jaime Moreno (see Appendix A), has observed that the doctors in Cuenca, Ecuador struggle to implement EBP into their patient care routine and would like to develop strategies to increase the usage of evidence-based practice in Cuenca hospitals. In our background chapter, we explore evidence-based practice as a methodology and its implementation, including evidence-based medicine, translational research, and challenges of evidence-based practice. We also dive into the essential components of EBP and what it looks like in higher-income countries. The discussion then transitions into clinical research and provides background on the medical system in Ecuador. Our methods chapter outlines our goals and objectives, with further elaboration to demonstrate what we did to accomplish these objectives. We discuss our results and conclude with our recommendations and deliverable for the project. We created a set of recommendations for doctors in Cuenca and future ideas for how this project can proceed in the future.

Evidence-Based Practice: Framework & Applications

Evidence-based medicine (EBM) is an ideology that proposes the investigation of "individual clinical expertise and the best external evidence" (Sackett et al, 1996, p.1). Applying an EBM methodology into daily practice allows physicians to provide the best quality care to their patients (Sackett et al, 1996). Since the emergence of EBM in the early 1990s, its core concepts, processes, and procedures have been adopted and applied directly to the daily activities of medical practitioners. The direct application of EBM is known as evidence-based practice (EBP), which refers to the use of EBM in medical professionals' daily routines (Trinder, 2006).

Principles & Methods of Evidence-Based Practice

Evidence-based practice is the combination of skills and judgment of experienced physicians with the most current, scientifically backed diagnoses and treatments (Hong & Chen, 2019). Evidence-based practice in health centers helps to evaluate cost-control, allows patients to receive the best possible care, and helps physicians avoid the responsibility of information overload (McQueen, 2001). While medical mistakes are inevitable, evidence-based practice helps reduce common errors. Evidence-based practice works towards removing biases and sets up cause-and-effect relationships between variables, allowing it to be more reliable than the sole dependence on highly qualified opinions of well-educated physicians (Hutchison & Rogers, 2012). This helps to ensure precise diagnoses and medical decisions by limiting instances of missing, incomplete, or low-quality patient care. Access to past evidence and shared decision-making minimizes misinterpretation, allowing physicians to tailor care to their patients (Scott, 2018; Sim et al, 2001).

An evidence-based medical approach begins by determining the needs of the patient, course of action, and results of any given medical situation based on a combination of previous medical training (Gibbs & Gambrill, 2002; Portney, 2020). Using evidence-based systems helps eliminate medical mistakes caused by fatigue, stress, and other factors that can influence the decision-making process (Bate et al, 2012). EBP utilizes the combination of available literature and their current medical knowledge to be better-informed and produce higher quality patient care. This form of decision-making considers all relevant information and provides the best opportunity for successful patient outcomes (Portney, 2020).

Methods of Evidence-Based Practice

Evidence-based practice helps physicians bridge clinical research and patient care (Trinder, 2006). The process of EBP can be broken down into steps that aim to aid health practitioners in improving practice methods and approaches to patient care, as demonstrated in Figure 1 below. The process involves finding appropriate literature, determining the best relevant evidence from that literature, and then applying that knowledge to the case at hand (Sackett et al, 1996; Melnyk et al, 2010). This five-step method is based on the ideology of evidence-based medicine which emphasizes professional judgment, the relationship between physician and patient, and deliberate judgment-making on the part of the physicians (Sackett et al, 1996).

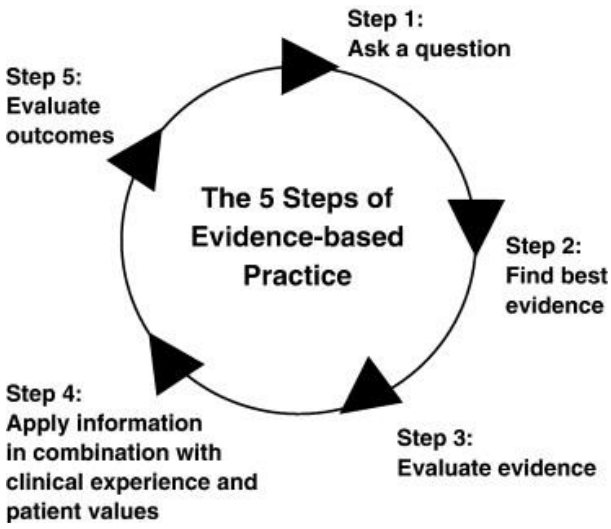

Figure 1: *Framework of Evidence-Based Systems (Sackett et al, 1996)*

Translational Research

Evidence-based practice is dependent on two major factors: the availability of applicable research publications and the adoption of best-informed procedures. This translation of research into practice is defined as translational research, which is the application of scientific discovery from controlled laboratory conditions to the uncontrolled conditions of medical care (Chesla, 2008). This creates a cause-and-effect relationship known as the "bench to bedside" effect, which refers to the translation of research and literature findings (laboratory bench) to clinical practice and patient care (bedside) (Kaufman & Curl, 2019). The process is dependent on basic and applied research, dissemination of research results, receiving and acceptance of research results by professionals, and the willingness and ability of professionals to apply their findings into their daily practice (Trinder, 2006). A lack of quality translational research tools has resulted in a gap between evidence production and utilization in medical practice up to 20 years (Trinder, 2006).

The translation of research into practice can be a difficult process for physicians due to limited access to research and the difficulties with understanding and applying new clinical information. This translational process often includes tools to help physicians have easier access to new and applicable clinical research (Trinder, 2006). One example is through care maps, which are grids and flow charts that physicians can follow based on the symptoms and conditions of the patient. Care maps help to provide a standard measure of practice for the most common issues (Monsen et al, 2011). Clinical guidelines are another common tool, which are "systematically developed statements to assist practitioner and patient decisions about appropriate healthcare for specific clinical circumstances" (McQueen, 2001, pg. 1537). These guidelines assist practitioners in making decisions appropriate for the specific clinical circumstances based on previous assessment of outcomes such as complications, mortality, and remission rates (McQueen, 2001).

Challenges of Evidence-Based Practice

The implementation of EBP into a healthcare professional's daily routine is challenging and requires an increased workload for the entire staff. Time and money are the two largest factors that prevent systems from using these practices (McQueen, 2001). In promoting a culture that

embraces EBP, it is important to recognize that implementation is time-consuming and complex. The goal is to develop consistent standards for diagnosis and health management, which can only be achieved with a comprehensive staff effort. Medical centers must foster an environment that encourages EBP among all healthcare professionals even though it can be overwhelming due to the information overload on part of the staff, the cost-control strategies the administrations use to optimize costs, and the need for the practice to serve a public that is very demanding and increasingly knowledgeable (McQueen, 2001).

Despite providing a dynamic solution, evidence-based practice faces many barriers in being implemented in low-income countries such as lack of trust, limited knowledge of health-care professionals, and lack of access to resources (Behague et al, 2009). Widely used medical databases such as UpToDate and MEDLINE (which is accessible through PubMed) allow for access to up-to-date methodologies but are cost-prohibitive and the information is not always applicable (Phua et al, 2012). In addition, the quality and relevance of sources found is dependent on the skillset of the researcher to analyze and the reproducibility of the study. Due to limited access, healthcare professionals in some low-income countries indicate that they do not know how to find a "good, published paper," which limits their ability to apply the best practices to their patients (Yiridomoh et al, 2020). Another limitation is the increased demand on the hospital staff to perform and understand new procedures and practices (Kalavani et al, 2018). This requires increased training and resource availability to the staff, which costs the hospital money. Hospitals struggle to fund these medical databases and provide monetary incentives that allow professionals to do this research (McQueen, 2001). The major barrier that exists is the inability to merge current training with updated methodologies. Despite acknowledging that evidence-based medicine would improve practices, a gap exists due to a lack of training curriculum and insufficient knowledge of how it can aid medical services.

Evidence-Based Practice in Minority World Countries

Evidence-Based Practice Training

The integration of EBP training into hospitals and clinical practices allows physicians to learn to provide safe, effective, and efficient care to patients (Kortekaas et al, 2016). As illustrated in Figure 2, EBP training aims to improve patient outcomes by ensuring that physicians have up-to-date and evidence-based reasoning behind each of their medical decisions (Turner, 2014). Point-of-care (POC) training is a methodology that provides training to staff that teaches them to make quick, real-time diagnostics on the premise of evidence-based practice (Abbott, 2020). These training programs aid hospital administration by creating opportunities for the POC clinicians to adopt EBP (Black et al, 2015). Furthermore, EBP training fosters a strong research culture which leads to physicians staying more up-to-date with recent medical publications.

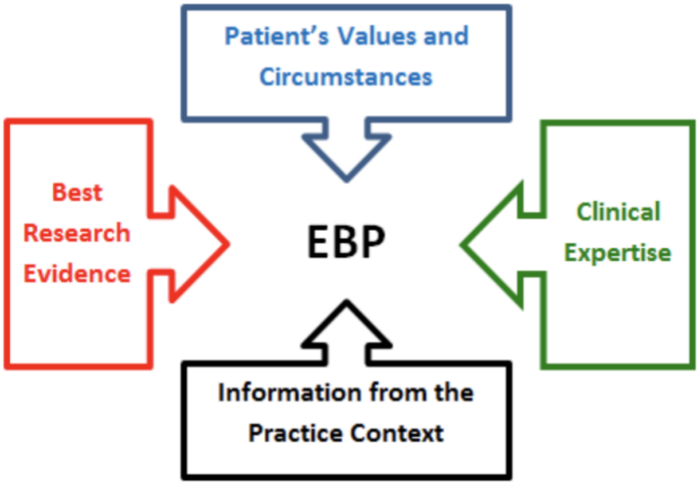

Figure 2: *Reasons for EBP training in clinical practices (Turner, 2014)*

There are two different types of training for EBP, which are stand-alone (trained in the classroom) and integrated training (trained in a clinical context). A 2004 study in the Netherlands concluded that both stand-alone and integrated EBP training of physicians led to overall increased knowledge of evidence-based practice, however, EBP skills, behavior, and attitude in the physicians only improved with integrated training (Kortekaas et al, 2016). The authors of this study believe that it is more beneficial for medical students to receive training not only in the classroom, but also in clinical context settings. Applying what they are learning and researching creates the opportunity for them to determine the best possible care for their patients.

Staying Updated

Prior to evidence-based practice, clinicians would rely on intuition, conversations with other clinicians, experiences of mentors, and teachings from medical school to inform their decisions. These methods of medical practice are flawed because they are subject to biases and are not updated over time (Turner, 2014). Currently, there are a variety of ways to integrate EBP by introducing new medical research and methods to medical students and physicians through an initiative called continuing medical education (CME). CME encourages physicians to maintain and develop skills and stay up-to-date with new medical research through events such as conferences, webinars, professional development activities, and periodic recertification (McMahon, 2016; Hecht et al, 2016). Research on the efficacy of CME for healthcare professionals in the US has demonstrated a strong correlation between increased CME practices and improved physician competence and performance in both basic and new medical knowledge/practices (Fils et al, 2015). Other minority world countries, such as the United Kingdom, Canada, Australia, and New Zealand, also require physicians to regularly complete programs to maintain professional standards and clinical competence, equivalent to CME in the US (Braido et al, 2005).

Required licensure and CME credits can vary depending on the type of healthcare system (public or private), but there are standardized qualifications that physicians in the US must meet to practice medicine. In addition to obtaining the initial state-issued medical license after graduating medical school and completing a board certification to obtain practice privileges,

doctors are required to have up to 100 hours of CME credits every two years (varies between states) to stay up-to-date with new medical research (Vandergrift et al, 2018). Physicians must also renew their medical licenses by passing the board certification exam every 7-10 years (institution-dependent); if they do not take it, or do not pass the exam, their licenses to practice in most hospitals are revoked until completed and passed (Boulet & Zanten, 2014). This periodic recertification helps to ensure that physicians are practicing the current most effective medical methodologies, rather than relying on outdated methods.

A study conducted from 2005-2015 via the PubMed interface, MEDLINE, argues that the most effective way to promote and implement EBP is through online CME programs because they are time and money efficient and can be done at any location (Patelarou et al, 2017). These online programs ease the transition of research into clinical practice and create opportunities for physicians to practice what they have studied. By continuing to understand and apply new research into practice through continuing education, physicians can increase the usage of EBP in their daily practice and increase the initiatives of developing their education (Black et al, 2015).

Medical Databases

Many hospitals also provide physicians access to multiple medical databases with clinical research literature to help them stay updated. A healthcare database is an online resource that documents physicians' or medical practitioners' patient records and is a safe, easily accessible, and quickly updated system (UpToDate Inc., 2021). Searches through a medical database yields peer-reviewed journal articles that provide evidence through quantitative research such as laboratory experiments, systematic reviews, and clinical trials (Eastern Michigan University, 2021). These articles are not posted unless multiple doctors have approved them and signed off that the information provided is accurate and beneficial.

A very commonly used database is UpToDate, which is a physician-authored clinical decision resource that supports the use of evidence-based practice for clinicians with point-of-care (POC) decisions (UpToDate Inc., 2021). Over 1.9 million clinicians worldwide rely on UpToDate and it is accessible to over 190 countries (Eastern Michigan University, 2021). Many physicians use this database because it effectively and efficiently generates decisions for the best type of patient care, is easily accessible, and follows hospital standards. The UpToDate database has information such as drug monographs, drug interactions, society guidelines, patient education information, access to clinical calculators, graded treatment recommendation, and synthesized topic reviews that would cover a variety of specialties, diagnoses, treatments, symptoms, and tests that are written in short paragraphs (UpToDate Inc., 2021). This database is available in 16 different languages, including Spanish, however the articles are only available in English (Wolters Kluwer, 2021). This database is updated every four months and is a quick read for physicians if they are looking to be proactive. There are multiple databases that provide a similar service to UpToDate, such as PubMed, MEDLINE, and Cochrane Library, among many more.

The levels of accessibility and types of databases that physicians use to stay updated differs between countries. Higher-income countries that have a growing medical research environment, such as, Australia, Japan, and Taiwan, are more likely to have high accessibility to databases used specifically in their region (Milea et. al, 2015). In some cases, such as in South Korea, a country may have a variety of databases accessible, but information regarding procedures or

clinical trials is limited only to national citizens, making it difficult from non-citizens to obtain that data (Milea et. al, 2015). Additionally, in countries all over the world, medical databases can be used to improve physicians' research skills and knowledge. The resources available to a country can determine how many or how few databases are used.

Evidence-Based Practice in Ecuador

Evolution of Clinical Research & Evidence-Based Practice

Over the past 20 years, Ecuador has placed an increased focus on establishing clinical research. This initiative was kickstarted through improvements in population welfare indicators and advances in the health system (Ramos et al, 2017). These initiatives include the development of the National Institute of Public Health Research, public and private research centers, and the promotion of academic health centers (López-Cevallos & Chic, 2010). This was all possible due to the period of economic stability Ecuador experienced in the early 2000's. While Ecuador does not have medical recertification requirements, they have developed a standard set of guidelines called Good Clinical Practice (GCP), which encourage physicians to be held accountable for using all the resources possible to provide the best patient care (Dixon, 2010). In tandem with these research projects, the nation created institutional infrastructures such as the National Agency for Health Regulation, Control, and Surveillance (Dixon, 2010). Clinical trial regulations were also put in place to help ensure that the research trials were done in compliance with GCP (Ramos et al, 2017).

The concept of GCP is important in helping hospital staff adopt EBP into their daily routine because it holds doctors accountable for providing optimal care, though these guidelines are not heavily enforced within hospitals (Dixon, 2010). While none of the nations in South America are part of the International Council for Harmonization of Technical Requirements for Registration of Pharmaceuticals for Human Use (a group that works on establishing GCP standards), the Pan American Health Organization created a group in 2001 to publish guidelines on GCP, and in 2005 Documento de las Américas was published. An increase in healthcare personnel and funding due to the new Ecuadorian constitution in 2008 was used to help promote these practices (Cueto, 2004). The amount of personnel increased almost 4-fold and the money allocation went from 3.5 million USD to 32.3 million USD from 2007 to 2013 (Ramos et al, 2017).

Current Healthcare System

While there has been a notable increase in the use of clinical research and evidence-based techniques throughout the healthcare system, there is still a lack of use of EBP in clinical practice (Cobo-Sevilla et al, 2019). In a survey sent to physiotherapists who work in the public sector in Ecuador, only 66% of the participants agreed that it was necessary to implement these practices. The other 44% of the participants identified that EBP was burdensome to enforce, claiming that time constraints, insufficient access to medical databases, and lack of co-worker collaboration were the primary barriers (Cobo-Sevilla et al, 2019). In general, the group showed interest in EBP, however, they identified that they lack proper training and the awareness of how to apply these practices into their daily routine.

Some issues that are preventing Ecuador from implementing EBP include lack of training, knowledge of the staff, and clinical research development (Ramos et al, 2017). To increase the

implementation of evidence-based decisions, the educational and training system of Ecuador must continue to evolve and improve. One issue that currently persists in Ecuador is the lack of CME requirements (Ramos et al, 2017). Many of the physicians in the United States are required to remain updated with the latest practices because they are later tested on their knowledge. While US doctors are required to continue their medical training and periodically renew their license, this is not currently required in Ecuador (Ramos et al, 2017). The country is currently working to transform policies to help create uniformity and uphold standards of care for their healthcare professionals.

Many physicians have a difficult time when trying to stay up-to-date with new medical practices and have varying accessibilities and requirements for evidence-based practice. In Cuenca, the promotion of safe and effective healthcare practices may be improved with the increased use of evidence-based practice. With the encouragement of our sponsor, Dr. Jamie Moreno, we learned more about how EBP practices are currently used and what barriers are present so we could propose strategies to help increase the usage of EBP in the physician's daily practice. To develop this plan, we investigated current implementation methods of EBP in both Cuenca and in the US to determine the successes and barriers of this methodology in both locations. By investigating the use of EBP in the US, we were able to learn how it can be successfully implemented into medical centers. Learning more about the Cuenca hospitals and doctors provided us with a baseline of their EBP practices which allowed us to develop tailored strategies to help promote and implement EBP practices into these hospitals.

Methods

The goal of our project was to devise strategies to incorporate evidence-based practice in hospitals in Cuenca, Ecuador. We achieved our goal through three primary objectives, listed below:

Objective 1: Investigate the presence & usage of EBP practices in the United States
Objective 2: Investigate the presence & usage of EBP practices in Cuenca, Ecuador
Objective 3: Develop & evaluate a plan to increase the usage of EBP in Cuenca hospitals

We first interviewed health-care professionals in both the United States and Cuenca, Ecuador. We analyzed this data, then tailored survey questions for each population to corroborate information learned from the interviews in a larger sample size. We used the information to develop a plan to help doctors in Cuenca, Ecuador to implement EBP into their work. Finally, we organized a focus group to evaluate the effectiveness and feasibility of our proposed strategies to increase the usage of EBP in Cuenca.

Interviews

We first conducted semi-structured interviews with healthcare professionals in Cuenca and the US to get a general understanding of evidence-based practice, including systems in place to enforce EBP, barriers to practice, and attitudes towards EBP (Beebe, 2014). We conducted the 30-minute interviews via Zoom and recorded them with permission from the interviewee.

Interviewees in the US were initially found through the team's personal contacts and then snowball sampling was used to connect with other healthcare professionals (Nissim & Arieli, 2011). Our population consisted of 10 practicing physicians and 1 clinical researcher. The list of questions for each physician and researcher can be found in Appendix B.

Interviewees for Cuenca were found by our sponsor and his team of physicians and medical students. We also connected with more physicians in Cuenca via snowball sampling (Nissim & Arieli, 2011). A representative from our sponsor's team attended each one of these interviews to aid in communication with physicians in Ecuador. Our population consisted of 8 practicing physicians. The list of questions for each group can be viewed in Appendix C.

We transcribed the interviews and then coded by key words and phrases to identify common themes (Ryan & Weisner, 1998). The information and phrasing used by the interviewees helped us to format and create appropriate and relevant questions for our survey (Beebe, 2014; Berg & Lune, 2012). Our categories for our coding charts can be found in Appendix D.

Surveys

Surveys were distributed to physicians in both the US and Cuenca. Both surveys consisted of four sections: Current EBP Activities, Attitude & Knowledge of EBP, Barriers of EBP, and Demographics. The Current EBP Activities section consisted of statements pertaining to methods

of EBP, including access and usage of databases and CME activities. All the statements were multiple choice, with options of either “Yes” or “No” or a scale of agreement which participants would choose the answer most relevant to them. The Attitude & Knowledge of EBP section consisted of statements regarding knowledge of the EBP theory, relationships between clinical research and practice, attitudes of EBP methods and impacts, and presence of EBP in daily medical activities. The Barriers of EBP section consisted of general statements regarding the availability of necessary resources to practice EBP. The last section discussed general demographics and demographics regarding place of work. There was also an optional free response section at the end for physicians to describe some ways they think EBP could be better incorporated into their medical practice. These surveys were sent out via Google Forms and were intended to take around 10-15 minutes to complete. The surveys were sent out via multiple platforms, via different Facebook groups, email directories, and LinkedIn, as well as to all the healthcare professionals we interviewed with a request to share. The full list of survey questions can be viewed in Appendix E.

There were 19 participants from the US that spanned multiple sectors of the health industry. The full list of survey questions can be viewed in Appendix E. There were 14 participants from Cuenca that spanned multiple sectors of the health industry. The full list of survey questions can be viewed in Appendix F.

The survey responses were automatically input into a Google Sheet, where the data was formatted into bar and pie graphs to visualize trends in the data. These trends from each of the two surveys were then compared to the respective interview results and then to each other. Due to low response rates for each of the surveys, the results were used to verify our interview findings as opposed to drawing independent conclusions.

Finalizing the Recommendations

We took the responses from the user evaluation to get a general understanding if the action plan was widely accepted by the participants or not. The data was compiled into an excel sheet, where it was formulated into easy-to-read charts. From this information, we determined the specific improvements that needed to be made to our action plan (CCHD, n.d.-a).

Using what we found about the presence and usage of EBP in the US and Cuenca, we determined what the best methods of EBP look like in hospitals. We created strategies to increase the use of EBP tailored to Cuenca hospitals with varying accessibility to EBP resources such as databases, CME activities, and time/money. These strategies formed a guidebook (CCHD, n.d.-b) which outlined steps for healthcare professionals in Cuenca to increase the usage of EBP (see Appendix H) (Walsh, 2004). This guidebook contained recommendations for doctors, hospital departments, medical centers, and the government/ministry of health to increase the presence of EBP using the resources they have available. These suggestions were created from our analyzed results of our findings from the interviews and surveys of physicians from the US and Cuenca, which can be found in the next chapter.

After completing the surveys and interviews, we analyzed the data and combined it with previous knowledge to create a set of recommendations to give to the physicians in Cuenca,

Ecuador to implement evidence-based practice. We then asked Dr. Moreno and the sponsor team to take part in a user evaluation where we asked them to help evaluate our recommendation guidebook (CCHD, n.d.-a). Each member of the team was asked to provide feedback on our recommendations. They were asked questions from Appendix D which were sent to them via WhatsApp text.

Findings

In this chapter we present the data we analyzed from our interviews and surveys with medical professionals in the United States and in Ecuador to develop strategies to increase the use of evidence-based practice (EBP) in Cuenca. Three themes emerged from our research: *Knowledge, Understanding, & Attitudes of Evidence-Based Practice*; *Medical Center Resource Allocation*; and *Accessing Information & Resources*. We synthesized the data we collected between the US and Ecuador in our discussion, leading into our recommendations for Cuenca physicians.

Knowledge, Understanding, & Attitudes of Evidence-Based Practice

United States

Through our research in the United States, we found that all the physicians we interviewed and surveyed understand what evidence-based practice is and the relationship between clinical research and medical practice. A US physician we interviewed identified EBP as being the "research, studies, and clinical trials to modulate clinical practices" to help improve the patient care. Overall, doctors in the US saw EBP as being a method to improve overall patient care by promoting a higher standard of patient care through continual learning and modifying behavior to improve practices. One physician we interviewed stated that a significant benefit of EBP is that it ensures the right decision since referencing literature allows for reproducibility by "taking advantage of past experiences and other people's answers." Throughout the interviews, EBP was identified as being a "patient oriented" technique which combines the needs and preferences of the patient with the best evidence possible. This was further supported by the survey data in which physicians either agreed or strongly agreed that EBP improved overall patient care (Figure 3), whereas a responder stated that "EBP makes adapting easier for clinicians and less risky for the patient involved." Additionally, all doctors identified that EBP is a methodology that should be practiced by all physicians to ensure that patients are being treated with the most up-to-date techniques (Figure 3). These practices were promoted by hospitals in the form of resources such as care-maps which are regularly updated by designated personnel with the most updated methodologies and are available to everyone.

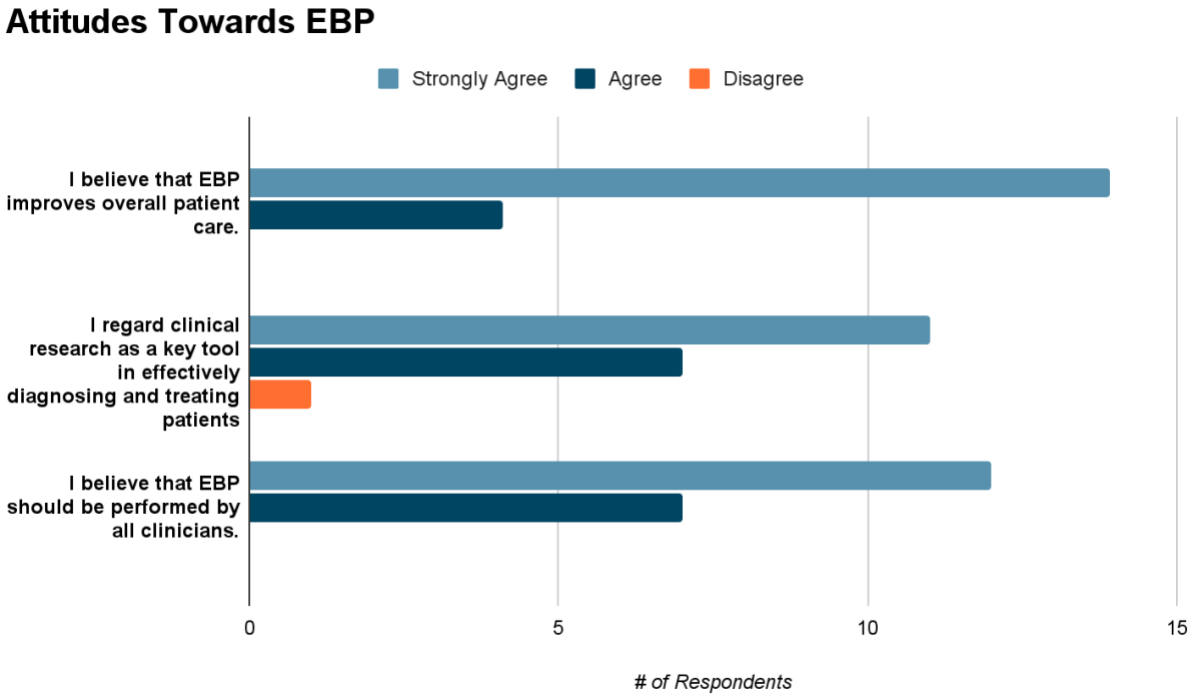

Figure 3: *Results from our survey sent to US physicians on their attitudes toward EBP. Shows responses to the prompt(s): "I believe that EBP improves overall patient care."; I regard clinical research as a key tool in effectively diagnosing and treating patients"; and "I believe that EBP should be performed by all clinicians." The population size was 19 physicians who have different specialties.*

Doctors also indicated that they had enough training to critically assess evidence and conduct EBP, along with the access and personal interest in furthering their education on EBP practices (Figure 4). All the surveyed physicians stated that their medical centers help encourage them to stay up-to-date through scheduling regular times to collaborate with each other about new cases and medical research (Figure 4). This promotes a sense of collaboration, as it allows doctors to communicate with each other about the latest information they have used to keep updated.

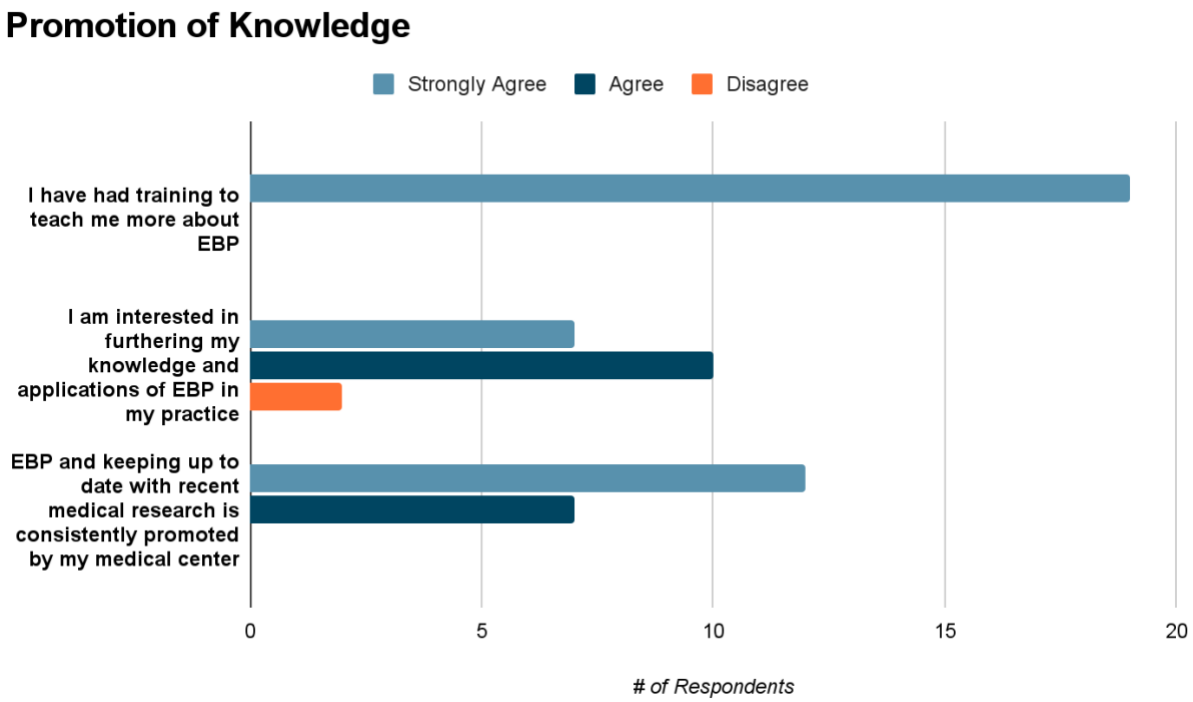

Figure 4: *US survey responses regarding knowledge and promotion of knowledge. Shows responses to the prompt(s): "I have had training to teach me more about EBP"; "I am interested in furthering my knowledge and applications of EBP in my practice"; and "EBP and keeping up-to-date with recent medical research is consistently promoted by my medical center." The population size was 19 physicians who have different specialties.*

Ecuador

All 8 physicians we interviewed from Ecuador were aware of evidence-based practice and how it can be applied. Most of the participants had a similar definition of EBP, one of them describing it as "the best available scientific evidence, applied to a patient according to their preference" to help make more informed medical decisions. All the physicians recognized the importance of evidence-based practice and agreed that the methods could improve the diagnosis and treatment of patients. However, most of the physicians stated that while they try to integrate evidence-based practice into their daily activities, it is often unrealistic due to lack of access to necessary resources and time constraints. Through combining surveys and interviews, we found that 70% of physicians feel that EBP establishes unrealistic expectations for daily practices in the current state of Ecuador health system.

Many of the physicians explained that the process of evidence-based practice is done on an individual basis, with little communication between doctors about new and challenging medical cases. One of the Cuenca physicians that we interviewed stated that there is "no teamwork, and there are no spaces for teaching or for exchanging analysis of clinical cases" (translated from Spanish) which limits the use of evidence-based practice among physicians. Overall, physicians in Cuenca think EBP is beneficial, however, do not know if the full usage is possible with the resources available. With the current allocation of resources, finances, and time 55% believe that other practice models are more suited to be implemented into their daily practices.

Medical Center Resource Allocation

United States

All the US physicians revealed that medical centers financially support their staff in their completion of recertification and continuing medical education requirements. Medical centers vary in the resources they provide to physicians. Some offer to reimburse the cost of the certification tests, others offer paid time for their staff to take these courses, while others pay for the travel and expenses for the physicians to attend conferences and seminars.

All the US physicians that we interviewed also stated that their medical center hospital devotes time for their staff to stay up-to-date with the latest practices through activities such as rounds and grand rounds (Figure 5). Rounds are a regular (daily or weekly) time that each department gets together and discusses new and interesting cases, along with any challenges they are having with diagnoses and treatments. Grand rounds are hospital-wide, in which one of the staff members presents on new, emerging research or relevant clinical trials.

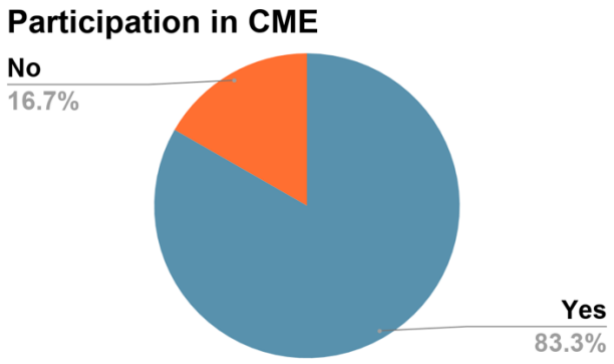

Figure 5: *US responses to the prompt: "I participate in regular conferences, webinars, or lectures that are hosted by my medical center (such as grand rounds, journal clubs and seminars, etc.)" The population size was 14 physicians who have different specialties.*

Ecuador

According to many of the interviews with Cuenca physicians, hospitals in Cuenca do not invest much time and money into evidence-based practice. One example of this is hospitals overloading the number of patients each physician is assigned to, thus not providing them with enough time per patient or in between patients to involve EBP into their diagnoses and treatments. All the 8 participants interviewed stated that their medical centers do not allocate additional time in the work week for physicians to read medical literature or investigate more into cases. This forces any EBP initiative a physician wants to incorporate to be done on their own time and expenses. A few of the doctors mentioned that they are only permitted 15-20 minutes per patient, which provides them only enough time to complete the necessary steps of something as routine as a physical exam and does not leave them time to look up evidence-based guidelines or literature for any of the patients. Between the survey and interviews, approximately 70% of participants agreed that EBP is too time-consuming with their current medical schedule (Figure 6). The

survey also indicated that physicians in Cuenca regarded a lack of financial support and access to resources as being the major barriers which prevent doctors from practicing EBP on a consistent basis.

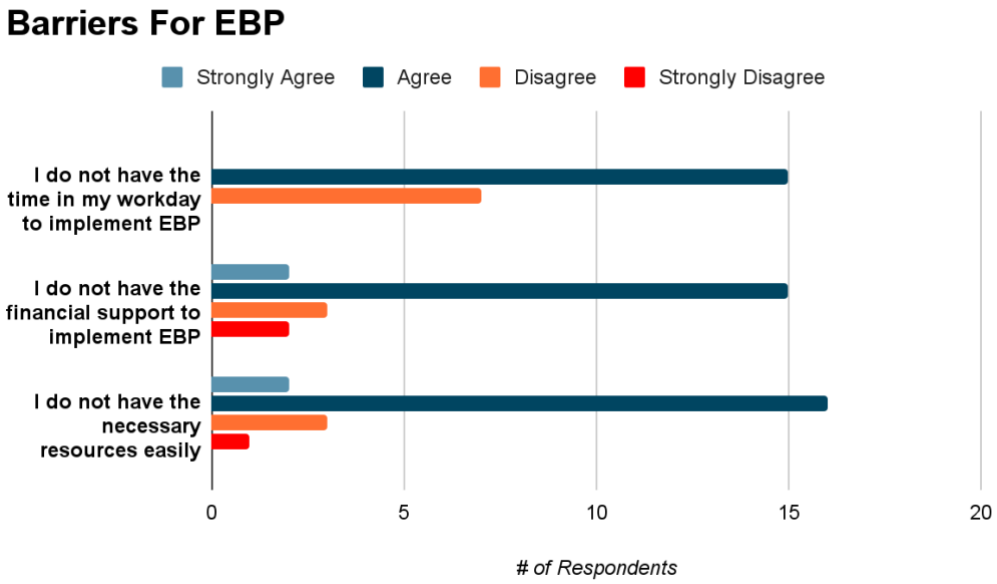

Figure 6: *Cuenca survey and interview responses regarding barriers of EBP. Shows responses to the prompt(s): "I do not have the time in my workday to implement EBP"; "I do not have the financial support to implement EBP"; and "I do not have the necessary resources easily accessible to implement EBP." The population size was 22 physicians who have different specialties*

None of the physicians in Cuenca that we interviewed receive individual paid time to review literature or group time to collaborate with each other. Over half of the physicians between the survey and interviews stated that their medical centers do not promote opportunities for continuing medical education (CME) programs or provide time in the week for physicians to complete these programs. All the participants stated that there are no requirements for recertification at all in Ecuador, and physicians that want to stay up-to-date must do so on their own time and budget. Since there are no recertification requirements, medical centers are not obligated or motivated to put forth extra investments to keep their physicians up-to-date. One of the interviewees expressed that this is not an issue with the physicians, but of the healthcare system; he said, "It is a system made by economists, they try to manage everything by the minute," and more patients means more money. Many of the survey respondents identified that they were unaware of whether their medical center offered programs to help medical workers stay updated. While some respondents indicated that they did have access to some form of medical education program, interview data suggests that these programs are extremely limited and rare. From the 14 survey participants, approximately half were consistent with what we found in the interviews, while others indicated they had some form of access to medical training programs through their medical centers (Figure 7).

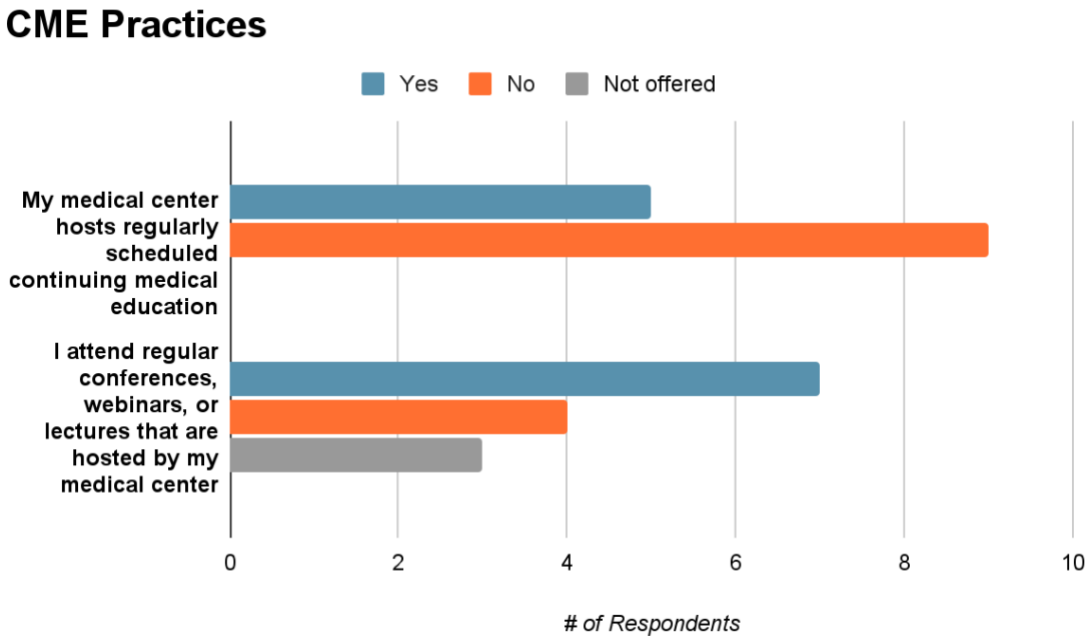

Figure 7: *Cuenca survey responses regarding presence of CME practices. Shows responses to the prompt(s): "My medical center hosts regularly scheduled continuing medical education programs to keep medical workers updated with new medical evidence"; and "I attend regular conferences, webinars, or lectures that are hosted by my medical center (such as grand rounds, journal clubs and seminars, etc.)." The population size was 22 physicians who have different specialties.*

Accessing Information & Resources

United States

Medical workers in the United States do not have an issue with accessing medical information or resources. Out of the 100% of the survey participants that stated they have access to medical databases, 70% claim to have free access/subscriptions to medical databases provided to them by their medical center, and many of them also pay for supplemental database subscriptions of their choice out-of-pocket (Figure 8). Most physicians that we interviewed use a database called UpToDate, provided to them by their hospital or medical center. One of our interviewees stated that "UpToDate is one of the best databases and is an unbelievable resource." He also noted that he pays for his own subscription to the American College Physician (ACP) journals where he receives emails from them about recent medical practices used. Both the database and ACP journals can be used to aid a physician's knowledge to pass their board recertification. Without these subscriptions paid for through the hospitals, participants agreed that the cost of databases may limit their use of evidence-based practice. Physicians from the study also use guidelines, journal publications like Journal of Internal Medicine, or medical encyclopedias available through the internet as resources for EBP.

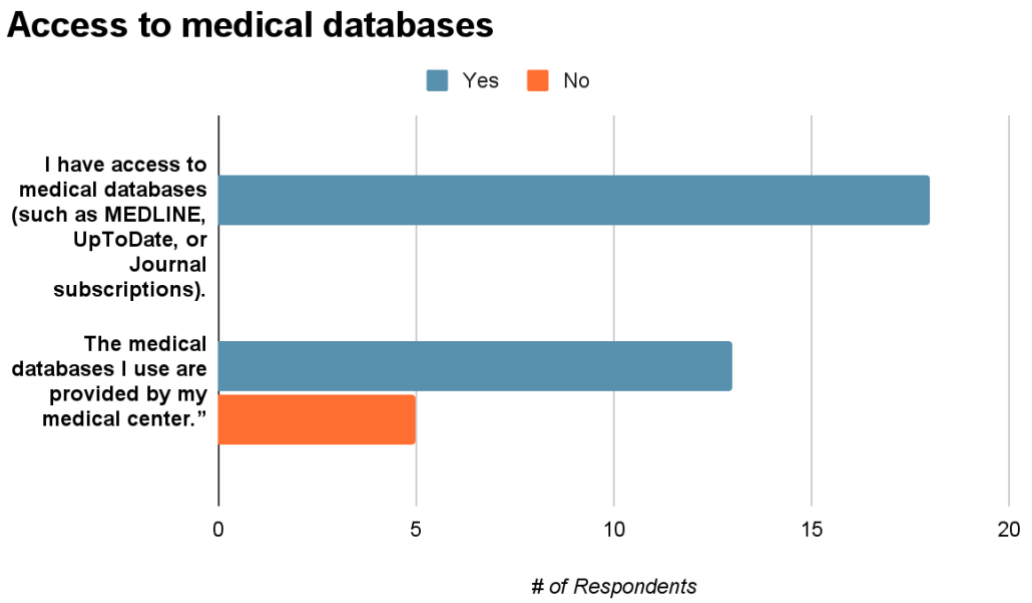

Figure 8: *US survey responses regarding access to medical databases. Shows responses to the prompt(s): "I have access to medical databases (such as MEDLINE, UpToDate, or Journal subscriptions)"; and "The medical databases I use are provided by my medical center." The population size was 19 physicians who have different specialties.*

We concluded from our research those academic hospitals are more likely to provide resources to their professors and medical professionals. According to one of our interviewed physicians, "many hospital systems have access to the electronic library of their host medical school/affiliated medical school." These physicians have access to UpToDate as well as a library system to provide more resources to utilize EBP. It is evident that physicians in the US have easy access to resources to stay updated with the latest medical practices.

Medical centers in the US can obtain the latest technology and medicine through substantial government funding and donations, and all the physicians we interviewed expressed that accessing these resources has never been an issue for them. With availability of these resources, physicians in the US can readily incorporate new evidence and techniques into their practice. None of the participants from the interviews discussed any problem regarding inaccessibility of the correct equipment when treating a patient with a new medical practice from recent literature.

Ecuador

Accessing and understanding relevant medical research is a major challenge among physicians in Ecuador. Most physicians that were interviewed expressed that their medical centers do not pay for subscriptions to medical databases to stay up-to-date, resulting in many physicians turning to alternative methods of obtaining medical literature. Some of these methods include contacting other institutions with access to specific journals or by illegally downloading the articles of interest. For those doctors who want access to these databases, many must pay out of pocket. Dr. Moreno is one of those physicians, and he pays around 500 USD a year to have access to UpToDate. He explained that "to me, my patients deserve two dollars a day."

The survey data shows that Dr. Moreno is an anomaly for paying for subscriptions, with most responders stating that they resort to finding alternative methods of accessing this literature, such as illegally sourcing and downloading it (Figure 9). By mainly relying on these alternative methods, physicians in Cuenca have decreased access to reliable evidence because they have restricted freedom to search for it and interpret it.

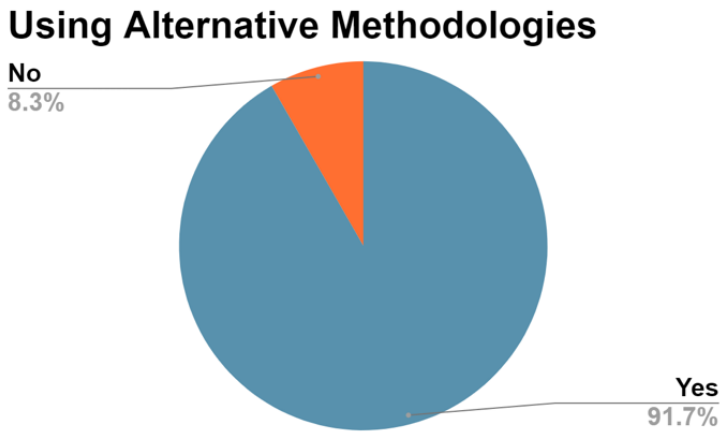

Figure 9: *Cuenca survey responses regarding accessing medical databases. Shows responses to the prompt(s): I have to find "alternative methodologies" to access peer-reviewed literature. The population size was 14 physicians who have different specialties*

Even if physicians have full access to databases, a large portion of the best medical literature is written in English, presenting a language barrier for physicians in Ecuador that may not be fluent in English. One of the physicians interviewed stated that "The greatest amount of information available will always be in English...The amount of information in Spanish is quite low and not very up-to-date." After more investigation into some popular databases, we found that even databases like UpToDate, which promotes being available in 16 languages, still provides many articles only available in English. Even with some fluency in the English language, physicians must be able to fully comprehend the statistical terms and techniques present in the literature to be able to integrate it into their practice.

Beyond the challenge of obtaining and understanding articles, sometimes the articles with the most up-to-date evidence are inapplicable to Cuenca hospitals due to lack of access to the proper medicine and technology. According to one of the Cuenca physicians we interviewed, "We are still doing things that you [the United States] did 20 years ago, we have to do that, we are forced to do that, we don't have the machines, they are too expensive." Many of the Ecuadorian physicians that we interviewed revealed that many times they are aware of the best evidence, but they do not have the resources to apply that evidence into their practices, forcing them to be flexible in their diagnoses and treatment of their patients. A realistic solution to this, according to one of the interviewees, is to look at research from countries with a similar socioeconomic background that have comparable resources, such as Egypt or India. These practices often present evidence that is more applicable.

A summary of our findings can be found in Appendix H.

Discussion

Accessibility to applicable literature is a major problem for Cuenca physicians, but is not a problem at all for US physicians. Physicians from both locations reference multiple databases, journals, and websites they use to stay updated, but even with access, Cuenca physicians often have a difficult time understanding the articles which are primarily written in English. Many of these articles are in English because a large majority of literature is written in English-speaking countries, particularly the US. We learned from our literature review that UpToDate, one of the most referenced databases from our study in both locations, can be translated into 16 languages, including the search engine and website information. After our interviews with the Cuenca physicians, we learned that the journal articles themselves are not translated, making it difficult for Spanish-speaking physicians to utilize the guidelines and literature published on the site. Even though it is possible for physicians to translate these papers using a program like Google Translate, when these articles are translated to Spanish some of the key medical terminology is often mistranslated or unclear in the context of Cuenca hospitals, and it is very time consuming to translate an entire article into a different language.

Since physicians reading this literature are doing so to possibly implement a new technique, it is critical that any translation is not just word-for-word, but also contextually translated as well. For any physician to implement evidence-based practices into their daily activities, they must fully understand the evidence provided, which doctors in Cuenca voiced struggle in the interviews and surveys. Without the existence of properly translated literature, Cuenca doctors have difficulties comprehending the evidence they are provided, thus making it challenging for them to apply evidence into their daily routine. This is not as prevalent an issue in the US, as English is the dominant language for the most used databases.

Our literature review showed that some of the most effective forms of evidence-based practice in the United States involve continuing medical education programs and regular collaboration between professionals in a medical center, which was further validated by our interviews and surveys with US physicians. The US doctors confirmed that these activities help keep them up-to-date with new medical research and allows them to share personal medical experiences that may benefit colleagues in the future. Research both from our literature review and our study verify that medical centers in the US promote these activities by providing regular time slots in a week/month for physicians to participate in conferences such as Grand Rounds or simply to review medical literature, and since the US requires periodic recertification and CME, medical centers also provide a stipend to physicians to complete these programs. In contrast, the Cuenca physicians stated that Ecuador does not have any requirements for continuing medical education or recertification, so medical centers do not put forth the extra time and money for physicians to complete these programs to help keep them up-to-date. Therefore, any EBP efforts by physicians must be individually motivated. Without any regular requirements for CME programs or recertification of physicians put forth by the Ministry of Health in Ecuador, medical centers will not fund extra activities for physicians to stay up-to-date, and individual physicians will not have the resources and opportunities available to them to incorporate EBP into their daily activities.

From our interviews with physicians in Cuenca, we learned that many medical centers in Cuenca allocate approximately 20 minutes per patient. Although the short appointment times allow physicians to see more patients in a day, it leaves physicians little time to locate and evaluate evidence-based guidelines and medical journals. With evidence-based practice being regarded as a time-consuming task, doctors are more likely to turn to other methodologies to be able to manage their patient load. This contrasts with the US model that we learned from our interviews with US physicians, where doctors are typically given more time between patients and therefore can analyze new studies and where the information came from.

Our literature review demonstrated that the healthcare of Ecuador is highly ranked worldwide due to the easily accessible and affordable healthcare that is available to most of its population. While Ecuador has established an overall successful healthcare model, the physicians that we interviewed and surveyed indicated an overall need for improvement of evidence-based practice in Ecuador. Doctors in the US have access to state-of-the-art technology and medicine referenced in the literature. The Cuenca physicians that we interviewed and surveyed on the other hand, voiced that they do not have the same accessibility to the technology and medicine referenced in most of the medical literature, and without it, there is no way to incorporate the evidence into their practice. Many of the Cuenca physicians also stated that even when they have access to evidence that they can comprehend (whether it was in Spanish or they are fluent in English), sometimes the evidence is not realistically applicable to the economic situation of the medical system or the patients. Many times, the current best evidence for something is only accessible in one language (often English) and requires new and expensive medical technologies, limiting the ability for many physicians in lower-income countries such as Ecuador to provide their patients with the most updated and best care possible. Without access to applicable literature, the amount and quality of evidence that lower-income countries can utilize is drastically limited.

Limitations

Throughout the duration of our project, we have faced certain challenges that prevented us from doing further analysis on physicians implementing evidence-based practice. While these challenges did not impede the success of our project, they did limit the scope of our results. One limitation was our inability to conduct our interviews in person. Due to the Covid-19 guidelines in place during our study, all our interviews were done via Zoom. This made them less personable and may have caused some of the interviewees to be less comprehensive about their experiences and daily practices.

Another challenge was the limited survey results we got from both the US and Ecuador population. We sent the US survey out through multiple means, but only collected 19 results. This means that the data we used to reinforce what we learned from our interviews only accounted for a very small portion of the physicians who practice in the US. The low response rate was also seen in the Ecuador survey results, as we only received 14. Within this population, most of the responders were still in medical school or just left medical school, therefore the results primarily represent the younger medical population rather than the older generation of physicians in Ecuador. A future study could try to gather a much larger dataset so that more of the population of doctors practicing could be represented in our findings. As we compared the survey results from the US versus those from Ecuador, we found that while the US results were

streamlined, the Ecuador responses were very scattered. This could have been due to several factors such as interpretation of the question or an effect of the lack of standardization of the Ecuador health system.

We also must account for the bias of our interviewees. For the US population, we talked to physicians and experts that we had personal connections to or who shared a common contact. All these people work for successful hospitals that receive significant financial support and resources. We did not talk with physicians in the States who work in low-income areas or ones who receive minimal funding. For the Ecuadorian population, all the doctors we spoke with knew one of the members of our sponsor team personally, and this sponsor member was on the Zoom interview with us. We do not know if their presence impacted the doctor's responses to any of the questions.

Recommendations & Conclusions

Drawing on the evidence collected via interviews and surveys, combined with the information from our literature review, we created recommendations for the Cuenca population. Our goal was to create strategies for physicians to use to increase evidence-based practices in their daily medical activities. Also, we wanted to provide recommendations for larger organizations, such as the Ecuadorian government, to improve EBP use through continuing medical education initiatives for their health professionals. We recognize that we cannot change Ecuador's access to modern medicine and technology, so our recommendations revolve around providing access to properly translated and applicable medical literature.

For Ecuador Medical Population

Doctors:

- As practicing clinicians, there are email aliases and online journals that can be subscribed to that will send daily or weekly summaries of the latest clinical practices and studies. This will provide access to quick and free information and allow physicians to devote their time to fully reading articles with applicable information for their patients. Some of these journals include:
    1. **The New England Journal of Internal Medicine:** https://www.nejmgroup.org/discover-our-products/know/new-england-journal-medicine/
    2. **European Journal of Internal Medicine:** https://www.ejinme.com/
    3. **The Journal of American Medical Association:** https://jamanetwork.com/
    4. **OMICS International Journal:** https://www.omicsonline.org/
    5. **Geneva Foundation for Medical Education and Research:** https://www.gfmer.ch/000_Homepage_En.htm

The journals listed above are written majority in English. We found that, such as the Cuenca doctors stated, finding primary literature in Spanish is extremely hard. These sites offer access to free journal articles and peer-reviewed literature, so by using these sites as a baseline, doctors can easily create a baseline of reputable articles.

Hospital departments:

- As a department, allocate paid time once a week for staff to get together and review cases or relevant medical literature. This will give them time to discuss cases and challenges they are having with patient care, as well as review the latest research they have found.
- Additionally, each department can create standardized practices for some of the most common treatments. This will create uniformity in care. It is important that someone is responsible for regularly checking to make sure these practices are most current. Many of the US physicians we interviewed explained that there was a staff member responsible for keeping guidelines for various procedures updated and standardized.

Medical centers:

- As an organization, medical centers can create weekly or monthly grand round events, where one physician presents on a new study or trial they are researching. These sessions can be open to all staff and held in a large conference center or room in the hospital. These conferences can also be held via Zoom if necessary. The medical center should build this paid time into a doctors' schedule.
- Hospitals can encourage physicians to train medical students. Medical students are taught the most updated medical procedures in the classroom, and therefore physicians that are teaching medical students must be up-to-date with those procedures. Additionally, medical students tend to ask a lot of questions about medical procedures, which forces the teaching doctor to have a justification behind each medical decision.

Government & Ministry of Health:

- On a national level, there can be an increase in the promotion of medical conferences and seminars. Additionally, the country can enforce CME requirements or incentives, which provide financial or other benefits to those who continue to get recertified. Possible outreach could include partnering with several global-outreach programs to help set up conferences and create CME/recertification guidelines. Some of the programs include:
    1. **World Health Organization Outreach Programs**
    2. **Doctors Without Border**
    3. **International Medical Corps**
    4. **Global Viral**
    5. **Global Alliance for Improved Nutrition (GAIN)**
    6. **The Healing Hands Foundation**

For Future Projects

Our project showed us that implementing evidence-based practice improved individualized care for patients. This study outlines improvements that each step in the hospital hierarchy can take to increase the use of these practices. Our first recommendation is that this project is used as a baseline study that project teams can build upon to develop refined strategies on the individual level through the national level that promote the use of EBP. Future WPI student groups that can travel to Ecuador can also observe EBP in medical centers to add depth to the study and further tailor strategies for the Cuenca physicians and medical centers.

Another recommendation is that this project be taken as a higher-level project to make a more user-friendly pdf document translation system to work in tandem with sites such as UpToDate or MEDLINE. This could be in conjunction with the Computer Science department and should be brought up to Craig Wills, the head of the Computer Science department at Worcester Polytechnic Institute. The project focus could be on taking the current English PDFs and creating a translation system for the doctors of Cuenca, so that they can translate pdf, incorporating a source finder with key words so that doctors have access to other studies which use the same statistical concepts. By splitting this project into multiple components, future students can aid the

Cuenca doctors on multiple fronts. The IQP component could focus on bringing more awareness to the situation and helping draft guidelines on EBP in the medical centers. The database initiative could focus on creating tools so that doctors could more easily access data, diminishing the barrier of time which would hopefully lead to doctors being more motivated to stay updated. Through the information gathered through our research, we hope to create a baseline of recommendations for future projects to build on to further aid the Cuenca doctors.

A summary of our recommendations in Appendix H (English). This infographic was translated to Spanish when given to the Cuenca population and can be seen guidebook of findings and recommendations that was given to the Cuenca population can be seen in Appendix I (Spanish).

Conclusions

The focus of evidence-based practice, as seen in both the literature review and our communication with physicians, is to allow doctors the ability to make the best decisions for their patients and become patient oriented. Through our investigation into Cuenca's current system, we found that a major issue that surrounded a lack of EBP was that doctors felt that the current system did not create an environment suitable for consistent usage of EBP. A major factor of this was that, currently, Cuencas doctors don’t have access to the necessary resources or enough time to consistently keep themselves or their patients updated. Through our project we aimed to bring awareness to the issues doctors face when attempting to promote EBP and suggest strategies that could overcome those barriers. When compiling our background, we struggled to find literature which focused on medical practices or EBP in Cuenca. Through the research we performed during our seven-week long project, we aimed to bridge that gap and bring awareness to the issues which exist in the Cuenca system and promote activism for change. When creating our recommendations for doctors, we created the basics for a guidebook which can be easily expanded upon, as well as providing a comprehensible guide to all of the interviews we conducted with analysis. Going forward, doctors can follow the strategies we proposed to them and even build-off them themselves in order to foster an environment in Cuenca where EBP is more easily executed, moving from economically oriented to patient oriented.

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Appendices

Appendix A: Sponsor Description

Our project is sponsored by Dr. Jaime Moreno, a director and primary doctor at the Hematology Laboratory at Hospital Santa Inez; a primary hospital in Ecuador that specializes in cardiology, neurology, pediatrics, trauma care, and urology. Dr. Moreno attended University of Miami Leonard M. Miller School of Medicine from 1980-1983, and then University of Cincinnati College of Medicine from 1983-1985 to study hematology and oncology. After a brief break of schooling, Dr. Moreno continued his studies at the University of California, Los Angeles from 1988-1989, where he worked as a research fellow in hematology and oncology for AIDS-related tumors. His studies were finished at Universidad de Cuenca, where he received his master's in health investigation. Since then, he has worked at the Santa Ines Consultant of Cuenca in Ecuador working in internal medicine in hematology and oncology, and he was a member on the board of Hearts of Gold Foundation from February-August of 2014.

For our project, we will collaborate with Dr. Moreno as well as Juan Francisco, Domenica Palacios, and Dr. Pedro Pablo Arias. Juan Francisco is a medical student at the University of Azuay and has studied English in America through a rotational program. Apart from being a medical student, he has worked as an activist to promote responsible health actions. Domenica Palacios works for TECHO Ecuador and studied at the Education University of Santana. TECHO Ecuador is a program in Ecuador which investigates minimizing the divide of the rights of the impoverished population. Dr. Pedro Pablo Arias is another health practitioner in Cuenca who has agreed to work with us in developing strategies for EBM implementation.

Appendix B: United States Interview Questions

Oral Consent

Thank you for choosing to participate in this interview. We are a group of students at Worcester Polytechnic Institute who are conducting research on hospitals in the US and in Ecuador. The purpose of our research is to develop informed strategies for hospitals in Cuenca, Ecuador to use to motivate their doctors to use evidence-based practice (EBP) practices in their diagnosis and treatment of patients. We are interviewing you today to understand the EBP that you and the doctors at your hospital use, as well as the incentives that are in place to motivate you and the staff to use such practices. This interview will take around a half hour. We will start by getting some information about you and your background, and then have an open conversation about EBP. This interview is voluntary, and you do not have to participate if you do not wish. If at any point we get to a question that makes you uncomfortable or that you do not want to answer, let us know and we can skip the question or conclude the interview. Do you have any questions for us before we begin? We put our contact information in the zoom chat. Please feel free to reach out to us at any time with questions, feedback, or other comments you may have.

Team members: Jordan Wynn, Alexandra Scariati, Margaret Richins, and Silvana Reid
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Project Advisor: Courtney Kurlanska
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Interview Questions for Physicians

1. What is your current position? How long have you been working in this role (number of years)?
2. Are you familiar with the concept of evidence-based practice (EBP)?
3. How would you define EBP in your own words?
    a. What would you classify as evidence-based practice?
4. Are you aware of any evidence-based practices that are conducted at the hospital?
5. Have you tried to incorporate evidence-based practice into your daily activities? Is it something that you were able to do?
    a. *If the answer is no:*
        i. Do you think it would be beneficial to adopt evidence-based practice into your daily activities?
        ii. What would help you?
    b. *If the answer is due to challenges:*
        i. What barriers prevent you from incorporating EBP?
    c. *If the answer is yes:*
        i. What resources do you use to incorporate EBP into your practice?
        ii. What and who facilitated that? How is it enforced/motivated?
        iii. How do you access content on EBP?
            1. Is there a specific system or database?
6. How do you keep up-to-date with the newest medical practices?
    a. How has working with medical students influenced your practices?
7. What aspect or aspects of EBP do you find most challenging?

    a. Do you think that there is any way to improve upon this?
        i. A standardized system? Delegation? Accessing it?
    b. Is it cost, availability, resources, etc? Prompt them after their general answer
8. What do you think is the biggest benefit of using EBP?
9. Is there anything that could be done by hospital administration to increase the ease and use of EBP among physicians?

Interview Questions for Researchers

1. What is your current position? How long have you been working in this role (number of years)?
2. In your own words, how would you define EBP?
3. What effects does EBP have on the quality of research?
    a. Such as: Provides more clarity? Makes ideas more dependable? etc
4. In your opinion, what are some of the characteristics of good evidence?
    a. Are there standards set in place? What differentiates good from bad evidence?
5. What role do you see EBP playing in the translation of research to clinical practice?
6. How do you access content on EBP?
    a. Is there a specific system or database?
7. Through your interactions with research scientists, do you find that a knowledge of EBP is prevalent?
    a. Is there a difference in the quality of work between researchers who have experience with EBP and those that do not?
8. What do you find to be the best way of educating others on how to use EBP in their studies?
9. When you go through the process of accessing information, what are the steps?
10. When writing a proposal, what are the steps you take to improve the quality of information?

Appendix C: Cuenca Interview Questions

Oral Consent

Gracias por elegir participar en esta entrevista. Somos un grupo de estudiantes del Instituto Politécnico de Worcester que estamos realizando investigaciones sobre prácticas en los Estados Unidos y en Ecuador. El propósito de nuestra investigación es desarrollar estrategias informadas para que los ractices de Cuenca, Ecuador las utilicen para motivar a sus prácticas de la medicina basada en la evidencia (PBE) en el diagnóstico y tratamiento de sus pacientes. Lo estamos entrevistando hoy para comprender las prácticas de PBE que usted y las prácticas de su hospital usan, así como los incentivos que existen para motivar a usted y al personal a usar dichas prácticas. Esta entrevista durará alrededor de media hora. Comenzaremos por obtener información sobre usted y sus prácticas, y luego tendremos una conversación abierta sobre PBE. Esta entrevista es voluntaria y no tienes que participar si no lo deseas. Si en algún momento llegamos a una pregunta que te incomoda o que no quieres responder, avísanos y practica saltarnos la pregunta o concluir la entrevista. ¿Tiene alguna pregunta para nosotros antes de comenzar? Ponemos nuestra información de contacto en el chat de zoom. No dude en comunicarse con nosotros en cualquier momento con preguntas, comentarios u otros comentarios que pueda tener.

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Interview Questions for Physicians

1. ¿Cuál es tu posición? ¿Cuánto tiempo lleva trabajando en este puesto (número de años)?
2. ¿Está familiarizado con el concepto de medicina basada en la evidencia?
3. ¿Cómo definiría EBM con sus propias palabras?
4. ¿Conoce alguna práctica de EBM que se lleve a cabo en el hospital?
5. ¿Ha intentado incorporar la EBM en su práctica? ¿Es algo que pudiste hacer?
    a. Si la respuesta es no:
        i. ¿Cree que sería beneficioso adoptar la medicina basada en la evidencia en su práctica?
        ii. ¿Qué te ayudaría?
    b. Si la respuesta se debe a desafíos:
        i. ¿Qué barreras te impiden incorporar EBM?
    c. Si la respuesta es sí:
        i. ¿Qué recursos utiliza para incorporar la EBM en su práctica?
        ii. ¿Qué y quién facilitó eso? ¿Cómo se aplica / motiva?
        iii. ¿Cómo se accede al contenido en EBM?
6. ¿Cómo se mantiene actualizado con las prácticas médicas más recientes?
7. ¿Qué aspecto o aspectos de la EBM le resultan más desafiantes?
    a. ¿Crees que hay alguna forma de mejorar esto?
        i. ¿Un sistema estandarizado? ¿Delegación? ¿Accediendo a él?

   b. ¿Es el costo, la disponibilidad, los recursos, etc.? Indíquelos después de su respuesta general.
8. ¿Cuál cree que es el mayor beneficio de utilizar EBM?
9. ¿Hay algo que la administración del hospital pueda hacer para aumentar la facilidad y el uso de la EBM entre los médicos?
10. ¿Considera que tener estudiantes de medicina trabajando con usted durante las rotaciones lo impulsa a estar actualizado?
11. Por ejemplo, si los estudiantes le hacen preguntas, usted se mantendrá más actualizado o si traen capacitación de la escuela de medicina.

Appendix D: Interview Coding Categories for US and Cuenca

7 coding categories emerged from the interview data:

1. **Concept of EBP**: category involves knowledge of EBP concept and why it is important
2. **Current EBP activities & promotion**: category involves how physicians and hospitals are current integrating EBP
3. **Attitude towards EBP**: category involves how physicians feel about using EBP (ie is EBP it worth it)
4. **Databases and resources**: category involves accessibility to resources that are necessary for successful EBP methods
5. **Barriers to EBP**: category discusses difficulties with practicing EBP (ie language, time, support)
6. **Improvements:** category involves recommendations that could be made to help improve and increase the use of EBP in hospitals
7. **Demographics**: category involves type of healthcare professional, gender, duration of time working in medical field, and information about the hospital

Appendix E: United States Survey

Written Consent:
Thank you for choosing to participate in this survey. We are a group of students at Worcester Polytechnic Institute who are conducting research on hospitals in the US and in Ecuador. The purpose of our research is to develop informed strategies for hospitals in Cuenca, Ecuador to use to motivate their doctors to use evidence-based practices (EBP) in their diagnosis and treatment of patients. We are asking you to participate in this survey to help us understand the EBP methods that you and the doctors at your hospital use, as well as any incentives that are in place to motivate you and the staff to use such practices. This survey should take about 15 minutes. We will start by getting some demographic information, provide statements to you about EBP, and then ask you to rate how strongly you agree or disagree. Finally, there will be space for you to discuss your experiences with EBP. This survey is voluntary, and you do not have to participate if you do not wish. If at any point you get to a question that makes you uncomfortable or that you do not want to answer, you can skip the question or conclude the survey. Please feel free to reach out to us at any time with questions, feedback, or other comments you may have. We have provided contact information below.

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US Physician Survey Questions
The purpose of this survey is to gain an understanding of evidence-based practices in the clinical practices

Instructions: Please select the option which corresponds best towards the statement or question provided. Only one box may be selected per question/statement. Your responses are anonymous.

Questions	Response Options
Part 1: Current Activities	
I have access to medical databases (such as MEDLINE, UpToDate, or Journal subscriptions).	☐ Yes ☐ No
The medical databases I use are provided by my medical center	☐ Yes ☐ No
I access medical databases to find scholarly articles to help me diagnose and treat patients	☐ Daily ☐ Weekly ☐ Monthly ☐ Yearly ☐ Never

Reading about new medical research is helpful in my day-to-day management of patients	□ Strongly agree □ Agree □ Disagree □ Strongly disagree □ I do not read new medical research
I am confident in my ability to critically assess and apply medical research papers	□ Strongly agree □ Agree □ Disagree □ Strongly disagree □ I do not read new medical research
I am aware of the concept of continuing medical education (CME)	□ Yes □ No
I find CME credit requirements helpful in keeping me up to date with new medical research	□ Strongly agree □ Agree □ Disagree □ Strongly disagree □ I do not participate in CME
I participate in regular conferences, webinars, or lectures that are hosted by my medical center (such as grand rounds, journal clubs and seminars, etc.)	□ Yes □ No
I find these regular conferences, webinars, or lectures that are hosted by my medical center helpful in keeping me up to date with new medical research.	□ Strongly agree □ Agree □ Disagree □ Strongly disagree □ I do not attend any of these activities
I regularly implement new medical evidence into practice	□ Strongly agree □ Agree □ Disagree □ Strongly disagree
Part 2: Attitude & Knowledge of EBP	
I am familiar with the concept of evidence-based practice (EBP)	□ Yes □ No
I have had training to teach me more about EBP	□ Yes □ No

I understand the relationship between clinical research and medical practice	□ Strongly agree □ Agree □ Disagree □ Strongly disagree
I regard clinical research as a key tool in effectively diagnosing and treating patients	□ Strongly agree □ Agree □ Disagree □ Strongly disagree
I am interested in furthering my knowledge and applications of EBP in my practice	□ Strongly agree □ Agree □ Disagree □ Strongly disagree
I believe that EBP improves overall patient care.	□ Strongly agree □ Agree □ Disagree □ Strongly disagree
I believe that EBP should be performed by all clinicians.	□ Strongly agree □ Agree □ Disagree □ Strongly disagree
EBP is present is my own daily medical activities	□ Strongly agree □ Agree □ Disagree □ Strongly disagree
EBP is present in my daily activities	□ Strongly agree □ Agree □ Disagree □ Strongly disagree
EBP and keeping up to date with recent medical research is consistently promoted by my medical center	□ Strongly agree □ Agree □ Disagree □ Strongly disagree
I believe evidence-based practice is too time consuming	□ Strongly agree □ Agree □ Disagree □ Strongly disagree

I prefer to stick to tried and trusted medical practices than constantly adapting my practices based on new evidence	□ Strongly agree □ Agree □ Disagree □ Strongly disagree
Part 3: Barriers of EBP	
I do not have the time in my workday to implement EBP	□ Strongly agree □ Agree □ Disagree □ Strongly disagree
I do not have the financial support to implement EBP	□ Strongly agree □ Agree □ Disagree □ Strongly disagree
I do not have the necessary resources easily accessible to implement EBP.	□ Strongly agree □ Agree □ Disagree □ Strongly disagree
I do not have the necessary knowledge of EBP to implement it.	□ Strongly agree □ Agree □ Disagree □ Strongly disagree
PART 4: Demographic Data	
Have you completed an interview or survey from our group prior to this survey?	□ Yes □ No
Age	□ 20-30 □ 31-40 □ 41-50 □ 51-60 □ 60 and older
Gender	□ Male □ Female □ Non-binary □ Prefer not to answer/other
Occupation	□ Physician □ Physician's Assistant □ Medical Student □ Nurse

	□ Other (please explain): _____
Duration of time working in medical field	□ Currently in medical school □ Less than 1-year post-medical school □ 1-5 years post-medical school □ 5-10 years post-medical school □ 11-20 years post-medical school □ 21+ years post-medical school □ Retired
Geographical Area	□ Rural □ Urban □ Suburban
Do you work in an academic medical center?	□ Yes □ No

Appendix F: Cuenca Survey

Consentimiento por escrito:
Gracias por elegir participar en esta encuesta. Somos un grupo de estudiantes del Instituto Politécnico de Worcester que estamos realizando investigaciones sobre hospitales en los Estados Unidos y en Ecuador. El propósito de nuestra investigación es desarrollar estrategias informadas para que los hospitales de Cuenca, Ecuador las utilicen para motivar a sus médicos a utilizar prácticas basadas en la evidencia (PBE) en el diagnóstico y tratamiento de sus pacientes. Le pedimos que participe en esta encuesta para ayudarnos a comprender los métodos de PBE que usted y los médicos de su hospital usan, así como los incentivos que existen para motivarlo a usted y al personal a usar dichas prácticas. Esta encuesta debería durar unos 15 minutos. Comenzaremos obteniendo información demográfica, le proporcionaremos declaraciones sobre la EBP y luego le pediremos que califique en qué medida está de acuerdo o en desacuerdo. Finalmente, habrá espacio para que discuta sus experiencias con la PBE. Esta encuesta es voluntaria y no tiene que participar si no lo desea. Si en algún momento llega a una pregunta que lo hace sentir incómodo o que no desea responder, puede omitir la pregunta o concluir la encuesta. No dude en comunicarse con nosotros en cualquier momento con preguntas, comentarios u otros comentarios que pueda tener. A continuación, proporcionamos la información de contacto.

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Ecuador Physician Survey Questions
El propósito de esta encuesta es obtener una comprensión de las prácticas basadas en la evidencia en las prácticas clínicas.

Instrucciones: Seleccione la opción que mejor se corresponda con la afirmación o pregunta proporcionada. Solo se puede seleccionar una casilla por pregunta / declaración. Tus respuestas son anónimas.

Preguntas	**Opciones**
Parte 1: Actividades actuales	
Tengo acceso a bases de datos médicas (como MEDLINE, UpToDate o suscripciones a revistas).	☐ Sí ☐ No

Si accede a UpToDate para ayudarlo en su práctica, ¿busca la literatura original en la que se desarrollaron las pautas?	□ Sí □ No
Las suscripciones a las bases de datos médicas que utilizó las proporciona mi centro médico de forma gratuita.	□ Sí □ No
Qué tan frecuente es acceder a bases de datos médicas para encontrar artículos académicos que me ayuden a diagnosticar y tratar a los pacientes.	□ Diario □ Semanal □ Mensual □ Annual □ Nunca
Leer sobre nuevas investigaciones médicas es útil en mi manejo diario de los pacientes	□ Totalmente de acuerdo □ De acuerdo □ Desacuerdo □ Muy en desacuerdo □ No leo nueva literatura médica
Accedo a nueva literatura médica a través de bases de datos públicas gratuitas	□ Totalmente de acuerdo □ De acuerdo □ Desacuerdo □ Muy en desacuerdo □ No leo literatura médica
La base de datos a la que más accedo es ____	□ Cochrane □ Pupane □ Google Scholar □ UpToDate □ Other_____
Confío en mi capacidad para evaluar críticamente y aplicar la literatura médica.	□ Totalmente de acuerdo □ De acuerdo □ Desacuerdo □ Muy en desacuerdo □ No leo nueva literatura médica
Tengo suscripciones a revistas y editoriales científicas.	□ Sí □ No □ No leo nueva literatura médica

Recibo y leo correos electrónicos sobre nuevas metodologías y prácticas médicas de suscripciones a bases de datos.	□ Sí □ No □ No leo nueva literatura médica
Tengo que encontrar métodos alternativos para acceder a la literatura revisada por pares.	□ Sí □ No □ No leo nueva literatura médica
Implemento regularmente nueva evidencia médica en mi práctica diaria.	□ Totalmente de acuerdo □ De acuerdo □ Descuerdo □ Muy en desacuerdo
Puedo aplicar las prácticas más actualizadas a mis pacientes durante mis prácticas diarias.	□ Totalmente de acuerdo □ De acuerdo □ Descuerdo □ Muy en desacuerdo
Conozco el concepto de educación médica continua (CME).	□ Sí □ No
Mi centro médico tiene programas de educación médica continua para mantener al personl de salud actualizados con nueva evidencia científica.	□ Sí □ No □ No estoy seguro
Asisto con regularidad a conferencias, seminarios web o congresos nacionales o internacionales.	□ Sí □ No □ Estos programas de educación médica continua no se me ofrecen.
Encuentro que las conferencias, seminarios web o congresos me ayudan a mantenerme al día con las nuevas investigaciones médicas.	□ Totalmente de acuerdo □ De acuerdo □ Desacuerdo □ Muy en desacuerdo □ No asisto a ninguna de estas actividades □ Estos programas de educación médica continua no se me ofrecen.
Parte 2: Conocimiento y actitud sobre EBP	

Estoy familiarizado con el concepto de práctica basada en la evidencia (EBP)	□ Sí □ No
He tenido una formación formal para enseñarme más sobre la EBP	□ Sí □ No
Entiendo la relación entre la investigación clínica y la práctica médica.	□ Totalmente de acuerdo □ De acuerdo □ Desacuerdo □ Muy en desacuerdo
Considero la investigación clínica como una herramienta clave para diagnosticar y tratar a los pacientes de manera eficaz.	□ Totalmente de acuerdo □ De acuerdo □ Desacuerdo □ Muy en desacuerdo
Estoy interesado en ampliar mis conocimientos y aplicaciones de la EBP en mi práctica.	□ Totalmente de acuerdo □ De acuerdo □ Desacuerdo □ Muy en desacuerdo
Creo que la EBP mejora la atención general del paciente.	□ Totalmente de acuerdo □ De acuerdo □ Desacuerdo □ Muy en desacuerdo
Creo que todos los médicos deben realizar la EBP.	□ Totalmente de acuerdo □ De acuerdo □ Desacuerdo □ Muy en desacuerdo
La EBP está presente son mis propias actividades médicas diarias.	□ Totalmente de acuerdo □ De acuerdo □ Desacuerdo □ Muy en desacuerdo
EBP está presente en mis actividades diarias	□ Totalmente de acuerdo □ De acuerdo □ Desacuerdo □ Muy en desacuerdo
Mi centro médico constantemente promueve la EBP y la actualización continua con los últimos estudios.	□ Totalmente de acuerdo □ De acuerdo □ Descuerdo □ Muy en desacuerdo

Creo que la práctica basada en la evidencia consume demasiado tiempo	□ Totalmente de acuerdo □ De acuerdo □ Desacuerdo □ Muy en desacuerdo
Creo que EBP establece expectativas poco realistas para el lugar de trabajo.	□ Totalmente de acuerdo □ De acuerdo □ Desacuerdo □ Muy en desacuerdo
Existen otras metodologías que son más prácticas para mis actividades diarias distintas a la EBP.	□ Totalmente de acuerdo □ De acuerdo □ Desacuerdo □ Muy en desacuerdo
Prefiero ceñirme a las prácticas médicas probadas y confiables que adaptar constantemente mis prácticas en función de nuevas pruebas.	□ Totalmente de acuerdo □ De acuerdo □ Desacuerdo □ Muy en desacuerdo
Parte 3: Barreras de la EBP	
No tengo tiempo en mi jornada laboral para implementar EBP.	□ Totalmente de acuerdo □ De acuerdo □ Desacuerdo □ Muy en desacuerdo
No tengo el apoyo financiera para implementar EBP.	□ Totalmente de acuerdo □ De acuerdo □ Desacuerdo □ Muy en desacuerdo
No tengo los recursos necesarios de fácil acceso para implementar EBP.	□ Totalmente de acuerdo □ De acuerdo □ Desacuerdo □ Muy en desacuerdo
No tengo los conocimientos necesarios de EBP para implementarlo.	□ Totalmente de acuerdo □ De acuerdo □ Desacuerdo □ Muy en desacuerdo

No tengo suficiente tiempo en una cita con un paciente para comunicar información sobre sus diagnósticos.	□ Totalmente de acuerdo □ De acuerdo □ Desacuerdo □ Muy en desacuerdo
Es fácil encontrar literatura revisada por pares que sea directamente aplicable a mi práctica diaria.	□ Totalmente de acuerdo □ De acuerdo □ Desacuerdo □ Muy en desacuerdo
Puedo aplicar la evidencia de la literatura directamente en mis prácticas diarias utilizando los recursos que tengo disponibles	□ Totalmente de acuerdo □ De acuerdo □ Desacuerdo □ Muy en desacuerdo
Es difícil para mí comprender completamente la literatura médica debido a las barreras del idioma	□ Totalmente de acuerdo □ De acuerdo □ Desacuerdo □ Muy en desacuerdo
Parte 4: Datos demogáficos	
¿Has completado una entrevista o encuesta de nuestro grupo antes de esta encuesta?	□ Sí □ No
Edad	□ 20-30 □ 31-40 □ 41-50 □ 51-60 □ 60 y más
Género	□ Masculino □ Mujer □ No binario □ Prefiero no contestar / otro
Ocupación	□ Médico □ Asistente médico □ Estudiante de medicina □ Enfermero □ Otro (explique): _____

Duración del tiempo de trabajo en el campo médico.	□ Actualmente en la escuela de medicina □ Menos de 1 año después de la escuela de medicina □ 1-5 años después de la escuela de medicina □ 5-10 años después de la escuela de medicina □ 11-20 años después de la escuela de medicina □ 21+ años después de la escuela de medicina □ Retirado
Área geográfica	□ Rural □ Urbano □ Suburbano
¿Trabajas en un centro médico académico?	□ Sí □ No
¿Trabaja en un centro médico público?	□ Sí □ No
¿Trabaja en un centro médico privado?	□ Sí □ No
¿Cómo calificaría sus habilidades para hablar inglés?	□ Avanzado □ Rango medio □ Principiante □ No puedo hablar en inglés
¿Cómo calificaría sus habilidades de lectura en inglés?	□ Avanzado □ Rango medio □ Principiante □ No puedo leer en inglés

Appendix G: User Evaluation

These questions were sent to all the sponsor team, who was asked to evaluate our recommendations and provide us with feedback. They were asked to include the responses to these questions in their message back to us:

1. Do our recommendations seem relevant and obtainable to implement?
2. Are there things you would like to see added or removed?
3. Could the content be presented in a more user-friendly way?
4. Do you feel these would impact patient care if they were implemented?

Appendix H: Findings & Recommendations (English)

INVESTIGATION OF EBP IN CUENCA, ECUADOR

COMPARING THE PRESCENSE AND LIMITATIONS OF EBP

1 ACCESSIBILITY TO LITERATURE

Doctors in the United States often have free access to databases through their medical centers. Medical centers in Cuenca don't usually provide this access and not all of these databases can be translated to Spanish. This causes issues with doctors being fully able to apply it to their practices.

2 TIME ALLOCATION

Both countries struggled with time allocations. Specifically, Cuenca doctors struggle to educate their patients within the required 20-minute appointment. EBP is commonly seen as a time-consuming activity so doctors tend to lean toward other methodologies to see more patients.

3 RESOURCES

Despite the high ranking of its health system, Cuenca doctors indicated that a huge barrier in incorporating EBP was a lack of access to medical devices and certain medications. This lack of resources also affects the amount of applicable literature because doctors have difficulty applying methodologies from wealthier countries that have access to more resources.

4 CONTINUING MEDICAL EDUCTION

From the United States, we gathered that an effective form of keeping updated is CME practices that allow collaboration between doctors. These activities are not widely spread in Ecuador. leading EBP to be an individual activity instead of a community activity.

RECOMMENDATIONS FOR CUENCA DOCTORS

DOCTORS

SUBSCRIBE TO EMAIL ALIASES AND ONLINE JOURNALS THAT SEND REGULAR UPDATES ON THE LATEST PRACTICES AND STUDIES.

HEADS OF DEPARTMENTS

ALLOCATE TIME FOR THE GROUP TO MEET AND DISCUSS ON A REGULAR BASIS AND CREATE STANDARDIZED PRACTICES FOR COMMON PROCEDURES

MEDICAL CENTERS

DEVOTE RESOURCES INTO DOCTOR TRAINING AND SEMINARS AND ENCOURAGE MEDICAL STUDENTS TO TRAIN UNDER PHYSICIANS

GOVERNMENT & MINISTRY OF HEALTH

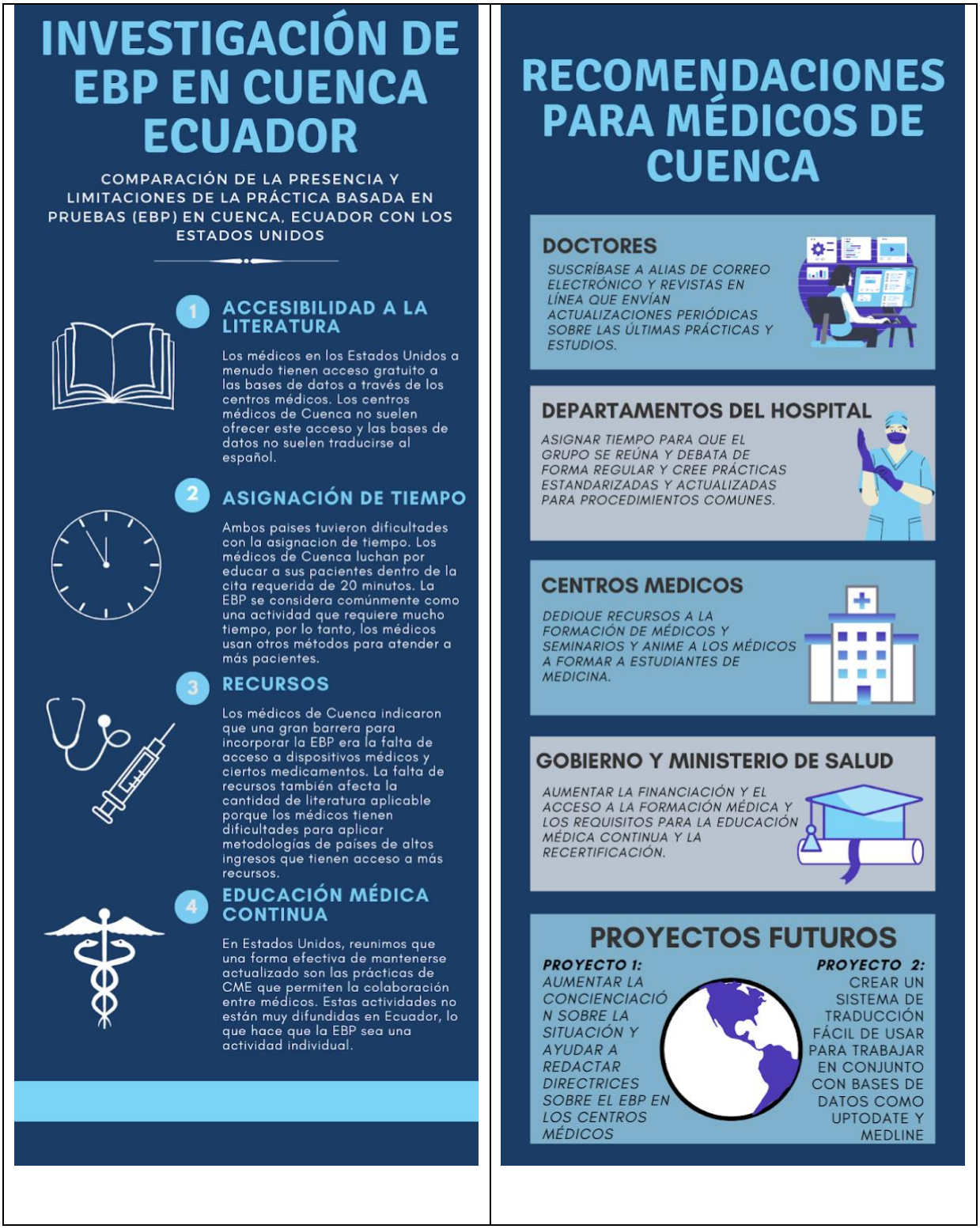
INCREASE ACCESS TO MEDICAL TRAINING AND REQUIREMENTS FOR CONTINUING MEDICAL EDUCATION

FUTURE PROJECTS

PROJECT 1: *INCREASE AWARENESS TO THE SITUATION AND HELP DRAFT GUIDELINES ON EBP IN THE MEDICAL CENTERS*

PROJECT 2: *CREATE A USER-FRIENDLY TRANSLATION SYSTEM TO WORK IN TANDEM WITH DATABASES SUCH AS UPTODATE AND MEDLINE*

Appendix I: Pautas de recomendación (español)



LOS MÉDICOS

A partir de nuestro estudio, encontramos que los médicos tienen dificultades para encontrar información confiable que se adapte a su entorno de trabajo

LA RECOMENDACIÓN

Suscríbete a alias de correo electrónico y revistas en línea que enviarán resúmenes diarios o semanales de las últimas prácticas y estudios clínicos. Esto proporcionará acceso a información rápida y gratuita que se puede modificar para adaptarse a las necesidades de los pacientes

REVISTAS RECOMENDADAS:

1. The New England Journal of Internal Medicine
2. European Journal of Internal Medicine
3. The Journal of American Medical Association
4. OMICS International Journal
5. Geneva Foundation for Medical Education and Research

DEPARTAMENTOS DEL HOSPITAL

A partir de nuestro estudio, descubrimos que la práctica basada en la evidencia se realizaba de forma individual en lugar de a nivel comunitario

LA RECOMENDACIÓN

- Como departamento, asigne tiempo pagado una vez a la semana para que el personal se reúna y revise los casos y la literatura médica pertinente. Esto les dará tiempo para discutir los desafíos que están teniendo con la atención al paciente, así como revisar las últimas investigaciones que han encontrado.

- Pida a cada departamento que trabaje en conjunto para crear prácticas estandarizadas y actualizadas para algunos de los tratamientos más comunes. Esto creará uniformidad en la atención hospitalaria. Revise estas prácticas estandarizadas anualmente y actualice según sea necesario para asegurarse de que las prácticas se basan en la evidencia más actual.

EL CENTRO MÉDICO

A partir de nuestro estudio, encontramos que muchos centros médicos no promueven activamente las actividades de práctica basadas en la evidencia

LA RECOMENDACIÓN

- Los centros médicos pueden crear eventos semanales o mensuales de la gran ronda, donde un médico se presenta en un nuevo estudio o ensayo que están investigando. Estas sesiones pueden estar abiertas a todo el personal y se llevan a cabo en un gran centro de conferencias o sala en el hospital. Durante la pandemia Covid-19, estas conferencias también se pueden celebrar a través de Zoom si es necesario. El centro médico debería construir este tiempo pagado en un horario de médicos.

- Los hospitales pueden alentar a los médicos a capacitar a los estudiantes de medicina para que ayuden a mantenerse al día, ya que proporcionan información sobre los últimos estudios. Hacen preguntas, lo que obliga a los médicos a tener razonamiento detrás de cada decisión médica.

GOBIERNO Y MINISTERIO DE SALUD

A partir de nuestro estudio, encontramos que hay una falta de promoción de los programas de educación médica continua

LA RECOMENDACIÓN

A nivel nacional, puede haber un aumento en la promoción de conferencias y seminarios médicos. Además, el país puede hacer cumplir los requisitos o incentivos de la educación médica continua, que proporcionan beneficios financieros u otros a aquellos que continúan siendo recertificados. La posible divulgación podría incluir asociarse con varios programas de divulgación global para ayudar a establecer conferencias y crear directrices de recertificación.

PROGRAMAS DE DIVULGACIÓN RECOMENDADOS:

1. World Health Organization Outreach Programs
2. Doctors Without Border
3. International Medical Corps
4. Global Viral
5. Global Alliance for Improved Nutrition (GAIN)
6. The Healing Hands Foundation