UNIVERSITY OF CALIFORNIA,
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Tuberculosis (TB) Screening among Healthcare Workers (HCW) in Hospital and Long-Term Care Facilities: A Quality Improvement Project to Assess and Improve HCW's Perspective and Willingness in Implementing Guidelines for TB Screening

DNP Scholarly Project Paper

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by

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DEDICATION

To my husband, Marco – thank you for your unwavering support in allowing me to follow, pursue and achieve all of my personal and professional dreams.

To our son, Marc, I hope to be your inspiration that you can achieve absolutely anything with grit and determination.

To my parents, siblings, family, friends, and my "village" of supporters – my success was all because of your patience, dedication, and love.

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VITA

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Doctor of Nursing Practice, Family Nurse Practitioner in Nursing Science

ABSTRACT OF THE DNP SCHOLARLY PROJECT PAPER

Tuberculosis (TB) screening among Healthcare Workers (HCW) in Hospital and Long-Term Care Facilities: A Quality Improvement Project to Assess and Improve HCW's Perspective and Willingness in Implementing Guidelines for TB Screening

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Kristine Mae Pasco

Doctor of Nursing Practice, Family Nurse Practitioner in Nursing Science

University of California, Irvine, 2022

Associate Professor Sanghyuk Shin, Chair

Tuberculosis (TB) was considered one of the ten leading causes of death worldwide among all genders due to the failure of early detection or initiation of treatment. It was established that TB was a preventable and curable disease after years of documented research and implementation of disease management programs that address the disease process. However, it still results in a high mortality rate by killing more people than any other infection.

The purpose of this project was to assess the willingness of stakeholders to implement the CDC's 2019 TB screening guidelines among healthcare workers through the identification of barriers and facilitators of effective implementation and use these to educate providers, managers, or policymakers to see if it would increase their willingness to adhere to the recommended TB screening and testing guidelines in their facility.

Gaps in implementing healthcare guidelines are evidenced by two domains: healthcare worker and facility/ management related. The study utilized the Consolidated Framework for Implementation Research (CFIR) to encourage hospital and long-term care facility stakeholders to willingly implement the current TB screening guideline once made available. A total of 21 participants completed the survey;

they were stakeholders who are knowledgeable of the infection control practices within their facility. I provided education on the updated TB screening guideline for HCWs, shared the evidence-based implementation of healthcare protocols, and shared best practices identified from other hospitals and long-term care facilities. I also employed educational presentations utilizing the CDC's slide sets for HCWs screening and testing, highlighting the significant changes between the 2005 and 2019 TB screening guidelines and evidence-based recommendations to implement the newest TB screening guidelines for HCWs.

Overall, results showed that most participants thought that the 2019 TB screening guideline was feasible to implement within their facilities. After the implementation, 86% of the participants were willing to implement the guideline once made available, wherein 14% were unsure due to perceived risks to the high elderly population and their proximity to the border. The participants also acknowledged that support and communication are the main barriers to successfully implementing the TB screening guideline. The participants thought that they felt equipped to provide effective and efficient guidance in implementing the TB screening guidelines among HCWs within their facilities with the resources provided. Lastly, I can conclude that the project was successful by showcasing a significant increase in knowledge, attitude, behavior, and high willingness of HCWs to implement the 2019 TB screening guideline within their facilities after the intervention.

CHAPTER 1: INTRODUCTION

Tuberculosis (TB) Screening among Healthcare Workers (HCW) in Hospital and Long-Term Care Facilities: A Quality Improvement Project to Assess and Improve HCW's perspective and Willingness in Implementing Guidelines for TB Screening

The implementation of recommended TB screening in health care settings remains inadequate, with significant shortcomings in detection, compliance, diagnosis, follow-up, and treatment (Tan et al., 2020). According to the study, there was a persistent occupational health threat to HCWs who provides direct patient care (Jones, 2017). However, recent results from Sosa et al. (2019) suggest that annual TB testing of HCWs was no longer recommended to reflect the overall decrease in the incidence of occupational TB transmission in the United States. Analysis from Threapleton et al., 2017, showed that there are multiple factors that affect the implementation of health care policy. This includes HCW's hesitancy to adhere to current guidelines due to a lack of understanding of the policy, lack of communication, training, resources, provision, and commitment from stakeholders, and the difficulty of keeping up with the changes and updates on the healthcare guidelines (Schmidt et al., 2020; Houghton et al., 2020; Joseph et al., 2005).

To effectively tackle the barriers to implementing the current TB screening protocol, it is necessary to apply careful planning, coordination, measurement, process improvement, and capacity building in the health care setting. Houghon et al. (2020) recommended identifying the barriers and facilitators that influenced HCWs' ability to adhere to healthcare guidelines. In addition, the review showed that education, alone or with additional infection control support, has a significant effect on the improvement of the HCWs' adherence and knowledge (Moralejo, 2018).

This project aimed to identify these shortcomings and recognize ways to support hospitals and long-term care facilities in impacting their willingness to adhere to the current TB screening

recommendations among healthcare employees. It was aimed that this approach would contribute to both the prevention and decrease of occupational TB and its inverse relationship to preventing infectious hazards to their patients.

Background/Significance

There is an elevated occupational risk of tuberculosis infection among healthcare workers (Gill & Prasad, 2019; Napoli et al., 2017). Per CDC (2019), about 4% of TB cases in the US are among HCWs. The highest cases are seen in nursing homes, homeless shelters, correctional facilities, hospitals, and long-term care facilities. A study by Jensen et al. (2005) shows that adherence to healthcare guidelines reduces the risk of an occupational hazard among HCWs, decreasing the risk of transmission of diseases among patients in healthcare settings. While there were guidelines that have been published for the prevention and control of tuberculosis infection, implementation of the prior TB screening guidelines in different health care settings remains inadequate (Ito et al., 2016). Due to insufficient implementation of the previous TB screening guidelines to protect healthcare workers from occupational tuberculosis, there have been significant shortcomings in detection, compliance, diagnosis, follow-up, and treatment (Heim et al., 2015; Ito et al. 2016; Janagond, Anand Bimaru, et al., 2017; Jones, 2017). Newer screening protocols and recommendations were made available by the Centers for Disease Control and Prevention (CDC) in 2019 to assist healthcare organizations in testing and screening healthcare employees at risk for developing TB (Sosa et al., 2019). The recommendations were developed after conducting a systematic review of published studies on TB screening, testing, and treatment of HCWs. The changes in screening, testing, and treatment of HCWs were updated to reflect the overall decrease in the incidence of HCWs diagnosed with TB disease due to occupational exposure in the United States.

The systematic analysis published by Sosa et al. (2019) further substantiates why it was important to update the previous TB screening and testing guidelines among HCWs. Their findings included no longer recommending annual testing for HCWs unless there is a known risk for exposure or ongoing

transmission within their settings. The new changes highlight individual TB risk assessment; symptom evaluation for all HCW when exposure is recognized. For HCW with a baseline negative TB test and without prior TB disease or LTBI, perform a test (IGRA or TST) when the exposure is identified; not routinely recommend retesting on 8-10th week period after last TB exposure if the last test is negative; including information about TB exposure risks for all HCW; and treatment is encouraged for all HCW with untreated LTBI, unless medically contraindicated. Meanwhile, a symptom evaluation and test (IGRA or TST) for those without documented prior TB disease or LTBI, consideration for selected HCP groups, and recommended annual TB education for all HCP remained unchanged.

Problem Statement

Since the CDC's 2019 TB screening guideline for healthcare workers was published, it remains unclear how many healthcare institutions have successfully adopted and implemented the current recommended guideline. Moreover, no available studies were found on assessing the barriers and facilitators of successful implementation of the current TB guidelines. To gain insight into the issues around the implementation of TB guidelines, studies on the 2005 CDC TB screening guideline were synthesized to offer additional insights into the barriers and facilitators of TB screening guideline adherence among health care facilities.

Population, Intervention, Comparison, and Outcome (PICO) Question

What are the barriers and facilitators of successfully implementing TB screening guidelines for hospitals and long-term care facilities? Will education increase their knowledge, attitude, behavior, and willingness to implement the new TB screening guidelines among healthcare employees?

CHAPTER 2: Body of Evidence

Review of the Literature

Search Process

I developed a search strategy using guidelines recommended by the Cochrane Qualitative Research Methods group and searched multiple electronic sources, including studies without date or language restrictions.

The search strategy incorporated the key terms: 'guidelines,' 'tuberculosis,' 'implementation,' 'attitudes,' 'barriers,' 'facilitators' and their associated synonyms (hindrance, impediment, promote, developer). The author searched electronic databases, including MEDLINE, The Cochrane Library, CINAHL (Cumulative Index to Nursing and Allied Health Literature), and Google Scholar.

I independently screened the search outputs for potentially eligible studies to minimize selection bias. The author also independently screened the full text of potentially eligible articles to check if the articles fulfill the inclusion criteria defined by the types of studies, participants, intervention, setting, and outcomes. The search results were presented in the form of a flow diagram as recommended by the Preferred Reporting Items for Systematic Reviews and Meta-analysis (PRISMA) (Appendix C).

Other resources such as the reference list of included studies, grey literature including government or non-governmental organization reports, and websites containing evidence on TB diagnosis, including the WHO, Evidence-based Tuberculosis Diagnosis, and the Centers for Disease Control and Prevention. I also conducted citation searching of relevant articles using related articles features on PubMed and Google scholar.

Appraisal of Evidence

Electronic searches on CINAHL and PubMed were conducted at the end of May 2021. Overall, 90 total references were screened, i.e., titles and abstracts from which 11 full-text articles were deemed potentially eligible. All articles were in English, and after full scrutiny of each text, 9 articles met our

inclusion criteria. Two articles were excluded; 1 was a pilot study that is still ongoing; therefore, the outcomes are yet to be defined, and the other one was not conducted within the United States.

Among the nine articles included, 5 were systematic reviews of different published articles exploring the barriers and facilitators of implementing policy into practice (Schmidt et al., 2020; Houghton et al., 2020; Threapleton et al., 2017; Sosa et al., 2019; Glenton et al., 2013); 2 were qualitative analyses that assessed different scenarios that affect or encourage the implementation of healthcare policies (Joseph et al., 2005; Evans-Lacko et al., 2010); 1 was a retrospective cohort study that evaluated the HCWs who routinely go through tuberculosis skin test (TST) screening and assessed the occupational exposure risks among them (Dobler et al., 2018); and 1 was a study that utilized discrete event simulation model to investigate the effectiveness of implementing concurrent flu immunization and TB screening among HCWs (Heim et al., 2015).

To enhance the applicability of this review, I included studies that focused on the implementation of a guideline about any healthcare policies due to the limited number of studies that specifically tackle the implementation of any TB screening implementation guidelines, whether it was the focus of the study or discussed within the study.

While this review initially aimed at looking at articles on identifying barriers and facilitators of TB screening and testing among HCWs, I also included studies that cover the implementation of healthcare policies and guidelines. Two factors led to include these studies. First, there was limited data in the studies of TB screening and testing among HCWs guideline implementation. In contrast, the implementation of healthcare policies/ guidelines includes added range to the topic of interest. Secondly, the review that looks at the barriers and facilitators to adhering to healthcare guidelines had many similar implications for HCWs' exposure to occupational hazards in healthcare settings and other environments.

Comprehensive Synthesis of Evidence

The synthesis of evidence included nine articles from the following resources: Medline Complete (n=7), CINAHL (n=1), and Pubmed (n=1). Among these articles, 5 addressed the barriers and facilitators toward implementation of a healthcare guideline, 1 described the current TB screening and testing protocol among HCWs, and 3 described the attitude and adherence of HCWs during the implementation of a new guideline. Despite the variation in the included publications, commonalities in implementation barriers and facilitators were shared among the studies (Figure 1).

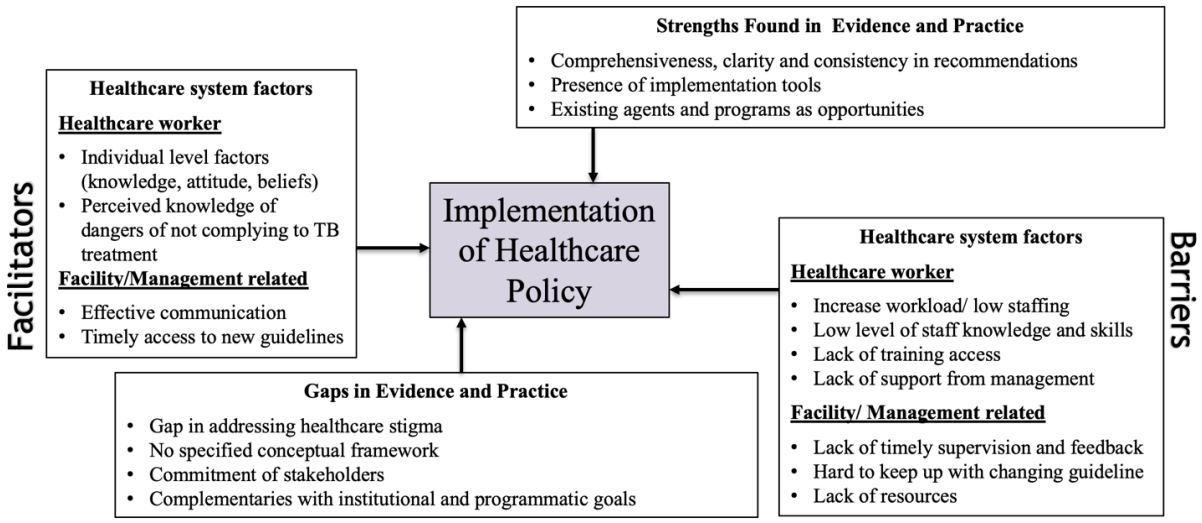

Figure 1. Identified barriers and facilitators for health care policy implementation.

There were several features of the evidence in favor of effectiveness. The study found showed comprehensiveness and consistency in recommendations. The study participants mentioned that the CDC 2005 TB testing guidelines for HCWs were clear and perception among all focus groups consistently revealed that TST was mandatory. That belief helped facilitate adherence to the TB screening guideline (Joseph et al., 2005). Additionally, Houghton et al. (2020) and Joseph et al. (2005) identified that organizational (e.g., communication and coordination of TB guidelines), environmental (healthcare

facility environment including having sufficient space, reasonable measure control to protect the staff), and individual factors (attitude and beliefs of HCWs) impact the successful implementation of a healthcare TB screening guideline. Therefore, addressing these three domains is important for implementing a guideline.

Among the nine identified studies, only three assessed interventions (Heim, 2015; Evans-Lacko, 2010; Threaplon, 2017). All three articles also looked at the HCW's knowledge, attitude, and behavior that may affect the effectiveness of implementing healthcare guidelines. These studies identified that the main barrier and facilitator of implementing healthcare guidelines was of lack knowledge about the guideline being implemented as a consistent finding. The lack of knowledge was evident from statements from HCWs stating that they have an incomplete understanding of the guideline. It explicitly reflected a poor understanding of the diseases being covered, risks to HCWs, and the effectiveness of the guideline being implemented (Schmidt et al., 2020; Houghton et al., 2020; Joseph et al., 2005; Evans- Lacko et al., 2010; Threaplon et al., 2017; Glenton et al., 2013).

Threapleton, 2017 performed a thematical synthesis from published methods to identify key themes in integrated approaches in older/ frail populations. The researchers reported on general approaches to improve quality care through integration of service access through the whole health system and focusing on care in specific settings such as hospitals, sub-acute settings, or in the community. The study synthesized 30 publications and identified that care continuity/ transitions, enabling policies/ governance, having shared values and goals, implementing person-centered care, offering multi-interdisciplinary services, and having effective communication are important components of improving the quality of care in different healthcare settings (hospitals, sub-acute settings, and community setting). It was also mentioned that barriers and facilitators need to be considered through the improvement of these integrative factors. One should not expect change to occur instantly, and slow integration is more likely to be successful and well accepted by HCWs in healthcare settings.

Heim et al. (2015) conducted a discrete simulation model to support the issues of resource allocations in planning and implementing influenza immunizations and screening campaigns among HCWs. Their study found that the length of the campaign and increasing staffing to run the operations directly affected the compliance of HCWs by decreasing wait times in the clinic and was helpful in resource allocation as the situation was observed. A notable difference was made as the researchers adjusted the simulation during the operational phase. They periodically compare and assess parameters and incorporate new information and data for the time remaining in the campaign. These parameters included a discrete event simulation model, including an operational phase where they use collected data to modify and incorporate new information and responses from healthcare staff. Afterward, they include results from the operational phase to improve the health outcomes of each HCW by analyzing the reduction in the number of clinic visits for each HCW.

It is also important to note that majority of the studies identified that knowledge, attitude, and behavior significantly affect the implementation of a guideline. Schmidth et al. (2020) enumerated the level of support, difficulty applying guideline protocols, lack of training, difficulty keeping up with the frequent changes of guidelines, and resistance to change from HCWs were among the factors that hinder a successful guideline implementation. Similarly, Joseph (2005) found that poor TB knowledge, feeling of inconveniency with testing, times and locations, and distrust or lack of confidence were the primary issues in implementing guidelines. On the other hand, the study showed that proper provision, coordination, and effective communication from providers and stakeholders increases the adherence and confidence of HCWs to adhere to the screening and testing guideline.

Critique of Methods

Results from Threaplon et al. (2017) found that the implementation of policy includes challenges when isolating implementation from other parts of the policy process and the lack of agreement about conceptual underpinnings. The studies involving intervention, as mentioned above, did particularly poorly

in evaluating the effectiveness of their interventions. However, their results of identified barriers and facilitators were congruent to other published studies and hence did not change the overall findings.

Another weakness was the lack of a conceptual framework that guides the identification of barriers and facilitators and the implementation of an intervention. Five out of nine articles did not specifically mention a conceptual framework that led to the conceptualization of inter-relating factors associated with their research implementation strategies. This then leads to challenges in identifying variables and analysts resorting to variables that are deemed potentially useful. Hence, the lack of a conceptual framework or evidence-based model creates nuances in designing and conducting high-quality empirical research that can be useful for generalizing the process of improving healthcare policy implementation, and achieving better policy compliance results (Schmidt et al., 2020; Houghton et al., 2020).

While the main focus of the evaluation is on a large-scale implementation effort in healthcare and human services areas that are specific to tuberculosis, the review also yielded insights from published papers that are not specific to a particular condition to gain insights toward a more integrated framework of implementation based on the identified barriers and facilitators.

During the review, it was observed that the method of conducting the meta-analysis, thematic synthesis, and qualitative study varied across studies, with different measurement tools and outcome measures used in the found published studies. These sources of variability may introduce further heterogeneity between studies and even within some studies.

Through this process, several observations were also noted regarding the characteristics of existing studies. In terms of scholarly articles found, six articles showed that the emphasis was mainly on changing practice by introducing evidence-informed policy or practice and the implementation science focusing on the organizational or service provider level (resources, mandated implementation of

guidelines) rather than the barriers that were driven by the healthcare worker's attitude, perception, and beliefs (Glenton et al., 2013; Sosa et al., 2019; Threapleton et al., 2017; Evans-Lacko et al., 2010; Dobler et al., 2018; Joseph et al., 2005).

Additionally, there was no clear articulation of policy-related implementation barriers or facilitators across any field, although many articles lightly addressed this. For example, both Schmidt et al. (2020) and Houghton et al. (2020) analyzed the barriers and facilitators to healthcare workers' adherence to infection prevention and control guidelines for respiratory disease respectively. However, both studies focused on the individual factors (knowledge, attitude, and behavior), effective communication, and availability of resources. They failed to mention any policy-related barriers and facilitators of guideline implementation.

Moreover, there is consistent evidence that combined effective implementation measures that are in line with the CDC's recommendations to prevent the transmission of TB in HCWs (Ito et al., 2016). Two key resources for the study were utilized to determine the effectiveness of health policy implementation: (1) existing frameworks, models, and theories (healthcare policy implementation, implementation science, and knowledge into practice translation) and (2) empirical studies that report on specific barriers and facilitators of the implementation process. Although the methods used in the included studies were appropriately done, the use of a very narrow population (employees or healthcare workers in hospital settings) prevents the generalizability of the findings. However, the diversity among healthcare settings, participants, and as well as the local contexts in which the studies occur enhances the usefulness and broader applications of the findings. Furthermore, I found a pressing need for further research on the effective implementation of healthcare policies, considering developing an integrated model that highlights the best practices to implement healthcare guidelines to improve adherence to the CDC TB screening guidelines among HCWs.

Administrative measures such as informed efforts to increase HCWs' adherence to healthcare guidelines in coordination with the revision of these guidelines should also focus on this regard. In particular, we should give importance to the barriers and facilitators of effective implementation of TB guidelines. This is to aid improve the management of TB screening among HCWs and its implications on other HCWs', patients, and budgetary impact on the organization.

In conclusion, the review represents a continuing effort to identify barriers and facilitators of the implementation science and knowledge translation into practice. It was found that knowledge, attitude, and behavior of stakeholders and HCWs, the environment where the guideline is being implemented, and the organizational access to resources are an integral part of the successful implementation of healthcare guidelines in healthcare organizations. Among the eligible studies reviewed, gaps identified were a lack of knowledge among HCWs on the healthcare guidelines that are being implemented and a lack of a conceptual framework that can help guide the implementation of a guideline. There is a little amount of evidence published that evaluates barriers and facilitators of implementing TB screening guidelines among HCWs. There is indeed a great deal that healthcare fields can learn from each other to advance our understanding of implementing health policies and systems-level implementation efforts, hoping that these efforts will be used as a model in interdisciplinary research to truly bridge this gap. In the face of continuing TB epidemic in many healthcare organizations, such studies should be encouraged in the breadth of settings, policies, and procedures, the inclusion of HCWs, whether they have direct patient contact or not, and proposed intervention and management.

Evidence-Based Recommendation for the Project

Two evidence-based recommendations were found and utilized to develop the project's evaluation protocol to improve TB healthcare screening guidelines among HCWs. Goorts, Dizon, and Milanese (2021), and Ito et al. (2016) recommended the use of implementation science that includes a multifaceted components approach to effectively improve adherence in implementing a new healthcare guideline. There can be variation in the implementation strategies but what was found more effective in

healthcare facilities were strategies that utilized educational meetings, local opinion leaders, and mediated interventions with a combination of multi-faceted strategic interventions (Goorts, Dizon, and Milanese, 2021). It was found that this approach was the most effective in improving adherence, knowledge, attitude, and behavior to guidelines. This then drew us to the conclusion of utilizing the Consolidated Framework for Implementation Research (CFIR) model. Its multi-dimensional approach guides formative evaluations of different implementation strategies and helps build the implementation knowledge of individuals in healthcare settings (Damschroder et al., 2009).

CHAPTER 3: PROJECT FRAMEWORK

Evidence-Based Practice Model

The implementation of the current TB screening guideline into practice requires changes in the knowledge, attitude, and behavior of HCWs and an adaptation to a certain level of the structural environment (Fischer et al., 2016). Even though behavior can change even in the absence of modification in knowledge and attitude, behavioral modifications based on such changes are proven to be more permanent. Based on our synthesis of evidence, to address the gaps in the implementation of the current TB screening guidelines, I propose to utilize the constructs of the Consolidated Framework for Implementation Research (CFIR). CFIR offers an overarching typology for implementation research and is comprised of five major domains: the intervention, the inner and outer setting in which it is implemented, the individuals involved in the implementation, and the process by which implementation is accomplished (Rojas Smith et al., 2014; Damschroder et al., 2009). The illustration of this framework and the component of each domain is provided in Appendix E. Elements of implementing the project will follow the structure of the five dimensions of the CFIR. By including the dynamic perspective where changes in each of these five domains occur, this framework also enables us to test what factors are predictors of sustainment.

The CFIR model was established to illuminate barriers and facilitators influencing policy implementation (Varsi et al., 2015). As many interventions were found to be effective in health research

studies, many of those studies fail to translate them to meaningful outcomes across multiple health contexts.

CHAPTER 4: METHODS

Project Goals

By conducting this research project, I aim to improve willingness to adhere to the CDC's HCW TB screening guidelines, primarily in hospital and long-term care facilities. This includes systematically collating the findings from survey implementation to determine the barriers and facilitators that could advance the evidence base and guide implementation approaches.

Through this project, I explored how knowledge, behavior, and attitudes from different settings affected the willingness to implement the 2019 TB screening guidelines among HCWs. The information gathered may (1) assess the willingness of stakeholders (supervisors/ managers) to implement the 2019 CDC guidelines (2) help guide the implementation of TB screening guidelines among HCWs and design effective interventions to improve the uptake of these published guidelines, (3) foster the successful implementation of other policies, and (4) teach healthcare professionals in healthcare settings and academia about potential barriers and facilitators of policy implementation.

The short-term goal of this project includes conducting an initial evaluation and analysis and providing education on the 2019 screening and testing guidelines. In contrast, the intermediate goal is to improve participants' knowledge, attitude, behavior, and willingness to implement the 2019 guideline. Lastly, the long-term goal is to increase adherence to 2019 screening and testing guidelines.

Project Description

Project Type/Design

This DNP project was determined to be a quality improvement project. Quality improvement because it reflected the increase in knowledge, attitude, behavior, and willingness to adhere to the CDC recommended TB screening and testing guidelines among HCWS after the educational intervention. This included improving the knowledge, attitude, and behavior of staff and stakeholders to gain some insight into the factors that affect the implementation of TB screening guidelines and determine their willingness to implement the guideline.

I used a cross-sectional design to identify barriers and facilitators to successfully increase willingness to implement the current TB screening guideline among HCWs within San Diego County. After obtaining approval from participants in the project, an initial survey was implemented to assess the HCW's level of familiarity with the 2005 and 2019 guideline and their perception of both of these guidelines as it applies to their facility.

The program was designed to assess the perception and willingness of HCWs to implement the CDC's recommended TB screening and testing guidelines among HCWs. A pre-test and post-test survey were utilized to evaluate the program's impact. The project's overall goal is to improve adherence to healthcare settings on the current recommended CDC TB screening guideline among HCWs by evaluating identified barriers and facilitators that would lead to a successful implementation of the current TB guideline among the nonadherent healthcare facilities.

Project Setting/Population

The project was conducted among 21 pre-identified hospitals and long-term care facilities within San Diego County. A convenience sampling method was utilized to increase the recruitment of project participants. It was done by contacting stakeholders from hospitals and long-term care facilities that I

have worked with in the past. I went to different hospitals and long-term care facilities, offering a flyer about the project to solicit interest in participation. Project subjects included facility supervisors/ stakeholders who can provide information on infection control practices within their healthcare facility.

San Diego County is in the southwestern corner of California and is ranked as the fifth-most populous county in the United States (San Diego County Health and Human Service Agency, n.d.). San Diego County is also home to the best-ranking healthcare facilities nationwide.

Participants and Recruitment

Project participants were healthcare facility staff who were knowledgeable of the infection control practices within their facility. The project participants included doctors, nurses, infection preventionist, supervisors, nurse practitioners, environmental health officers, and epidemiologists. They were recruited by personally setting up a virtual meeting with stakeholders to explain the purpose and goal of the project. Follow-up emails and phone calls were also made to ensure participation and receipt of the project survey before and after the intervention.

Description of Intervention

Barriers and facilitators of implementing the current TB screening guideline among HCWs were identified by implementing a formative evaluation survey on pre-identified hospitals and long-term care facilities within San Diego County.

Results from the preliminary survey were summarized. After answering the pretest survey, the participant watched an education video presentation on the CDC's 2019 TB healthcare screening guidelines and testing, highlighting the significant updates, changes, and what remained the same. Published resources from the CDC's website were utilized in the presentation. Links to the website of the CDC's TB screening, testing, and treatment of US. Health Care Personnel Frequently Asked Questions (FAQs) and information regarding the best practices that other healthcare facilities utilize to overcome barriers to implementing the current guideline were also provided to the participants.

The intervention aspect of the project tackled the five major domains of the CFIR model. These five domains were individuals, inner setting, outer setting, process, and intervention. Using the CFIR model ensured that the key barriers and facilitators to implementation were systematically examined across the 5 domains and organized the important contextual factors likely to influence the implementation of each component. I used this model to produce actionable findings. I included this information in the presentation of the current TB screening guideline for identifying improvements to implementation strategies for future practice transformation efforts. Such timely identification of actionable findings during the project implementation will support a rapid-cycle approach to evaluation in which ongoing feedback is provided to stakeholders to support learning, adaptation, and continuous quality improvement.

Measures/Instruments

The questionnaire, record taking, and an interview schedule were developed based on the project's objectives and the respondents' availability. The survey questionnaires consisted of closed-ended and open-ended questions to thoroughly explore the topic and provide precision to the project. The questionnaire included sections evaluating demographic factors, knowledge, attitudes, beliefs, and barriers and facilitators of healthcare policy implementation.

The data were collected utilizing the questionnaires that were developed based on the CFIR model. The questions on the survey administered were sectioned into areas representing knowledge, attitude, behaviors, and willingness of stakeholders regarding TB guideline implementation and the construct variables, which are barriers, facilitators, and cues to action. The questions were presented on a Likert scale with Strongly Disagree as the lowest score and Strongly Agree as the highest score. Participants were also given, I do not know, as a choice to measure their knowledge of the question that was being asked. The pre-test included 38 questions, while the post-test had 24 questions. The questions from the pre-test with answers that were not likely to change were excluded from the post-test. The questions were adopted from the CFIR interview guide tool for quantitative data available on the CFIR

website, and Organizational Readiness to Change Assessment (ORCA) mapped to the CFIR developed by Helfrich et al. (2009)

The CFIR model was used to develop questions that assessed participants' knowledge and whether they correctly answered the TB knowledge questions. Wherein attitude and behavior were evaluated whether the participants were likely to disagree with the statements regarding the TB screening guideline. Lastly, I assessed the willingness, perceived barriers, and facilitators and whether the participants tend to agree with the perceived benefits of implementing the current TB screening guideline. Due to the instrument's inclusivity, I saw that it is a strong model for evaluating TB screening implementation and build implementation knowledge across healthcare facilities.

Data Collection Procedures

At the beginning of the project, I conducted preliminary data collection utilizing an online survey developed through REDCap software 1-to 2 weeks after recruiting the project participants. After analyzing the data collected from the initial evaluation, I reached out to the project participants to ensure they had all the necessary information and links to watch the educational video I recorded for the project. A similar approach was made to evaluate the effectiveness of the intervention simultaneously after the intervention. The results for each section were actively reviewed to ensure that our project participants answered all the fields and that all the survey questionnaires were completed. Follow-up emails were sent to ensure all participants answered the surveys every 3 days. Data collected were extracted into an Excel spreadsheet for analysis.

Data Analysis

Descriptive and summary statistics were computed and evaluated among healthcare facilities in preliminary analysis and outcome evaluation. Descriptive and summary estimates (i.e., percentages, means, medians, standard deviations) were assessed using Chi-square tests for categorical variables. All the statistical analyses that were done were only for hospitals and long-term care facilities. Lastly, paired t-test was used to compare if there was a significant difference in the knowledge, attitude, behavior, and

willingness of participants to implement the 2019 Tb screening guideline. All analyses were conducted will use Microsoft Excel's Real Statistics resource pack extension version 7.9.1.

Ethical Considerations

The official University of California, Irvine, Institutional Review Board (IRB) form, Request for -Determination-Non-Human-Subjects, was completed after the DNP proposal was approved and before initiating the DNP project. This DNP project is a cross-sectional study that does not include human study subjects and does not need to undergo a formal ethical review for approval. All information collected as part of the project was aggregated data from the participants and did not include any potential identifiers. I also prepared a summary of findings for UCI School of Nursing stakeholders and project participants utilizing proper dissemination guidelines. Results were discussed and presented at the end of the Spring Quarter 2022 to ensure that the findings align with our PICO question, relevance to the implementation of current TB HCW screening guidelines, and implications for future research.

Stakeholders/Barriers

Due to a surge in COVID-19, a revision was done to the initial plan of implementing the DNP project. I was unable to schedule in-person meetings with the stakeholders. I had to record a video presentation instead of an in-person presentation due to the facilities and hospital's visitor policies that were in place to mitigate the spread of COVID-19. There were also limitations in the survey. Since the survey was based on self-reported data, there may be a respondent's bias. Given that the population included in the project are key stakeholders, there were also delays in response to the questionnaire being implemented.

Formative Process Evaluation

The evaluation of the project aimed to identify the willingness of hospitals and long-term care facilities to implement the 2019 CDC TB screening guideline for healthcare workers. The original goal of the project was to assess the barriers and facilitators of implementing the guideline; however, during the beginning of the project implementation, I found through the California TB Controller's Association that

California has not yet updated the TB screening for health care worker's regulation to follow the 2019 CDC TB healthcare worker screening guideline.

Another aspect of the project that I modified was the method of implementing the educational portion of the project due to the surge of cases in COVID-19. Most facilities did not permit in-person meetings. Hence, instead of conducting an in-person presentation of the 2019 guideline, I had to record a video presentation of the 2019 TB health care screening guideline and made all resources available through electronic resources.

During the first two months of the project, I actively recruited participants through email and phone calls and ensured that the pretest survey was answered promptly. Follow-up emails were sent to those participants who had not yet responded every three days. I also ensured that all fields were required to be answered before submitting the pretest survey and the posttest survey. The implementation video was embedded between the two surveys to ensure that they were made aware and well informed on the 2019 CDC TB screening guideline updates. A follow-up meeting with the participants was also arranged to ensure that their questions were answered and clarified after the project implementation.

CHAPTER 5: RESULTS AND CONCLUSIONS

Results

A total of 21 participants participated on the survey (Table 1); majority of the respondents were nurses (n=12), followed by supervisor (n=2), medical doctor (n=2), nurse/infection preventionist(n=2), epidemiologist (n=1), nurse practitioner (n=1) and environmental health officer(n=1). Table 1 also showed that 33% (n=7) were familiar with the 2005 CDC's TB Screening and Testing of Health Care Personnel. Wherein only 19% (n=4) were familiar with the 2019 screening guideline, 28% (n=6) answered that they were unsure of the guidelines and 19% (n=4) were familiar with both 2005 and 2019 guidelines.

Table 2, Table 3, and Table 4 show the result from the pretest and posttest. The result from the analysis is sectioned by the different constructs of the CFIR model as shown below:

Characteristics of Individuals. The results showed that there is a significant improvement in the participant's knowledge and attitude to implement the CDC's 2019 Tb screening guideline (p-value 0.001). Results showed that there was only 40% of the participants knew the 2019 guidelines (Table 2). The participants feel that they don't have enough training to adhere to the 2019 TB screening guideline and that implementing it puts a heavy burden on the staff. However, they understand the importance of adhering to it, feel empowered to continue to improve TB screening among HCWs, and that the 2019 guidelines fit with the current work processes and practices in their facilities.

Outer Setting. There is no significant difference in the participants' perception of the CDC guideline on the pretest and post-test (p-value 0.09). During the pretest and post-test, the participants strongly agree that the CDC has high-quality materials that are appropriate and engaging and allow them to reflect upon progress toward implementing the 2019 screening guideline.

Intervention Characteristics. There was no significant improvement in the participant's readiness to implement the screening guideline (p-value 0.08). The analysis of the pretest and post-test showed that the participants think it is feasible to implement the 2019 guideline because the implementation of the 2005 guideline went well in their facility with the support of their managers/ supervisors. They also believe it is essential to implement it as soon as it is available. However, the participants think that cost is one of the issues in implementing the 2019 guideline.

Inner Setting. The survey found that the 2005 guidelines were easily implemented in their facilities, and they have the resources that they need to implement the recommended screening guidelines. Meanwhile, the participants also felt that their opinions are not solicited regarding the decision to implement new policies, their managers/ supervisors do not set a high priority on the implementation of

TB screening guidelines, that there was lack of active support from supervisors and staff taking an active interest in programmatic-related problems and success could hinder the successful implementation of the 2019 guideline.

Process. Participants consistently identified that the climate and process within their facilities negatively impact the implementation of the TB screening guideline. This involves aligning the program implementation with their mission and strategic plan, using data to guide the implementation process, establishing clear goals, and holding staff accountable for implementing the 2019 guideline.

Upon conducting a paired t-test, the result showed a significant improvement in the participant's knowledge, attitude, behavior, and willingness to implement the CDC's 2019 TB screening and testing guideline for HCW (p-value <0.05) (Table 4). On the pretest, the mean score on each domain was as follows: individuals (3), outer setting (4), inner setting (3), intervention (5), and process (3). Conversely, I saw a significant increase in the post-test results that showed a mean score of 5 across all domains. Among 21 participants, 86% (n=18) said that after learning more about the implications of the 2019 CDC TB screening and testing guideline for HCW, they are willing to implement the guideline within their facility. Some respondents mentioned that they think it is beneficial to know that the new guideline is well supported by research and that there is a low incidence of occupational TB risk for their employees. They also mentioned that it will significantly reduce the costs related to annual TB testing and would help them allocate expenses to other facility needs. However, 14% (n=3) remained unsure due to worries about the health risks it imposes on their employees and patients or residents due to the high elderly population and their proximity to the border.

Discussion

This project found that interventions based on the multidimensional context in guideline implementation were successful in improving knowledge and attitude among participants. During the project implementation, some participants acknowledged that they had insufficient training regarding the TB screening and testing guidelines for HCWs and needed additional education to be informed. However, after the intervention, I saw a significant increase in our participant's knowledge and attitude toward the

new CDC TB screening guideline. Though many participants also felt that there were too many existing barriers that may hinder the implementation of the new guideline, they were still motivated to make it happen once the guideline was made available to their facilities. We found that training and education are beneficial for achieving high levels of willingness to implement the recommended guidelines

The pretest and post-test surveys revealed multiple barriers and facilitators to the adherence of HCWs in hospital and long-term care facilities to TB screening and testing guideline among HCWs which was summarized in Table 2 and Table 3. Generally, successful outcomes for developing an efficient, effective, and evidence-based protocol depend upon a multifactorial approach to understanding the causes, consequences, and remedies to successfully implement a guideline (Mbanya et al., 2010; Sosa et al.,). Not fully understanding the 2005 and 2019 TB screening and testing guidelines was a consistent finding among participants. This finding came up when several participants answered "I do not know" on several questions pertaining to the specifics of the 2005 screening guideline and whether they knew the existence of the 2019 screening guideline. There were also comments that implicitly reflected poor communication and a lack of support from their stakeholders. The literature review, along with the results of the project, solidified that knowledge is a key facilitator in guideline adherence.

Challenges in the uptake of the implementation of a guideline were also identified because most participants feel that there was a huge gap in communication and support from stakeholders. Similarly, Chambers (2013) found that implementation programs must adapt to the multidimensional context in which stakeholders function to ensure a sustainable and smooth delivery when implementing a guideline.

Moreover, I also had challenges in communication with the stakeholders and thought that the implementation of the guideline would be impacted due to these issues. I had difficulty arranging meetings with stakeholders in between required classes and meeting required clinical hours. Despite the challenges presented throughout the project implementation, I have completed the total number of participants needed for the DNP project and collect all the pertinent data for the outcome evaluation and analysis. The project participants were very cooperative and responsive despite their busy schedules. I was expecting that the project implementation might take longer than expected due to the burden that the

COVID-19 surge presented. Overall responses to the survey supported the implementation of the new TB guideline into practice.

Lastly, project participants considered that the constantly changing nature of information and guidelines is challenging to process and for the organization to disseminate. Having solid strategies such as receiving informational support and up-to-date information from the CDC were viewed as necessary by the HCWs (Kang, 2018; Seale, 2014). Routes of disseminating information may include posters, conducting regular meetings, and email notices highlighting the summary of updates and changes in protocols (Kang, 2018).

Strengths and limitations

The main limitation of the project is primarily that I was not able to assess and improve adherence to the 2019 CDC TB screening and testing guidelines for HCWs because the State of California has not yet adopted the policy. The State of California still recommends using the 2005 guidelines, which require annual testing of HCWs. Nevertheless, the project provided insight into the factors that help facilitate adherence and willingness to implement TB guidelines within their facilities. The adaptation of the CFIR model helped significantly address multiple domains such as knowledge, attitude, and belief of participants leading to increased willingness to adhere to the 2019 guideline.

Another significant strength of this study is that the findings align with the evidence-based studies published from different sources—making this a great venue for future projects or research that wants to assess the barriers and facilitators in implementing a guideline.

Sustainability and Dissemination

At the end of the project implementation, the project participants were given the resources that were presented in the educational video for future use. They were also encouraged to sign-up for the CDC's emails/ newsletters to ensure that they are up to date on the guideline revisions and recommendations for TB screening among HCWs.

Dissemination of the project findings includes sharing information with DNP program staff, project participants, and fellow colleagues through written summary and oral presentation at the end of

the project. The results of the project may also be submitted at local, regional, or international conferences to extend the reach of the project findings.

Conclusion

In conclusion, this project showed that the CFIR-based intervention improved the knowledge, attitude, behavior, and willingness of HCWs to adhere to the recommended TB healthcare screening and testing guidelines in hospitals and long-term care facilities. Secondly, it identified several barriers and facilitators influencing their adherence and willingness to comply with the recommended guideline. It also aided in achieving the DNP essentials by conducting activities that are aligned to translate these results into my future practice. This project may serve as a future reference to further examine the barriers and facilitators that affect the adherence to healthcare guidelines.

These findings proved that the provision of comprehensive and regular TB training and education that includes updates in guidelines, transmission, distribution of written educational materials through email, or conducting regular meetings to answer questions or concerns of HCWs could facilitate an increase in guideline adherence.

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Appendix A

Detailed Statistical Data

Table 1

Baseline characteristics of Study population

	Parameter	Total n= 21
Role	Medical Doctor	2
	Nurse	14*
	Infection Preventionist	2*
	Supervisor	3
	>2 roles	2
Other	Nurse Practitioner	1
	Epidemiologist	1
	Environmental Health Officer	1
Screening Guideline	2005 CDC's TB Screening and Testing of Health Care Personnel	7
	2019 CDC's TB Screening and Testing of Health Care Personnel	4
	Both	4
	Unsure	6

* Participants selected 2 or more roles in their facility.

>2 roles = number of participants who answered 2 or more roles in their facility.
Screening Guideline = CDC TB screening guideline that the participants are familiar with

Table 2

Pretest: Perception of the implementation of the CDC's 2005 and 2019 TB Screening Guideline among HCWs

CFIR Domain	Question	Level of Agreement (n=21)						Median
		Strongly Disagree	Somewhat Disagree	Neither Agree or Disagree	Somewhat Agree	Strongly Agree	I do not know	
Characteristics of Individuals	I am aware of the 2019 TB screening guideline.	3 (14)	5 (24)	0 (0)	6 (29)	5 (24)	2 (10)	4
	The 2019 TB screening guidelines made sense to me.	2 (10)	5 (24)	1 (5)	4 (19)	5 (24)	4 (19)	4
	I feel I had enough training to adhere to the 2019 TB screening guideline.	3 (14)	5 (24)	4 (19)	3 (14)	3 (14)	3 (14)	3
	The staff understand the importance of the 2019 TB screening guideline.	4 (19)	4 (19)	5 (24)	5 (24)	1 (5)	2 (10)	3
	Staff at the facility are receptive to change in clinical processes.	2 (10)	4 (19)	3 (14)	7 (33)	1 (5)	4 (19)	4
	Implementing new guidelines put a heavy burden on the staff.	3 (14)	5 (24)	1 (5)	7 (33)	2 (10)	3 (14)	4
	The 2019 TB screening guideline conform to the opinions of the managers/ supervisors in our facility.	1 (5)	3 (14)	5 (24)	2 (10)	3 (14)	7 (33)	4
	I feel empowered to continue to improve TB screening among HCWs.	1 (5)	1 (5)	6 (29)	4 (19)	9 (43)	0 (0)	4
	I feel invested in the success of the current TB screening guideline.	1 (5)	2 (10)	6 (29)	2 (10)	8 (38)	2 (10)	4
	I feel that there is enough communication on the updates on TB screening guidelines from our managers/ supervisors.	4 (19)	4 (19)	5 (24)	2 (10)	6 (29)	0 (0)	3
	I actively seek new information regarding TB screening guidelines among HCWs.	4 (19)	4 (19)	4 (19)	5 (24)	4 (19)	0 (0)	3
	The 2019 TB screening guideline fit with the current work processes and practices in our facility.	3 (14)	3 (14)	2 (10)	3 (14)	5 (24)	5 (24)	4
Outer Setting	Published CDC materials (including website, promotional materials, and information packets) are of high quality.	0 (0)	0 (0)	2 (10)	8 (38)	3 (14)	8 (38)	5
	The CDC's information and materials are appropriate.	0 (0)	1 (5)	2 (10)	8 (38)	3 (14)	7 (33)	4
	The CDC's information and materials are engaging.	0 (0)	3 (14)	2 (10)	7 (33)	2 (10)	7 (33)	4
	The CDC updates are helpful in allowing us to reflect upon progress toward implementation of the current TB screening guideline.	0 (0)	1 (5)	2 (10)	6 (29)	5 (24)	7 (33)	5
Intervention Characteristics	The 2019 TB screening guideline is feasible to implement in our facility.	0 (0)	2 (10)	2 (10)	4 (19)	8 (38)	5 (24)	5
	It is important that the 2019 TB screening guideline is implemented now.	0 (0)	3 (14)	3 (14)	3 (14)	8 (38)	4 (19)	5
	The implementation of the TB screening guideline that we currently follow went well.	0 (0)	3 (14)	5 (24)	0 (0)	6 (29)	7 (33)	5
	All our managers/ supervisors. are supportive of the health care worker's TB screening guidelines.	1 (5)	1 (5)	6 (29)	4 (19)	5 (24)	4 (19)	4
	Cost is not an issue to implement the 2019 guideline in our facility.	0 (0)	5 (24)	4 (19)	2 (10)	5 (24)	5 (24)	4
Inner Settings	Our managers/ supervisors. encourage staff to be involved in implementing the HCW TB screening guidelines.	4 (19)	2 (10)	4 (19)	4 (19)	5 (24)	2 (10)	4
	Our facility does a good job assessing staff needs and expectations.	4 (19)	2 (10)	4 (19)	6 (29)	5 (24)	0 (0)	4
	We have the resources we needed to promote the 2019 TB screening guideline in our facility.	2 (10)	4 (19)	3 (14)	4 (19)	3 (14)	5 (24)	4
	In our facility, the clinical staff's opinions are solicited regarding decision about the implementation of a new policy.	6 (29)	11 (52)	2 (10)	1 (5)	0 (0)	1 (5)	2
	Communication within our facility is effective.	5 (24)	4 (19)	5 (24)	5 (24)	2 (10)	0 (0)	3
	The managers/ supervisors. set a high priority on the implementation of the 2019 TB screening guideline.	6 (29)	6 (29)	5 (24)	2 (10)	1 (5)	1 (5)	2
	The HCW TB screening guideline that we currently have has been easily integrated in our facility	3 (14)	3 (14)	2 (10)	5 (24)	3 (14)	5 (24)	4
Process	Our staff (managers, supervisors, other staff), have become program champions, actively supporting and promoting the HCW TB screening guideline beyond what is require	8 (38)	4 (19)	4 (19)	3 (14)	1 (5)	1 (5)	2
	Our staff takes an active interest in programmatic-related problems and successes.	3 (14)	4 (19)	4 (19)	7 (33)	2 (10)	1 (5)	3
	Our managers/ supervisors. actively support implementation of HCW TB screening guideline.	4 (19)	4 (19)	5 (24)	5 (24)	2 (10)	1 (5)	3
	Our facility consistently implements programs that are aligned with our mission and strategic plan.	2 (10)	1 (5)	5 (24)	10 (48)	3 (14)	0 (0)	4
	We use data to guide our facility (e.g., performance reviews, assessments).	0 (0)	2 (10)	3 (14)	9 (43)	7 (33)	0 (0)	4
	Our managers/ supervisors. establish clear goals for HCW TB screening guideline to decrease rate of TB among HCWs.	2 (10)	4 (19)	6 (29)	6 (29)	2 (10)	1 (5)	3
	Our managers/ supervisors. hold staff members accountable for achieving results of HCW TB screening.	2 (10)	4 (19)	7 (33)	4 (19)	4 (19)	0 (0)	3

CFIR= Consolidated Framework for Implementation Research

Table 3

Post-test: Perception on Implementing CDC's 2019 TB Screening Guideline among HCWs

CFIR Domain	Question	Level of Agreement (n=21)						Median
		Strongly Disagree	Somewhat Disagree	Neither Agree or Disagree	Somewhat Agree	Strongly Agree	I do not know	
Characteristics of Individuals	I am aware of the 2019 TB screening guideline.	0 (0)	0 (0)	0 (0)	8 (38)	13 (62)	0 (0)	5
	The 2019 TB screening guidelines made sense to me.	0 (0)	0 (0)	0 (0)	7 (33)	14 (67)	0 (0)	5
	I feel I had enough training to adhere to the 2019 TB screening guideline.	2 (10)	3 (14)	2 (10)	2 (10)	12 (57)	0 (0)	5
	The staff understand the importance of the 2019 TB screening guideline.	1 (5)	2 (10)	1 (5)	6 (29)	9 (43)	2 (10)	5
	Staff at the facility are receptive to change in clinical processes.	2 (10)	1 (5)	1 (5)	7 (33)	8 (38)	2 (10)	4
	Implementing new guidelines put a heavy burden on the staff.	4 (19)	4 (19)	1 (5)	7 (33)	4 (19)	1 (5)	4
	The 2019 TB screening guideline conform to the opinions of the managers/ supervisors in our facility.	0 (0)	2 (10)	3 (14)	6 (29)	6 (29)	4 (19)	4
	I feel empowered to continue to improve TB screening among HCWs.	0 (0)	0 (0)	0 (0)	8 (38)	13 (62)	0 (0)	5
	I feel invested in the success of the current TB screening guideline.	0 (0)	0 (0)	0 (0)	6 (29)	15 (71)	0 (0)	5
	I feel that there is enough communication on the updates on TB screening guidelines from our managers/ supervisors.	4 (19)	6 (29)	1 (5)	5 (24)	5 (24)	0 (0)	3
	I actively seek new information regarding TB screening guidelines among HCWs.	0 (0)	0 (0)	3 (14)	7 (33)	11 (52)	0 (0)	5
	The 2019 TB screening guideline fit with the current work processes and practices in our facility.	1 (5)	0 (0)	0 (0)	6 (29)	13 (62)	1 (5)	5
Outer Setting	Published CDC materials (including website, promotional materials, and information packets) are of high quality.	0 (0)	0 (0)	0 (0)	4 (19)	16 (76)	1 (5)	5
	The CDC's information and materials are appropriate.	0 (0)	0 (0)	0 (0)	4 (19)	16 (76)	1 (5)	5
	The CDC's information and materials are engaging.	0 (0)	3 (14)	1 (5)	6 (29)	10 (48)	1 (5)	5
	The CDC updates are helpful in allowing us to reflect upon progress toward implementation of the current TB screening guideline.	0 (0)	0 (0)	0 (0)	7 (33)	13 (62)	1 (5)	5
Intervention Characteristics	The 2019 TB screening guideline is feasible to implement in our facility.	0 (0)	1 (5)	0 (0)	1 (5)	17 (81)	2 (10)	5
	It is important that the 2019 TB screening guideline is implemented now.	0 (0)	1 (5)	1 (5)	2 (10)	17 (81)	0 (0)	5
	The implementation of the TB screening guideline that we currently follow went well.	0 (0)	1 (5)	0 (0)	2 (10)	13 (62)	5 (24)	5
	All our managers/ supervisors. are supportive of the health care worker's TB screening guidelines.	0 (0)	2 (10)	1 (5)	6 (29)	10 (48)	2 (10)	5
	Cost is not an issue to implement the 2019 guideline in our facility.	0 (0)	1 (5)	2 (10)	3 (14)	12 (57)	3 (14)	5

CFIR= Consolidated Framework for Implementation Research

Table 4

Improvement in Knowledge, attitude, and behavior among HCWs

CFIR Domain	Mean Score		
	Pretest	Post-test	p-value
Characteristics of Individuals	3.6	4.58	0.001
Outer Setting	4.5	5	0.09
Intervention Characteristics	4.6	5	0.08
Inner Setting	3.28	--	--
Process	3.14	--	--
Overall Result	4.05	0.68633274	9.79352E-17

Appendix B

Kuali Approval Form

Tuesday, April 26, 2022 at 13:42:47 Pacific Daylight Time

Subject: Confirmation of Activities that DO NOT Constitute Human Subjects Research
Date: Wednesday, January 12, 2022 at 12:00:16 PM Pacific Standard Time
From: no-reply=kuali.co@mx3.kuali.co on behalf of Kuali Notifications
To: pascok@uci.edu

Dear Kristine Mae Pasco,

The University of California, Irvine (UCI) Human Research Protections (HRP) Program complies with all review requirements defined in 45 CFR Part 46 and 21 CFR 50.3.

Based on the responses provided in Non Human Subjects Research (NHSR): #666 - "Barriers and Facilitators to the Implementation of Tuberculosis (TB) Screening Guideline among Healthcare Workers (HCW) in Hospitals and Long-term care facilities", and per the definitions cited below, the activities do not constitute human subject research or a clinical investigation, as applicable. Therefore, *UCI IRB review is not required and will not be provided.*

45 CFR 46.102(l) defines research as "a systematic investigation, including research development, testing and evaluation, designed to develop or contribute to generalizable knowledge; and 45 CFR 46.102(e)(1) defines a human subject as "a living individual about whom an investigator conducting research obtains (i) Obtains information or biospecimens through intervention or interaction with the individual, and uses, studies, or analyzes the information or biospecimens; or (ii) Obtains, uses, studies, analyzes, or generates identifiable private information or identifiable biospecimens."

21 CFR 50.3(c) defines a clinical investigation as "any experiment that involves a test article and one or more human subjects and that either is subject to requirements for prior submission to the Food and Drug Administration under section 505(i) or 520(g) of the act, or is not subject to requirements for prior submission to the Food and Drug Administration under these sections of the act, but the results of which are intended to be submitted later to, or held for inspection by, the Food and Drug Administration as part of an application for a research or marketing permit."

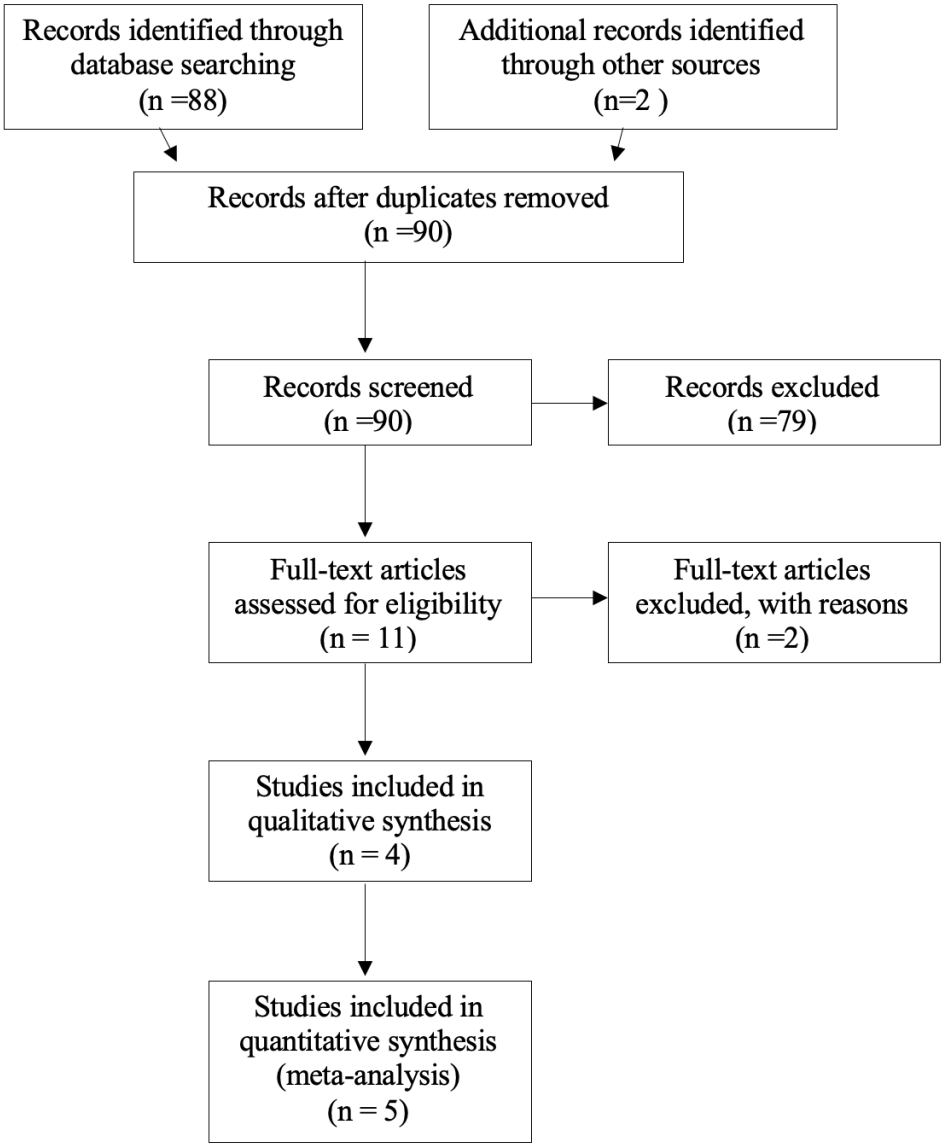
To view the determination for your submission, click here:
uci.kuali.co/protocols/protocols/61ba77abcf9f94003532ab29

Please DO NOT REPLY to this email as this mailbox is unmonitored. If your project changes in ways that may affect this determination, please contact the HRP staff for additional guidance: irb@uci.edu.

Page 1 of 1

Appendix C

PRISMA Flow Diagram



Appendix D

Table of Evidence

Fist author (Year) Title of the article	Conceptual framework	Design/ Method	Sample/ Setting	Major valuables (outcomes) studied (their definitions)	Measurement (Instrument or tools to measure outcomes)	Data analysis Method	Findings	Appraisal: Put the level and quality of the article Worth to use?
Heim, J. (2015) Design and implementation of a combined influenza immunization and tuberculosis screening campaign with simulation modelling	Design and implement a concurrent campaign of influenza immunization and tuberculosis (TB) screening for health care workers (HCWs) that can reduce the number of clinic visits for each HCW.	The study used discrete-event simulation model to evaluate the performace of Seattle' Children's Hospital flu/ TB campaign. The simulation model supported decision making in 2 phases: planning phase and operation phase.	Healthcare workers (paid employees, students and volunteers) and patients (hospital inpatients, outpatients, and immediate family members).	IV: System performance DV: Staffing, delivery schedules, instrument cycles PO: System performance in providing TB results for HCWs.	Using the 2nd phase of the discrete event simulation model - operational phase, the researchers used collected data to modify and incorporate new information and adjustments to the reponses. At the end of the study period, they modified the simulation model to incorporate the lessons learned to determine the study outcome. Two criteria drove the selection of these configuration: The time to report TB screening results for each HDW and the wait time for services at the OHS clinic.	The study utilized descriptive analysis to determine the staffing and scheduling scenarios of the study. They also did a comparison of arrival patterns of HCWs to determine the pattern of arrivals and a prescribed levele- loaded pattern (obtained by appoinemnts).	The campaign was successful in implementing concurrent flu immunization and TB screening with fewer clinic visits, which was greatly appreciated by HCWs. However, the campaign increased additional work load for the participating clinics and laboratory medicine test and evaluations.	This is a high quality article. I can incorporate the TB screening planning and operational phase in my study. In this study, all alternative configurations were also evaluated to find the best design which I can apply on the screening strategies that I want to explore in my study,
Schmidt, B. (2020) Healthcare workers' adherence to infection prevention and control guidelines for respiratory infectious diseases: A rapid qualitative evidence synthesis	Qualitative evidence synthesis to identify the challenges faced in implementing IPC guidelines for respiratory infectious diseases.	The review included qualitative and mixed methods studies on perceptions and experiences on adhering to IPC guidelines, conducted among any type of HCW or other staff members who are responsible for patient care in the hospitals, long term care, primary care or community setting.	HCW or other staff members who are responsible for patient care in the hospitals, long term care, primary care or community setting.	IV: Staff adherence and perceptions DV: HCWs or staff members who are responsible for patient care PO: Barriers and facilitators that influenced HCWs ability to adhere to IPC guidelines	Sampling analysis was done through the search process of relevant studies that listed barriers and facilitators that influenced HCWs ability to adhere to IPC guidelines	Out of 36 relevant studies, The authors reviewed key articles and undertook a rigorous and comprehensive scoping exercise to include in the study. Methodological limitations were assessed to make sure each study meet the criteria.	Factors that influenced their adherence are: *level of support from the management *trouble applying guideline protocols that were log, ambiguous or did not reflect international guidance *Lack of training *Hard to keep up with the frequently changing guidelines *Increased workload associated with the new guidelines *Performance are not assessed in practice *lack of resources Facilitators: *Effectively communicating the updated guidelines *Having access to the new guidelines *individual level factors (knowledge, attitude and beliefs) *They felt motivated to follow the guideline because of the fear of getting infected themselves or passing it along their families.	It is a great article to include in my DNP project because it specifically focus on the barriers and facilitators of implementing health guidelines among HCWs.
Houghton, C. (2020) Barriers and facilitators to healthcare workers' adherence with infection prevention and control (IPC) guidelines for respiratory infectious diseases: a rapid qualitative evidence synthesis (Review)	The researchers used a "best fit framework" approach to analyze and synthesize found evidence.	A prespecified sampling frame was used to sample eligible studies. Researchers included qualitative designs and used both qualitative and quantitative methods for data collection.	Healthcare workers with responsibility for patient care in any healthcare setting, infection control practitioners and managers.	The studies explored the views and experiences of nurses, doctors and other healthcare workers when dealing with severe acute respiratory syndrome (SARS), H1N1, MERS, TB or seasonal influenza. The review was focused on barriers and facilitators that influenced healthcare workers ability to adhere to IPC guidelines.	The best frot framework approach was used to analyze and synthesize found evidences. This approach was useful in generating findings that are relevant to identify barriers and facilitators of HCWs adherence to IPC guidelines	Methodological limitations were assessed using an adapted version of the Critical Skills Appraisal Programme (CASP) tool. The researchers also used the GRADE-CERQual approach to assess confidence on each finding.	Researchers found that there are 3 domains that affect HCWs adherence to IPC guidelines: Organizational, environmental and individual factors. Organizational factors influce safety climate that reflects tha magement's support to their employees, communication of IPC guidelines and availability of training programs. Environmental factors examined the structure and available resources in each health care facility, they identified that physical environment and availability of PPE also affects their adherence to the guidelines. Lastly,	This article provides a comprehensive guide and idea on how to conduct literature search on identifying barriers and facilitators of HCWs adherence to IPC guidelines. This is going to be useful in my project because it lays out an outcome that is similar to the outcome that we are aiming to produce at the end of the program.
Joseph, H. (2005) Factors influencing health care workers' adherence to work site tuberculosis screening and treatment policies	None mentioned	Qualitative data reduction was used to create and categorize codes and examine the relationship among the concepts and participant's responses. The codes were continuously revised throughout the testing to construct validity and reliability codes in the study.	Healthcare workers in 4 health care facilities (2 health departments and 2 hotspitals)	Group segmentation of the adherent and nonadherent group to TB treatnment and screening. TST adherent = received TST on time TST nonadherent = did not receive TST on time Treatment adherent = completed treatment for TBI Treatment nonadherent = did not accept or complete regimen for LTBI	Atlas.ti software was used to analyzed qualitative data that were gathered during the duration of the study. Some concept revisions were done throughout the study to reflect the reliability and validity of the study	Qualitative analysis of transcripts utilizing Atlas.ti software. The researchers also used the tents of grounded throury to explore additional concepts that came from participant's responses	Adherence to TST (Facilitators): *Worksite visits by EH staff for placing and reading TST *Tesing during off peak hours *Supervisory Involvement *Mandatory testing *Active follow up after missed TST *Perception that TST program provides protection to self and others *Perception that TST is appropriate for the level of risk Adherence to TST (Barriers): *Poor TB knowledge *Inconvenience of testing days, times and locations *Long wait at EH office *Distrust or lack of confidence in EH *Doubts about TST	This is a great baseline for my study because it assessed the common perceptions faced hy HCWs that determines that barriers and facilittaors of implementing a policy into practice.
							Adherence to LTBI Treatment (Facilitators): *Provision of comprehensive support services by EH Coordination and commuunication with private providers *Ongoing counseling, including information and emptional support *Active follow up with phone calls to HCWs *Confidence in treament effectiveness Adherence to LTBI Treatment (Barriers): * Perception that treatment is harmful, with high probability of causing adverse effects *Perception that, without TB symptoms, there is no need for medication *Misunderstanding of TB pathology *Failure of private providers and EH staff to recommend treatment *Insufficient emotional and information support provided by EH *Distrust and lack of confidence in EH	

Fist author (Year) Title of the article	Conceptual framework	Design/ Method	Sample/ Setting	Major valuables (outcomes) studied (their definitions)	Measurement (Instrument or tools to measure outcomes)	Data analysis Method	Findings	Appraisal: Put the level and quality of the article
Dobler, C. (2018) Tuberculin Skin Test Conversions and Occupational Exposure Risk in US Healthcare Workers	The researchers followed an LTBI treatment diagram that gives an overview of the screening processs for LTBI in HCWs at Mayo Clinic.	Retrospective cohort study of employeesof a large tertiary medical center in US Midwest who had undergone TST screening in between 1998-May 2014	The study took place at Mayo Clinic Rochester, Minnesota (a tertiary care hospital with a very low incidence of TB per year). The researchers evaluated all teir HCWs who routinely undergo TST screening to commence their employment.	TST conversion was defined as a positive TST of >10mm and reason for conversion that was categorized into 3 categories: occupational known exposure, nonoccupational exposure and possible occupational exposure.	Descriptive analysis was done to measure the number of employees who had positive TST that falls under the 3 defined categories of reason for conversion.	TST screening data was extracted frrom the Mayo Clinic Rochester employees' medical records during the study period January 1, 1998 to May 31st 2014.	Among 40,142 employees who received TST, only 123 converted over 16.4 years. 9% of the converters had suspected TB exposire at workplace but none developed active TB.	I can utilize this article to give a general idea of the incidence of TB among HCWs over the years and why the new TB guideline was implemented.
Evans-Lacko, S. (2010) Facilitators and barriers to implementing clinical care pathways	Care pathways was used by the researchers to reduce variations in clinical practice and improve quality outcomes in health interventions.	The reseearchers did a literature search on active implementation efforts by other healthcare facilities from 1982 to 2007 to address potential barriers that may impede the implementation and suggest interventions which may increase the uptake andusage of care pathways.	Healthcare worker's (clinician or management) in different healthcare organization (management, resources and financial or institutional structures).	Evaluate both facilitators and barriers in the design, implementation and evaluation of care pathways.	Summarize the known factos that consequently promote or hinder the implementation of scientific evidence in clinical practice	A qualitative analysis was done to evaluate evidences on the known factos that help or hinder clinicians in adopting and putting care pathways into practice.	Barriers and facilitators of successful implementation of Evidenced Based Care Pathways: https://bmchealthservres.biomedcentral.com/articles/10.1186/1472-6963-10-182/figures/1	
Threapleton, D. (2017) Integrated care for older populations and its implementation facilitators and barriers: a rapid scoping review	A scoping review was conducted from published methods to identify key themes in integrated care for older populations.	Scoping review of literatures from MEDLINE, Cochrane, organizational websites and internet searches in between 2005-2017.	Literatures that includes integrated care approaches in older/frail populations	Intervention outcomes, barriers and facilitators were segrated into 4 main categories:Macro-level contextual factors; Miso-Level (funding, leadership, service structure and culture); Miso-level intervention organization (characteristics, resources and credibility); and micro-level factors (shared values, engagement and communication).	The reports gathered from the themaric synthesis of articles were grouped into 2 categories: those reporting on general approaches to improve quality care through integrating services across the whole health system and those focusing on one elements of integrated healthcare or focusing on care in pecific setting such as hospitals, sub-acute settings or in the community.	Thematical synthesis of the facilitators and barriers of implementing integrated care guidelines.	**Macro-level factors: External context** Barriers: *Cultural inertia *Health system instability Facilitators: *Strategic direction for improving services *Wider health system stability *Laws and regulation regarding professional competency, scope of practice, care standards and safety	
							Miso-level factors: System organization Barriers: *Funding/finances -Funding silos -Competitive funding among stakeholders -Unclear financial attribution *Organizational leadership -A barrier occurs when organization leaders are not in charge of interventions and changes are implemented from outside groups -Weakness in commissioning to support innovations and collaborative work and lack of sustained project management *Structure of existing services -Divides between primary and secondary or health and social service provision -Time pressure and staffing levels -Complexity in the care system *Philosophy/ culture -Poor institutional philosophy -A permission-based and risk-averse culture -Bureaucratic environment based on a command and control approach to management	
							Facilitators: *Funding/finances -Common governance -Incentives for integration -Funding realignment, ring-fencing and pooling -Funding systems for integration *Organizational leadership -Ensure strong project management and ties between implementers and the organization where changes will occur -Strong leadership and clearly communicated strategic visions *Structure of existing services -System-level policies and procedures should be made that detail how care works and who is eligible *Philosophy/ culture -Encourage innovation -Enable an adaptive system and focus on the system's capacity to self-organize	

Fist author (Year) Title of the article	Conceptual framework	Design/ Method	Sample/ Setting	Major valuables (outcomes) studied (their definitions)	Measurement (Instrument or tools to measure outcomes)	Data analysis Method	Findings	Appraisal: Put the level and quality of the article
							Facilitators *Shared values and understanding -Training is needed on the objectives of change -Joint training (different professional groups) may be useful -Staff consultation promotes feelings of involvement and understanding of aims *Engagement -Identify or appoint 'champions' who act to remind and encourage staff. Champions may be more effective when they exist among peer groups i.e. GPs to encourage GPs -Engage workforce with a simple vision and enable people on the front line to 'feel involved' in changing the service to ensure they effectively engage -Some staff autonomy and being motivated helped to make changes possible *Communicatiion -Allow time for relationships to develop -Co-location increases frequency and quality of communication and gives better access to the appropriate professional knowledge -Regular, ongoing and pre-planned communication between senior partners in the relevant organizations is important for success -Create rules and agreement in advance about how the partnership/ collaboration will work -Electronic record sharing and using an integrated information system for record sharing can help integration, with real-time data sharing -Preliminary work is needed to involve staff so they feel consulted and valued -Clear outlines of each role/responsibility are needed. Integrated care pathways can formalize multi-disciplinary team-working and enable professionals to examine their roles and responsibilities -Encourage staff to make decisions autonomously	
Sosa, L. (2019) Tuberculosis Screening, Testing, and Treatment of U.S. Health Care Personnel: Recommendations from the National Tuberculosis Controllers Association and CDC, 2019	none identified	Sytematic review of literatures published after the release of 2005 TB screening guideline for healthcare workers	Healthcare personnel, health worker, occupational exposure in both low incidence and high income countries	The search included articles indexed in MEDLINE, EMBASE, and Scopus. The medical subject headings used for the search were "latent tuberculosis" and "tuberculosis"; search terms included "healthcare worker," "healthcare personnel," "health worker," "occupational exposure," and "occupational diseases." English language articles were included that 1) were published during January 2006–November 2017; 2) described TB screening and testing in low-incidence (11), high-income countries (12); 3) employed study designs that were randomized controlled tri- als, prospective cohort, retrospective cohort, or cross-sectional studies; and 4) reported LTBI prevalence, test conversion or reversion, or TB transmission rates.	Among the 36 studies identified in the analysis, substantial examination was done to identify all outcomes by location and study design. The researches also examined the patterns of results to make sure each study did not indicate publication bias.	Descriptive analysis was done to determine the number of personnels who had baseline positicve test, having TB disease occurrence and those who did not experiece TB disease.	Findings include TB screening of all HCP, including a symptom evaluation and test (IGRA or TST) for those without documented prior TB disease or LTBI (unchanged); individual TB risk assessment (new); symptom evaluation for all HCP when an exposure is recognized. For HCP with a baseline negative TB test and no prior TB disease or LTBI, perform a test (IGRA or TST) when the exposure is identified. If that test is negative, do another test 8–10 weeks after the last exposure (unchanged), Not routinely recommended (new); can consider for selected HCP groups (unchanged); recommend annual TB education for all HCP (unchanged), including information about TB exposure risks for all HCP (new emphasis); and treatment is encouraged for all HCP with untreated LTBI, unless medically contraindicated (new).	This is considered a high quality article. It is essential to know the new and updated TB screening guideline for educational purposes once the barriers and facilitators of implementing TB screening among healthcare workers has been identified.
Glenton, C. (2013) Barriers and facilitators to the implementation of lay health worker programmes to improve access to maternal and child health: qualitative evidence synthesis	Thematic synthesis approach	Searched Medline, OvidSP, CINAHL, EBSCO, British Nursing Index and Archive.	Lay health workers that provide maternal and chold health in primary and community setting	The researchers studied the experiences and attitudes of stakeholders regarding lay health workers programmes for maternal and child health in primary or community healthcare setting.	Certainty of outcomes were validated using CerQual approach, an approach that the researchers developed for this study alongside the qualitative synthesis of literatures.	Barriers and facilitators to lay health workers (LWH) were identified using thematic synthesis approach.	Barriers and facilitators were mainly tied to programme acceptability, appropriateness and credibility; and health system constraints. Programme recipients were generally positive to the programmes, appreciating the LHWs' skills and the similarities they saw between themselves and the LHWs. However, some recipients were concerned about confidentiality when receiving home visits. Others saw LHW services as not relevant or not sufficient, particularly when LHWs only offered promotional services. LHWs and recipients emphasised the importance of trust, respect, kindness and empathy.	This is a medium quality literature given the limited amount of literatures reviewed to evaluate the outcome. However, it will be beneficial to explore the barriers and facilitators on implementing healthcare policy in different settings

Appendix E

Conceptual Framework

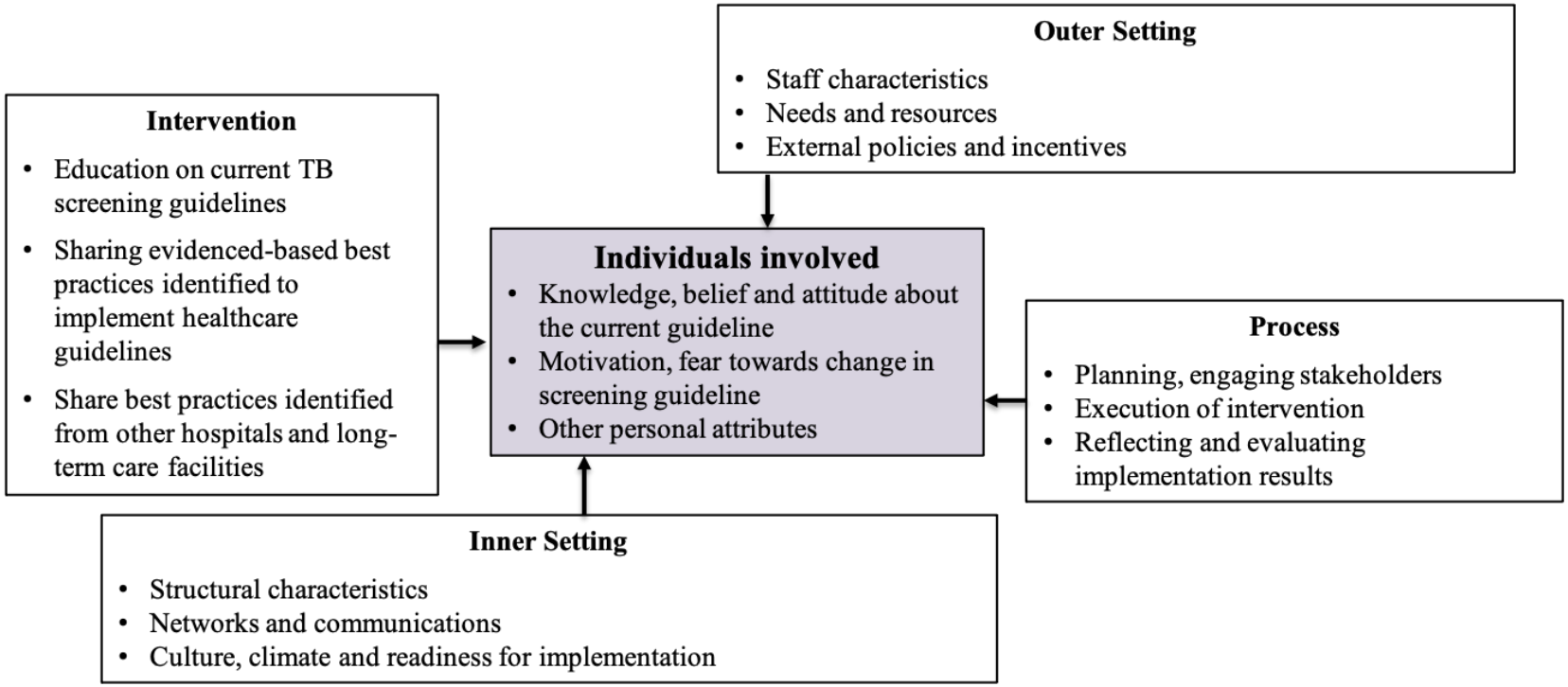


Figure 1. Consolidated Framework for Implementation Research (CFIR)

Appendix F

Data Collection Instruments

Pretest Survey

Pretest Survey

These questions relate to the barriers and faciliarriers and facilitators of implementing TB screening protocol among healthcare workers in hospitals and long-term care facilities.

Please read each statement carefully. Indicate the extent to which you agree or disagree that the statement characterizes your facility by choosing the appropriate response.

In answering the questions, you should think about what your facility is actually like now, not how you think it might be in the future or how you might wish it to be.

Part 1. This section aims to determine your current role in your facility and the TB screening guideline being used in your facility

What is your role in the facility? (Select all that apply)

☐ Medical Doctor
☐ Nurse
☐ Infection Preventionist
☐ Supervisor
☐ Other

Please specify "Other"

_____

Which CDC TB Health Care guideline are you familiar with?

◯ 2005 CDC's TB Screening and Testing of Health Care Personnel
◯ 2019 CDC's TB Screening and Testing of Health Care Personnel
◯ Both
◯ Unsure

Part 2. Answer each question to the best of your knowledge. If unsure, please select " I do not know."

Section I. Please answer the following questions based on your knowledge/understanding of the 2019 CDC's TB screening for Health Care Worker's guideline as it applies to your facility.

	Strongly Disagree	Somewhat Disagree	Neither Agree or Disagree	Somewhat Agree	Strongly Agree	I do not know
I am aware of the 2019 TB screening guideline.	◯	◯	◯	◯	◯	◯
The 2019 TB screening guidelines made sense to me.	◯	◯	◯	◯	◯	◯
I feel I had enough training to adhere to the 2019 TB screening guideline.	◯	◯	◯	◯	◯	◯

The staff understand the importance of the 2019 TB screening guideline.	○	○	○	○	○	○
Staff at the facility are receptive to change in clinical processes.	○	○	○	○	○	○
Implementing new guidelines put a heavy burden on the staff.	○	○	○	○	○	○
The 2019 TB screening guideline conform to the opinions of the managers/ supervisors in our facility.	○	○	○	○	○	○
I feel empowered to continue to improve TB screening among HCWs.	○	○	○	○	○	○
I feel invested in the success of the current TB screening guideline.	○	○	○	○	○	○
I feel that there is enough communication on the updates on TB screening guidelines from our managers/ supervisors.	○	○	○	○	○	○
I actively seek new information regarding TB screening guidelines among HCWs.	○	○	○	○	○	○
The 2019 TB screening guideline fit with the current work processes and practices in our facility.	○	○	○	○	○	○

Section II. Please answer the following questions based on your knowledge/understanding of the 2019 CDC's TB screening for Health Care Worker's guideline.

	Strongly Disagree	Somewhat Disagree	Neither Agree or Disagree	Somewhat Agree	Strongly Agree	I do not know
Published CDC materials (including website, promotional materials, and information packets) are of high quality.	○	○	○	○	○	○
The CDC's information and materials are appropriate.	○	○	○	○	○	○
The CDC's information and materials are engaging.	○	○	○	○	○	○

In our facility, the clinical staff's opinions are solicited regarding decision about the implementation of a new policy.	○	○	○	○	○	○
Communication within our facility is effective.	○	○	○	○	○	○
The managers/ supervisors. set a high priority on the implementation of the 2019 TB screening guideline.	○	○	○	○	○	○
The HCW TB screening guideline that we currently have has been easily integrated in our facility	○	○	○	○	○	○

Section V. Please answer the following questions based on your knowledge/understanding of the currently implemented guideline in your facility unless otherwise specified.

	Strongly Disagree	Somewhat Disagree	Neither Agree or Disagree	Somewhat Agree	Strongly Agree	I do not know
Our staff (managers, supervisors, other staff), have become program champions, actively supporting and promoting the HCW TB screening guideline beyond what is required.	○	○	○	○	○	○
Our staff takes an active interest in programmatic-related problems and successes.	○	○	○	○	○	○
Our managers/ supervisors. actively support implementation of HCW TB screening guideline.	○	○	○	○	○	○
Our facility consistently implements programs that are aligned with our mission and strategic plan.	○	○	○	○	○	○
We use data to guide our facility (e.g., performance reviews, assessments).	○	○	○	○	○	○
Our managers/ supervisors. establish clear goals for HCW TB screening guideline to decrease rate of TB among HCWs.	○	○	○	○	○	○

The CDC updates are helpful in allowing us to reflect upon progress toward implementation of the current TB screening guideline.	○	○	○	○	○	○

Section III. Please answer the following questions based on your knowledge/understanding of the currently implemented guideline in your facility unless otherwise specified.

	Strongly Disagree	Somewhat Disagree	Neither Agree or Disagree	Somewhat Agree	Strongly Agree	I do not kno
The 2019 TB screening guideline is feasible to implement in our facility.	○	○	○	○	○	○
It is important that the 2019 TB screening guideline is implemented now.	○	○	○	○	○	○
The implementation of the TB screening guideline that we currently follow went well.	○	○	○	○	○	○
All our managers/ supervisors. are supportive of the health care worker's TB screening guidelines.	○	○	○	○	○	○
Cost is not an issue to implement the 2019 guideline in our facility.	○	○	○	○	○	○

Section IV. Please answer the following questions based on your knowledge/understanding of the currently implemented guideline in your facility unless otherwise specified.

	Strongly Disagree	Somewhat Disagree	Neither Agree or Disagree	Somewhat Agree	Strongly Agree	I do not kno
Our managers/ supervisors. encourage staff to be involved in implementing the HCW TB screening guidelines.	○	○	○	○	○	○
Our facility does a good job assessing staff needs and expectations.	○	○	○	○	○	○
We have the resources we needed to promote the 2019 TB screening guideline in our facility.	○	○	○	○	○	○

Our managers/ supervisors. hold staff members accountable for achieving results of HCW TB screening.	○	○	○	○	○	○

Posttest Survey

These questions relate to the barriers and faciliarriers and facilitators of implementing TB screening protocol among healthcare workers in hospitals and long-term care facilities.

Please read each statement carefully. Indicate the extent to which you agree or disagree that the statement characterizes your facility by choosing the appropriate response.

In answering the questions, you should think about what your facility is actually like now, not how you think it might be in the future or how you might wish it to be.

Part 1. Answer each question to the best of your knowledge. If unsure, please select " I do not know."

Section I. Please answer the following questions based on your knowledge/understanding of the 2019 CDC's TB screening for Health Care Worker's guideline as it applies to your facility.

	Strongly Disagree	Somewhat Disagree	Neither Agree or Disagree	Somewhat Agree	Strongly Agree	I do not kno
I am aware of the 2019 TB screening guideline.	○	○	○	○	○	○
The 2019 TB screening guidelines made sense to me.	○	○	○	○	○	○
I feel I had enough training to adhere to the 2019 TB screening guideline.	○	○	○	○	○	○
The staff understand the importance of the 2019 TB screening guideline.	○	○	○	○	○	○
Staff at the facility are receptive to change in clinical processes.	○	○	○	○	○	○
Implementing new guidelines put a heavy burden on the staff.	○	○	○	○	○	○
The 2019 TB screening guideline conform to the opinions of the managers/ supervisors in our facility.	○	○	○	○	○	○
I feel empowered to continue to improve TB screening among HCWs.	○	○	○	○	○	○
I feel invested in the success of the 2019 TB screening guideline.	○	○	○	○	○	○

I feel that there is enough communication on the updates on TB screening guidelines from our managers/ supervisors.	○	○	○	○	○	○
I actively seek new information regarding TB screening guidelines among HCWs.	○	○	○	○	○	○
The 2019 TB screening guideline fit with the current work processes and practices in our facility.	○	○	○	○	○	○

Section II. Please answer the following questions based on your knowledge/understanding of the 2019 CDC's TB screening for Health Care Worker's guideline.

	Strongly Disagree	Somewhat Disagree	Neither Agree or Disagree	Somewhat Agree	Strongly Agree	I do not kno
Published CDC materials (including website, promotional materials, and information packets) are of high quality.	○	○	○	○	○	○
The CDC's information and materials are appropriate.	○	○	○	○	○	○
The CDC's information and materials are engaging.	○	○	○	○	○	○
The CDC updates are helpful in allowing us to reflect upon progress toward implementation of the current TB screening guideline.	○	○	○	○	○	○

Section III. Please answer the following questions based on your knowledge/understanding of the currently implemented guideline in your facility unless otherwise specified.

	Strongly Disagree	Somewhat Disagree	Neither Agree or Disagree	Somewhat Agree	Strongly Agree	I do not kno
The 2019 TB screening guideline is feasible to implement in our facility.	○	○	○	○	○	○
It is important that the 2019 TB screening guideline is implemented now.	○	○	○	○	○	○

The implementation of the TB screening guideline that we currently follow went well.	○	○	○	○	○	○
All our managers/ supervisors. are supportive of the health care worker's TB screening guidelines.	○	○	○	○	○	○
Cost is not an issue to implement the 2019 guideline in our facility.	○	○	○	○	○	○

After watching the video, are you willing implementing the 2019 CDC's TB screening guideline for health care workers?

○ Yes
○ No

How do you feel about implementing the 2019 CDC's TB screening guideline for health care workers in your facility?

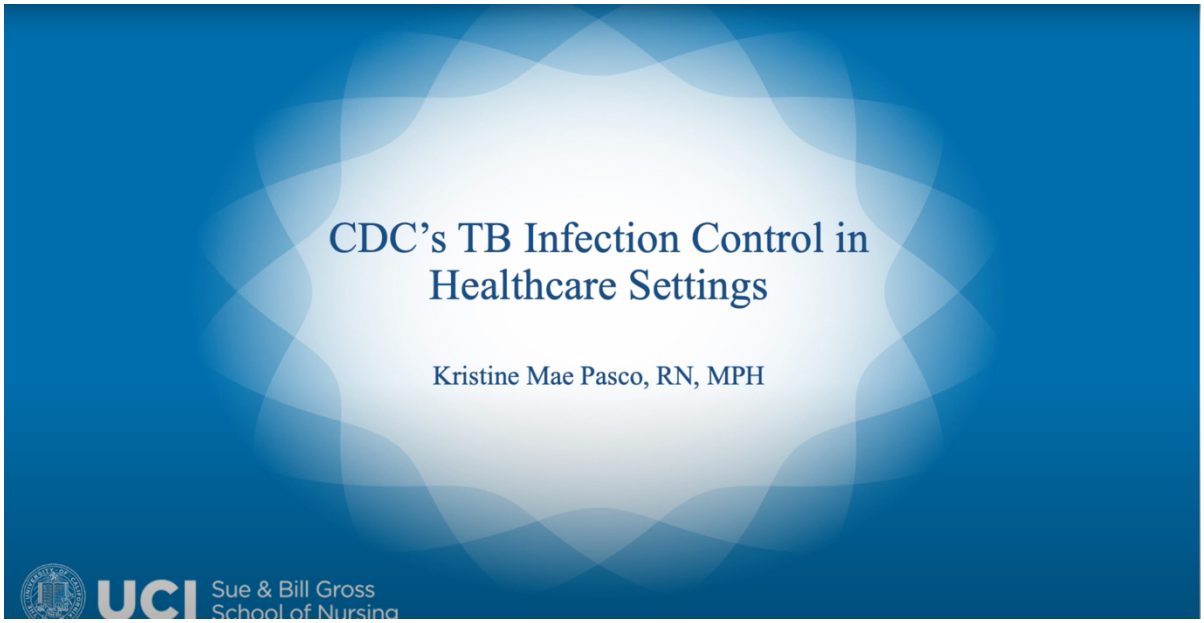
_____

What are your thoughts, inputs regarding the feasibility of implementing the 2019 CDC's TB screening guideline for healthcare workers?

Appendix G

Intervention Material

Educational Video



CDC's Updated TB Testing and Treatment Recommendations for Health Care Personnel Video:

https://www.cdc.gov/tb/topic/infectioncontrol/video/Healthcare_Guidelines_CC_LowRes.mp4

Educational Infographics

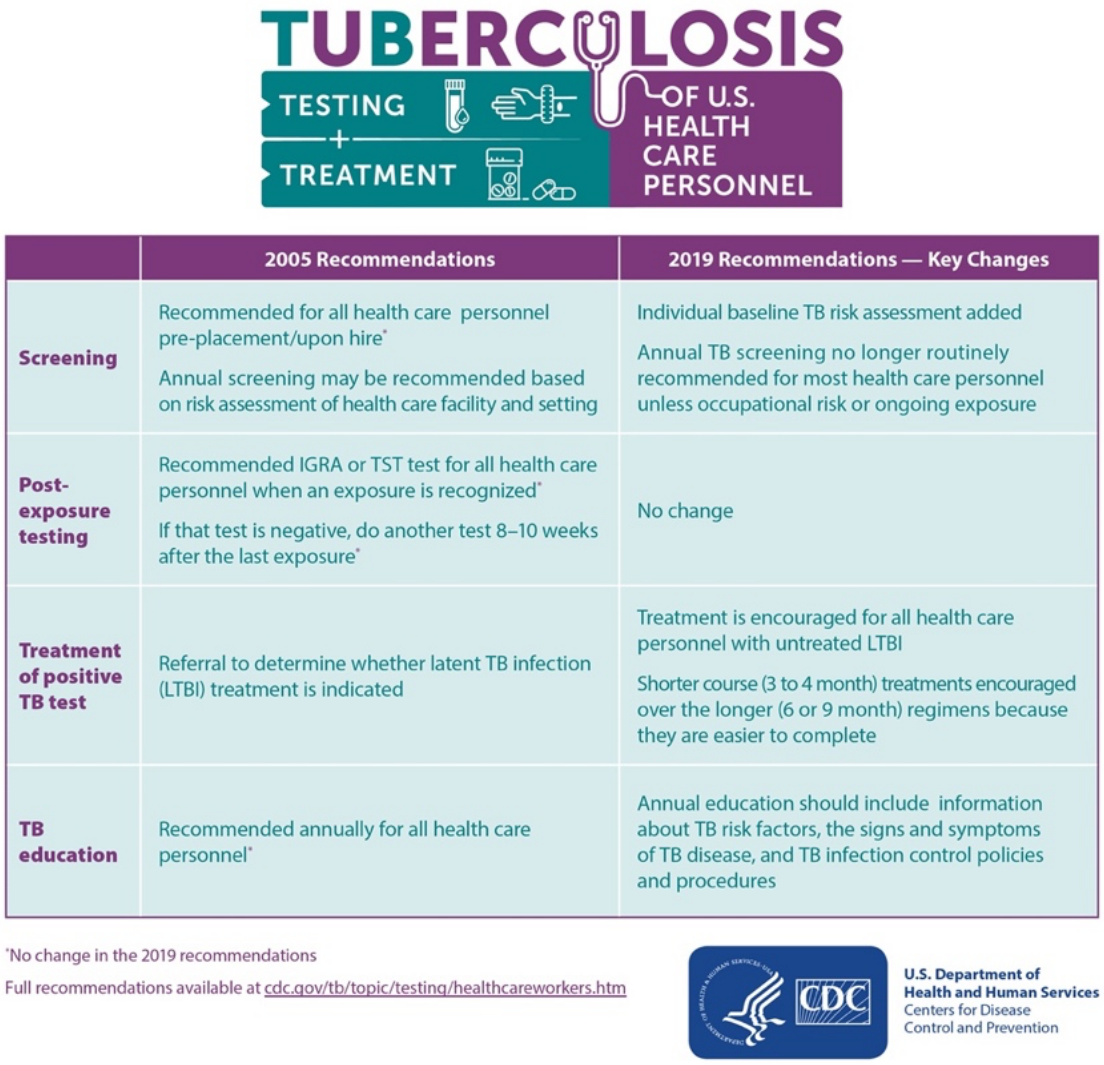


Figure 2. Updated Recommendations for TB Screening, Testing, and Treatment of US. Health Care Personnel, by Centers for Disease Control and Prevention. (2019, May 16). Updated recommendations for TB screening, testing, and treatment of US. Health Care Personnel. Centers for Disease Control and Prevention. Retrieved November 7, 2021, from https://www.cdc.gov/nchhstp/newsroom/2019/recommendations-for-tb-screening.html.

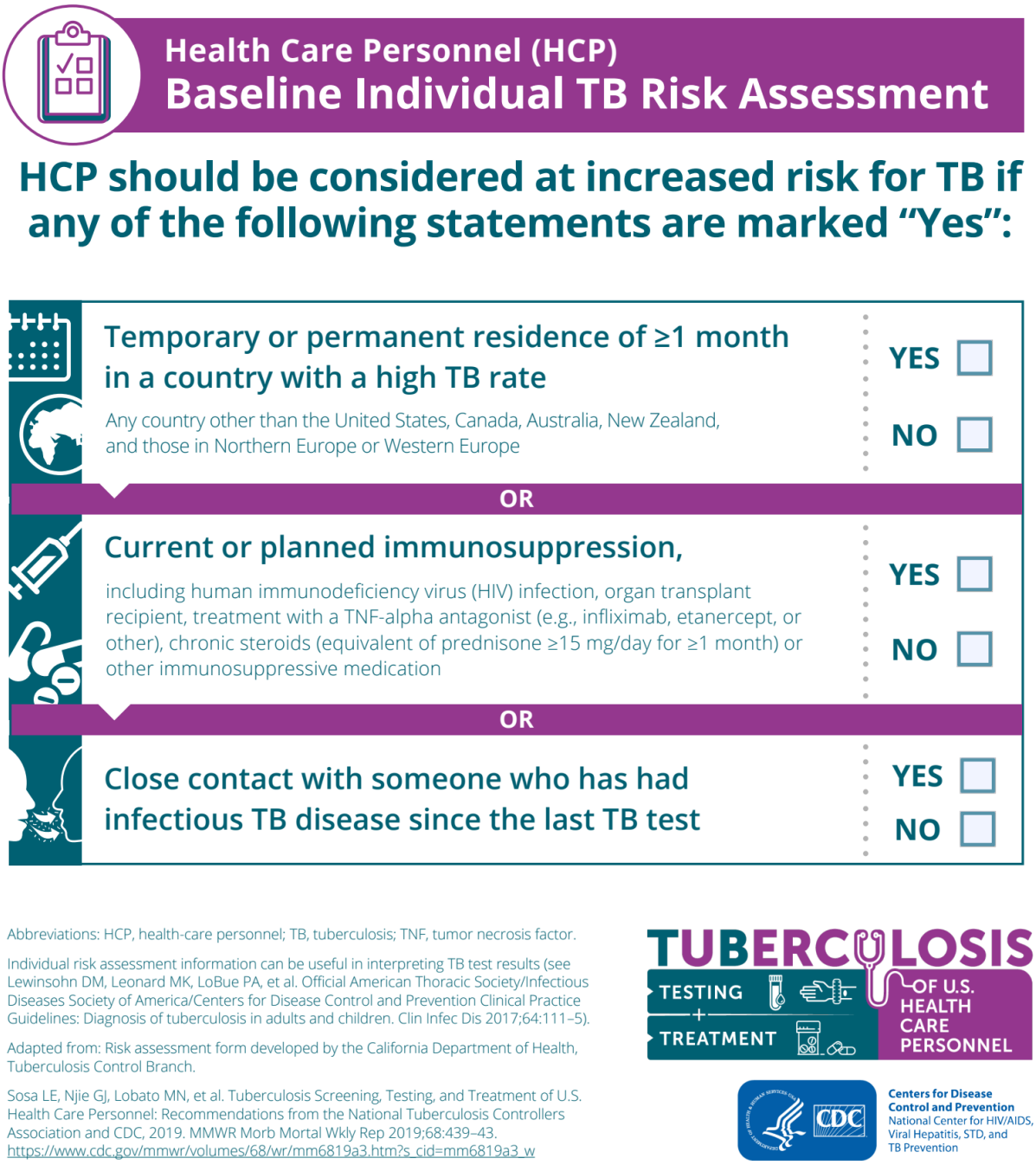


Figure 3. Baseline Individual TB Risk Assessment. (2019, May 16). Updated recommendations for TB screening, testing, and treatment of US. Health Care Personnel. Centers for Disease Control and Prevention. Retrieved November 7, 2021, from https://www.cdc.gov/tb/topic/infectioncontrol/pdf/healthCareSettings-assessment.pdf

Websites

- Resources for TB Screening and Testing of Health Care Personnel
- TB Education & Training Network
- Tuberculosis (TB) Screening, Testing, and Treatment of U.S. Health Care Personnel Frequently Asked Questions (FAQs)
- CDC's Emails Subscription Service