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DNP Project Final Write up

Identification of Post-Intensive Care Syndrome (PICS) in Primary Care

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Date of Submission: April 20, 2021

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Abstract

Background: Post-intensive care syndrome (PICS) occurs in approximately 50% of ICU survivors and increases risk of mortality and hospital readmission while decreasing quality of life. There were no national guidelines for diagnosis or treatment of PICS at the time of the completion of this project.

Purpose: The purpose of this project was to increase identification of PICS in the primary care setting by providers. This was accomplished by implementing an educational toolkit and algorithm to better identify patients with PICS and to evaluate the incidence of PICS.

Methods: An educational presentation and a survey were presented to the providers at a primary care office in Maryland. An algorithm was applied to each patient seen in the office from October 2020 to February 2021; if the patients were identified by the algorithm to be at risk for PICS, the PICSq was administered in the office by the medical assistants.

Results: The data concerning the effect of the education material imply a positive correlation on provider confidence in the diagnosis of PICS. The mean pre-education was 0 on a self-rated scale of 0-5 (*SD*=0) and the mean pre-education was 3 on a scale of 0-5 (*SD*=1.155). In the five months of observation and data collection, thirteen patients were identified to be at risk for PICS requiring screening using the PICSq.

Conclusion: Provider education about PICS in the primary care setting can increase the rate of identification of PICS. Tools such as the algorithm and the PICSq, in conjunction with increased provider awareness within the primary care setting, promoted a more positive transition following an acute care stay.

Keywords: Post-Intensive Care Syndrome, PICS, primary care, critical care

Introduction

Post-intensive care syndrome (PICS) was coined by the Society of Critical Care Medicine in 2013 as the term to encompass the physical, cognitive, and psychological issues that arise after an intensive care unit (ICU) admission (Drexhage, et al., 2014). Symptoms of PICS can present as fatigue, anxiety, sleep disturbances, post-traumatic stress disorder (PTSD), memory loss, irritability, and decreased strength (Drexhage et al, 2014). Physical symptoms can present in 25-80% of ICU survivors, and cognitive deficits present in approximately 30-80% of ICU survivors (Colbenson, et al., 2019). These impairments not only affect patient quality of life, but also their ability to return to work and function in society.

Problem Statement

There is a high risk of PICS among adult intensive care unit (ICU) survivors as indicated by a gap in current primary care practice and effective management of patients with PICS after ICU discharge. This is, in part, due to of a lack of provider awareness and formal monitoring (Drexhage et al, 2014). ICU survivors have elevated risks of physical, cognitive, and mental deficits or complications associated with ICU admission. Failure to identify and address these symptoms may lead to decreased function, lost wages, and caregiver strain (Colbenson, et al., 2019; Drexhage, et al., 2014). With this quality improvement (QI) project, the intention was to increase provider knowledge of PICS, implement and evaluate an algorithm and toolkit in a primary care office in Anne Arundel county, Maryland, and address this gap in practice while quantifying the incidence of PICS. The desired outcome of these actions was to improve the quality of life for patients transitioning from the hospital back to the community.

Organizational Gap Analysis

There were currently no national guidelines for the identification, diagnosis, or treatment of PICS (Needham et al., 2012) at the time of this project completion. Many providers are not aware of PICS at all (Inoue et al., 2019; Naylor & Keating, 2008). Within hospital network used in the project, there were 13 primary care offices that stretched from the Eastern Shore of Maryland into Prince George's County to the west. The farthest north that primary care offices could be found is Pasadena, Maryland. Additional hospital networks had primary care offices with 27 locations in 12 counties including Baltimore county and Washington D.C. There were no critical care rehabilitation clinics or support groups (online or in-person) available in any of the offices. Within the site of the health system targeted for the project, there were no practices in place to screen for PICS. The site is located in Anne Arundel county, Maryland.

Background

PICS is a term used to describe symptoms in one or more of the following domains experienced by ICU survivors: physical, cognitive, and psychological (Inoue et al., 2019). These symptoms can persist for years after discharge (Needham et al., 2012). Of the 5.7 million patients admitted to the ICU each year, about half of the surviving 4.85 million will experience at least one symptom of PICS (Daniels, et al., 2018; Marra et al., 2018). Symptoms of PICS can include fatigue, anxiety, sleep disturbances, post-traumatic stress disorder (PTSD), memory loss, irritability, and decreased strength (Drexhage et al, 2014). In addition, ICU survivors are at an increased risk for readmission to the hospital

(Colbenson, et al., 2019). The effects of PICS also extend to the patient's family and caregivers. Approximately one third of patients cannot return to work, and an additional third are unable to return to their original job (Colbenson, et al. 2019; Held & Moss, 2019). This effect on employment can put financial pressure on the family. The potentially physical demands on the caregiver to provide care to the patient within the home may cause additional stress. Caregiver strain occurs so often with PICS that the term *post-intensive care syndrome family* (PICS-F) has been established to describe these effects (Davidson, et al., 2012; Huggins, et al., 2016)

Review of the Literature

The search terms used to complete this review of literature included "post-intensive care syndrome or PICS", "screening tool", "identification", "prevention" and "critical care rehab". The online databases accessed through the UMass Amherst library included PubMed, the Cumulative Index of Nursing and Allied Health Literature (CINAHL), Web of Science, and the Cochrane Library. Only articles with available full text were used. Articles published within the last five years were prioritized. Additional older studies were included due to the novelty of the term PICS and consequential limited number of investigations that referenced the condition by name. The phenomenon predated the literature and thus older studies could inform and corroborate more recent investigations into the symptoms of PICS such as Hopkins et al. (1999), Mohr et al. (2013), and Naylor and Keating (2008). Furthermore, studies such as those by Iwashyna et al. (2010), Pandharipande et al. (2013), Needham et al. (2012), and others are highly

cited and represented keystone findings relevant to the topic at hand. Non-English papers were included if an English translation was available.

The number of results yielded by conducting a search using only the key terms "post-intensive care syndrome" or "PICS" were 513, 139, and 2,201 in the PubMed, CINAHL, and Web of Science databases, respectively. Additionally, the Cochrane Library yielded a single (unrelated) Cochrane review and 81 trials. Including the key term "screening tool" reduced the number of search results to six, 51, and 71 for PubMed, CINAHL, and Web of Sciences, in addition to a single trial from the Cochrane Library. Using the search terms "post-intensive care syndrome" or "PICS" and "prevention" instead of "screening tool" yielded 33, 59, and 85 results from PubMed, CINAHL, and Web of Science, respectively, along with 16 trials within the Cochrane Library. These search results began to highlight the gap of knowledge regarding PICS and the current focus of study for those seeking knowledge about PICS. The Cochrane Library in particular demonstrated the preference for prevention strategies over identification and management. A total of 31 articles were chosen for this literature review. The articles were chosen based on relevance, quality, and excluded specific ICU (cardiac or neuroscience) data regarding PICS.

The Johns Hopkins Nursing Evidence-Based Practice Model was used to evaluate the strength and quality of the evidence used in the literature review (Dearholt & Dang, 2012). Sufficient sample sizes were determined to be $n \geq 100$ and $n \geq 500$ for "B" and "A" quality studies, respectively (Dearholt & Dang, 2012). A simplified table showing the type of study and level of evidence of each article is provided (see *Appendix A*).

Risk of PICS

Approximately half of ICU survivors will develop one or more symptoms of PICS after discharge from the ICU (Inoue et al., 2019). Symptoms of PICS can present as fatigue, anxiety, sleep disturbances, post-traumatic stress disorder (PTSD), memory loss, irritability, and decreased strength (Drexhage et al, 2014). There have been major risk factors associated with development of these symptoms. Acute conditions such as hyper- and hypoglycemia, delirium, and hypotension have been associated with an increased risk for PICS (Inoue et al., 2019; Pandharipandem et al., 2013). Some treatments received in the ICU such as mechanical ventilation and sedation have been linked to PICS (Colbenson, et al., 2019; Desai, et al., 2011). Studies have shown that certain diagnoses result in higher incidences of PICS including sepsis and acute respiratory distress syndrome (ARDS) (Hopkins et al., 1999; Iwashyna et al., 2010; Mikkelsen et al., 2012).

Prevention of PICS

As PICS becomes more well-known and defined, prevention of PICS within the ICU setting has become a priority for the Society of Critical Care Medicine (Drexhage et al., 2014; Inoue et al., 2019). The primary strategy to prevent PICS in the ICU revolves around the prevention of delirium. The ABCEDFGH, ABCDEF, and ABCDE bundles have both been shown to reduce the rates of both delirium and PICS symptoms. Key components of these bundles include early mobilization, sedation vacations, and spontaneous breathing trials, which increase the number of ventilator free days and reduce the need for sedation (Inoue et al., 2019; Lee et al., 2019). Other studies have explored the use of ICU diaries in order to prevent the psychiatric symptoms of PICS, but

this has had limited success in randomized control trials (Colbenson, et al., 2019; Garrouste-Orgeas et al., 2019; Pun et al., 2018).

Screening Tools

There is no nationally recognized screening tool for PICS. However, there are three screening tools that are frequently used to identify the physical, cognitive, and psychiatric symptoms of PICS: the post-intensive care syndrome questionnaire (PICSq), the self-report form of the Healthy Aging Brain Care Monitor (HABC-M SR), and the Short Form 36 (SF-36) (Jeong & Kang, 2019; Pfoh et al., 2016; Wang et al., 2019a). The PICSq and the HABC-M SR have been tested and found to be reliable and valid as a screening tool for PICS (Jeong & Kang, 2019; Wang et al.2019a; Wang et al., 2019b).

The PICSq was developed in South Korea using literature reviews and qualitative interviews of ICU survivors (Jeong & Kang., 2019). The PICSq is an 18-question self-report questionnaire that takes approximately five minutes to complete (Jeong & Kang, 2019). It consists of Likert-type questions that address symptoms of PICS (difficulty with memory, concentration, fatigue, hopelessness, etc.) in the past 30 days; the questions are scored 0 for “Never”, 1 for “Sometimes”, 2 for “Most often”, and 3 for “Always” (Jeong & Kang, 2019). The reliability of the PICSq is represented by a Cronbach’s α of 0.93 and a Cronbach’s α of 0.84-0.90 for internal consistency of each factor (Jeong & Kang, 2019).

The HABC-M SR is an established clinical tool that has been extensively validated in older patients with normal cognition, mild cognitive impairment, early-stage

dementia, and late-life depression (Wang et al., 2019a). It was also validated for the identification of PICS although it cannot be used to identify PICS in those with severe cognitive impairment. The HABC-M SR is a 27-question tool that can be administered in approximately five minutes. The questions address cognitive, functional, and behavioral symptoms and how frequently patient is experiencing these symptoms in the past two weeks). The symptoms are scored 0 points for "Not at all (0-1 day)", 1 point for "Several days (2-6 days)", 2 points for More than half the days (7-11 days)", and 3 points for "Almost daily (12-14 days)" (Wang et al., 2019a). The internal consistency of each subscale of the HABC-M SR is represented by a Cronbach's α of 0.83-0.92. The scores on each subscale also correlate (cognitive and physical) or strongly correlate with pre-existing standardized measures (Wang, 2019a).

The SF-36 is a 36-question tool that evaluates the health status of a patient but includes many symptoms of PICS (Pfoh et al., 2016). The SF-36 may require an additional established tool such as the Mini-Mental Status Exam to better assess for cognitive function. The SF-36 takes approximately 10-15 minutes to complete on its own (Pfoh et al., 2016). The SF-36 has not been formally evaluated for PICS assessment, though it has been used in several studies for this purpose as it assesses for physical function, mental function, and quality of life (Daniels et al., 2018).

All three of these tools require minimal training to administer and can be completed in person or over the phone (Jeong & Kang, 2019; Pfoh et al., 2016; Wang et al., 2019a). However, limited studies have been completed and there is no sensitivity and specificity data for any of questionnaires as a screening tool for PICS.

Critical Care Rehabilitation

Critical care specific rehabilitation centers have been created worldwide but are more predominant in Europe, especially in the United Kingdom (Held & Moss, 2019). There are few critical care rehabilitation sites in the United States but all operate with differing criteria, treatment modalities, and theoretical frameworks (Held & Moss, 2019; Cuthbertson et al., 2009). Studies have shown that critical care rehabilitation centers are not significantly effective at improving symptoms of PICS or quality of life in ICU survivors (Held & Moss, 2019; Wang et al., 2019b; White et al., 2018). Due to a lack of randomized sampling, the studies displayed limited insight. Although there were few studies, the potential for effective use of tele-medicine to assist those with symptoms of PICS has been identified (Held & Moss, 2019). More studies are required to determine if critical rehabilitation centers and tele-medicine are effective and if so, what framework should be used.

Barriers to PICS Identification

There is no current diagnostic code for PICS in the International Classification of Disease, 10th Revision (ICD-10) (Brandl et al., 2020). Prior to the Society of Critical Care Medicine's decision to address this condition, physical symptoms were referred to by other names such as ICU-acquired weakness (ICU-AW) and critical illness polyneuropathy (CIP) (Jolley et al., 2016; Ohtake et al., 2018; Vanhorebeek et al., 2020). Some of the symptoms of PICS are already established diagnoses including anxiety, depression, and PTSD (Huggins, et al., 2019; Jackson et al., 2014; Sivanathan et al.,

2019). The complexity of the disorder and the inability of providers to identify it with a single ICD-10 code presents a barrier to both identification and adoption of screening.

In addition to a lack of an ICD-10 code, there is no official definition of PICS (Brandl et al., 2020). The Society of Critical Care Medicine defines PICS as a combination of one or more physical, cognitive, and psychiatric conditions that are the direct result of the critical care stay but there is no formality to this definition from a coding standpoint (Drexhage, et al., 2014). As a result, the guidelines, screening tools, and structures of critical care rehabilitation centers are largely individualized and lack defined structure.

To further complicate matters, it is also difficult to determine the true incidence of PICS. ICU survivors have a one-year mortality rate of 16-44% (Brandl et al., 2020; Lone et al., 2016). The five-year rate of mortality is significantly higher than those who have been discharged from the hospital but not from the ICU (32% compared to 22%, $P < 0.001$) (Lone et al., 2016). As a result, healthier ICU survivors may be overrepresented because death is a very possible secondary diagnosis (Brandl et al., 2020).

PICS Awareness

One of the main gaps identified when addressing PICS was the lack of knowledge and awareness (Drexhage et al., 2014). This gap extends from provider to patients and caregivers. The lack of concrete definitions and guidelines prevents providers from adequately addressing the problem. Additionally, some providers may be unaware of the diagnosis altogether (Inoue et al., 2019; Naylor & Keating, 2008). Patients experiencing

these symptoms have reported that they may not disclose them to their primary care providers due to a lack of awareness of available services, or for fear of not being understood (Heydon et al., 2019). Providers who are aware of PICS can screen those at risk, and help identify resources and services available to patients.

Theoretical Framework

The Transitional Care Model (TCM) was used as the theoretical framework for this project (see *Appendix B*). The TCM is focused on ensuring coordination and continuity of care as patients move between different locations and levels of care (Naylor & Keating, 2008). The components suggested in the TCM model are screening, staffing, maintaining relationships, engaging patients and caregivers, assessing/managing risks and symptoms, education/promoting self-management, collaborating, promoting community, and fostering communication (Morkisch et al., 2020). The components used in the project were screening, assessing/managing risks and symptoms, and fostering communication. The project lacked the direct connection between different levels of care because the project was at the primary care level. However, future projects or studies could follow the patient throughout the entire healthcare system. The idea behind the TCM resonated with the goal of the project: to identify and address a condition that occurs as a result of critical care hospitalization, but one that is seen in the community after discharge.

The screening portion of the model focused on identifying those at high risk for readmission to the hospital; the risk factors for this strongly overlap with either risk factors of PICS (dementia/delirium) or symptoms of PICS (deficits in ADLS, cognitive impairment, and emotional concerns) (Morkisch et al., 2020). This project promoted

engaging patients in their care by encouraging them to discuss any PICS symptoms they may be experiencing with their primary care physician (Morkisch et al., 2020). The algorithm and PICS screening tool embody the assessing/managing risk components of the TCM. This component was intended to determine changes in the patient's health status (Morkisch et al., 2020). The collaboration component was not addressed in the way intended by the TCM because a transitional care provider is recommended; but it does address bringing in members of the entire healthcare team (in the case of this project, the primary care provider) to ensure that all providers are in communication (Morkisch et al., 2020). This is important because PICS focuses on deficits and symptoms that occur as a result of the critical care hospitalization. The model recommends this to occur with a single, transitional care provider from the hospital to outpatient settings. Collaborating, promoting community, and fostering communication all place a strong emphasis on continuity of care and communication between the healthcare team the hospital and in the outpatient setting (Morkisch et al., 2020). Staffing was unrelated to this project but addresses continuity of care while in the hospital and follow-up afterward (Morkisch et al., 2020). Maintaining relationships through home visits and telephone calls are also not directly applicable to this project (Morkisch et al., 2020). The education/promoting self-management component, although important, was not addressed in this project. This component is for education of the patients in order for them to manage their symptoms at home; this could be explored when PICS is more widely recognized and resources such as PICS support groups become available (Morkisch et al., 2020).

Methods

This quality improvement project design used a review of literature on post-intensive care syndrome in order to develop a) an education presentation and tests/survey, b) a toolkit, and c) an algorithm. The algorithm and toolkit were implemented at a primary care office in Anne Arundel county, Maryland between September 2020 and February 2021. Two exams were administered to the providers at different times: pre- and post-intervention. Within the education was a toolkit presenting three screening tool options useful for identifying PICS in the office. An algorithm was also provided in order to allow providers to rule out patients who did not meet the criteria for PICS screening. Additionally, a Likert-type scale survey was provided pre- and post-intervention through Typeform in order to determine provider confidence with PICS and screening tool preference. The providers received the educational presentation with voiceover, the exams, and the surveys via email throughout the course of the project. The student was available anytime via email, phone, or scheduled appointment to meet with providers and staff to answer questions.

Project Site and Population

The clinical setting was a primary care office within Anne Arundel county. The office facilities had no screening process for PICS; there was no critical care rehabilitation center in the area and there were no in-person or online support groups for critical care survivors or their caregivers. As of the 2010 United States Census of Anne Arundel county, there were 537,631 people with a population density of 1295.9 inhabitants per square mile (United States Census Bureau, 2019). The racial makeup was

74.2% White, 17.9% Black or African American, and 4.2% Asian; 8.1% of the population identified to be of Hispanic origin (United States Census Bureau, 2019). The median income of the household is $83,456 and 5.3% of the population lived below the poverty line (United States Census Bureau, 2019).

The office employed medical doctors (MDs), doctors of osteopathic medicine (DOs), and nurse practitioners (NPs) in addition to medical assistants (MAs) and ancillary staff. In the office, there were four physicians and one nurse practitioner. The inclusion criteria for the patient-centered portion of the project were based on the algorithm. If patients coming to the office for a primary care visit met the algorithm criteria, they were screened for PICS using the PICSq. If the patients did meet the algorithm criteria, they were excluded from the project.

Prior to the novel coronavirus pandemic (COVID-19), the structure of the office was relatively standard. Patients signed in at the front desk and waited to be called into a room by a medical assistant (MA). In the room, the patient's vitals were recorded and the history of presenting illness was explored. Each provider had about two and a half rooms in which to work. There was a separate exit at which the patients would check out and leave at the end of their visit. Each provider had their own office and the site offered phlebotomy and a therapist who was present once per week. At the time of the project, during the pandemic, the providers were never all simultaneously present in the office. The providers switched off working half days (some days in the morning, some days in the afternoon, and some days entirely telemedicine). The student provided education to the providers about PICS and presented both the algorithm and toolkit to the personnel of

the office in September via email. After administering the email, the student was present on a bi weekly office Zoom meeting with providers to address any further questions or concerns. There was an incentive of two $25 Starbucks gift cards to those providers who completed all of the surveys and exams, and to the staff who helped to administer the screening tools during the project. The winners from each group were chosen at random from those who met the above criteria. The student applied the algorithm to each patient with an office visit every Sunday for the upcoming week. The MAs administered the PICSq to patients if they met the algorithm criteria. The toolkit was be given to the office in the form of a bound document and a digital copy. Paper copies of the PICSq were left in the office for the MAs to administer as needed.

Goals and Objectives

The DNP student educated primary care providers and staff at the site on PICS and the evidenced-based PICS toolkit. The toolkit contained an introduction, an amended version the review of literature for this project, the educational presentation (see *Appendix C*), the algorithm (see *Appendix D*), the screening tools (see *Appendix E*), a table comparing the screening tools, and the survey that was used pre-and post-education (see *Appendix F*); the table of contents of the toolkit is listed in *Appendix G*. The pre-education survey only involved the first two questions of the survey. In the post-education surveys, all six questions were completed by the providers. The content of the educational presentation included the risks of PICS, the symptoms of PICS, the algorithm for identifying patients that require screening for PICS, and potential screening tools that can be applied to primary care practice. A ten-question multiple choice exam was created

and administered pre-education, and post-education, immediately after the education (see *Appendix H*). These exams were administered in September and October 2020. A Likert-type survey was used to assess provider confidence regarding PICS and for providers to indicate their preferred screening tool; the providers unanimously chose the PICSq to be implemented at this site.

The student had password protected access to the electronic medical record. Each week, the student applied the algorithm to the list of patients scheduled for the upcoming week. If any patients met the criteria, the PICS screening tool was administered to the patient at the time of their visit. For this project, the screening criteria for the PICSq was a critical care stay >48 hours (since 04/2020) and 18 years of age or older. If the patient met that criteria but was in hospice, they were excluded. The screening tool was administered by a medical assistant (MA) who had received the educational presentation. The PICSq takes less than five minutes and required little to no training to administer. The screening tool could be administered in person or over the phone if the patient visit was a tele-medicine visit. The student evaluated the results of the screening tool at the end of a five-month period. This data was collected to provide an estimate of how many people present to the primary care office with symptoms of PICS.

The main goal of this project was increase in provider awareness of PICS to increase the identification of PICS in the primary care setting. This was addressed by the development, implementation and evaluation of an evidence-based toolkit for primary care providers at a primary care office in Maryland to identify PICS in their patients who

have recently been hospitalized. The toolkit was created using the most recent peer-reviewed literature regarding PICS, screening tools, and prevention methods.

There were four goals and preferred outcomes of the project. The primary goal was provider education about the topic of PICS was sought through the education presentation and toolkit. One hundred percent of the providers received the education via email; 60% (n = three) (goal 80% [n = four]) of the providers received additional information on the phone. In conjunction with provider education, the second goal was an increase in provider knowledge regarding PICS. The goal was an increase in the exam score in at least 80% of the providers. Only 60% (n = three) of the providers took the pre- and post-intervention exams, and of those, two providers demonstrated an increase in scores. To complete the provider portion of the project, the third goal was to receive provider feedback about the toolkit. Eighty percent (n = four) of the providers took the pre- and post-intervention survey; this was the goal. The feedback was positive from 60% (n = three) of the providers and 40% (n = two) of the providers indicated that they were likely to incorporate the algorithm and PICSq into their practice. The final goal was related to the patient portion of the project and focused on identification of PICS at the site. Because the project was remote, the student was able to screen 100% of the patients (the goal was at least 75%). This included patients who were no-shows and telemedicine patients.

Measurement Instruments

In order to measure the outcomes of this DNP Project, the following instruments were used: multiple choice exam, the chosen PICS screening tool, and a survey. The

educational presentation, multiple choice exam, survey and algorithm were of the student's own design using data from highest levels of evidence possible, preferably those with evidence levels I and II and high quality using the John Hopkins Nursing Evidence Level and Quality Guide (Dearholt & Dang, 2012). The screening tool administered was chosen by the providers from a list of three established, validated, and reliable tools. The PICSq was chosen to be the screening tool implemented in the office. The reliability of the PICSq was demonstrated with a Cronbach's α of 0.93 and the internal consistency was good (Cronbach's α = 0.84-0.90) (Jeong & Kang, 2019). The tool was deemed valid through exploratory factor analysis and confirmatory factor analysis (Jeong & Kang, 2019). The PICSq was not available in the public domain but permission to use the tool was granted by the author/developer of the tool (see *Appendix I*).

Data Collection Procedures

IRB was obtained from the site and from the University of Massachusetts Amherst. The student presented the education presentation and administered the pre-intervention exam and pre-intervention survey (questions one and two of the survey) to the providers of the primary care offices via email. The student was available for follow-up questions and clarification at the next biweekly provider meetings for the office. The student administered a post-intervention exam immediately after the meeting. After the student discussed the results with the providers and office manager, the student implemented the chosen screening tool (PICSq) in the office. The algorithm was used to identify if a patient meets the screening tool criteria. Five months' worth of data was

gathered and analyzed at the conclusion of the collection process. The student used the electronic medical record of the facility (Epic) remotely in order to access the medical records of patients scheduled to come in to the office and implemented the algorithm and screening tools in the office as allowed by the site in conjunction with COVID-19 restrictions. The student completed data collection on a weekly basis and verified the schedule at the conclusion of each week. The student applied the algorithm to each patient on the schedule. If the patient met the criteria for screening, the PICSq was administered to the patient. The MAs were educated in the administration of the screening tool. If the patient screened positive for PICS, the provider was notified immediately upon receipt of the results. The screening process was flawed and affected the results of the PICS screening. The MAs administering the screening tool did not ask the patients to circle symptoms that they felt occurred only as a result of their critical care stay. Because of this, the providers were notified of the symptoms that the patients indicated. The provider determined if treatment was required and incorporated the symptoms in their treatment plan if necessary. The results of the screening tools were collected weekly.

Data Analysis

The results of the multiple-choice exams were analyzed using Microsoft Excel 2016. The average pre- and post-education scores were calculated. The standard deviation was calculated as well. The difference between the two testing timeframes to evaluate the effectiveness of the education.

The results of the survey were also analyzed in Microsoft Excel. The average self-rated provider scores pre- and post-intervention were calculated; additionally, the standard deviation was derived. The differences between the scores at the two timeframes were used to assess the change in provider familiarity with PICS and provider confidence in diagnosis of PICS pre- and post-intervention.

There were 5006 patient visits (including no shows and telemedicine visits) with the primary care office from October 2020 to February 2021. Some of the patients visited the office multiple times. Of the 5006 visits during this timeframe, 13 individuals were indicated to be at risk for PICS using the algorithm. No statistical analyses were performed on these data.

Ethical Considerations/Protection of Human Subjects

The University of Massachusetts, Amherst (UMass) Internal Review Board (IRB) approval was obtained prior to initiating the DNP project. The project site determined that it did not meet criteria for research. Therefore, IRB approval was not required and the facility granted permission to conduct the project at the site.

The official University of Massachusetts IRB Determination Form was submitted and approved in August 2020. All participants were protected by the Health Insurance Portability and Accountability Act of 1996 (HIPAA) which, among other guarantees, protects the privacy of patients' health information (Modifications to the HIPAA Privacy, Security, Enforcement, and Breach Notification Rules, 2013). Additionally, this project followed the *Standards of Care* for practice at the project site. All information collected as part of evaluating the impact of this project was aggregated data from the project

participants and did not include any potential patient identifiers. Patients were not discriminated against based on race, gender, sexual orientation, immigration status, or veteran status.

The risk to patients participating in this project were no different from the risks of patients receiving standard primary care. Participant confidentiality was assured by coding the participants using individual identification numbers. The list of participants and their identifying numbers was kept on encrypted devices within the primary care office and was only accessible to the project coordinators. All electronic files containing identifiable information were password protected to prevent access by unauthorized users; only the student acting as project coordinator had access to the passwords.

Results

The project involved implementing an educational program and PICS algorithm in a primary care office in Maryland. The educational program included information about PICS, the algorithm, and multiple potential screening tools for PICS. The providers were given a pre- and post-intervention multiple-choice exam and survey. The providers of the office chose the specific screening tool to implement using the survey; the four providers who responded to the survey chose the PICSq.

Analyses was performed on both the multiple-choice exam scores and the results of the survey. The intervention results were taken in September 2020, the intervention was administered in September 2020 via email and additional questions about the educational material provided were addressed via a Zoom meeting with the providers and office manager. The results of the post-intervention exam and survey were received in

September and October 2020. Three of the five providers completed the pre- and post-intervention exam which consisted of ten questions. Four of the five providers completed the pre- and post-intervention survey questions (questions 1 and 2). The survey questions used a Likert-type scale with 0 being unfamiliar or unconfident with diagnosis of PICS and 5 being extremely confident. See Tables 1 and 2 for exam and survey results.

Table 1

Exam Results

Provider	Pre-Education Score (%)	Post-Education Score (%)
A	60	60
B	70	80
C	50	80

Note: Exam scores (percentage out of 100) for each provider pre- and post-intervention. The exam contained ten multiple choice questions.

Table 2

Survey Results

Provider	Familiarity Pre-Education	Familiarity Post-Education	Diagnosis Confidence Pre-Education	Diagnosis Confidence Post-Education	Screening Tool	Education Material Rating	Likelihood of Screening Tool Implementation
A	0	0	0	4	PICSq	5	5
B	0	1	0	2	PICSq	1	1
C	2	3	0	2	PICSq	5	4
D	0	0	0	4	PICSq	3	3

Note: Survey responses of each provider. The screening tool question provided a choice of each of the three screening tools outline above. The remaining questions were a self-rated score of 0-5. The provider familiarity and provider diagnosis confidence were the only questions on the survey that were administered pre- intervention and post-intervention. Screening tool choice, educational material rating, and likelihood of implementing a PICS screening tool in the office were evaluated post-intervention.

The average provider confidence in diagnosis of PICS was positively correlated with the provider education. The mean pre-education was 0 on a self-rated scale of 0-5 (*SD*=0) and the mean pre-education was 3 on a self-rate scale of 0-5 (*SD*=1.155). The average multiple choice exam score increased from a mean score of 6/10 (*SD*=1) to a mean score of 7.333/10 (*SD*=1.158). The average provider familiarity with PICS increased from a mean score of 0.5 on a self-rated scale of 0-5 (*SD*=1) to a mean score of 1 on a self-rated scale of 0-5 (*SD*=1.414).

No statistical analyses were performed on the remainder of the survey, as the last three questions were provided for the post-intervention portion only. The provider noted a rating of the educational material as part of the survey provided post-intervention. The providers also indicated whether they would incorporate PICS screening with their patients via the survey. The survey for questions 4 and 5 also used a Likert-type scale, 0 to indicate poor education materials and unlikely to implement the PICSq and 5 to indicate excellent education materials and very likely to implement the PICSq. The average rating of the education materials was 3.5 on a self-rated scale of 0-5 (*SD*=1.915) and the average likelihood of implementing the PICSq within the office was 3.25 on a self-rated scale of 0-5 (*SD*=1.708).

Of the 5006 patients screened using the algorithm from October 2020 to February 2021, 13 patients met the criteria for PICS screening. The patients were screened for PICS using the PICSq. However, given the lack of patient baseline data and the remote aspect of the project, the results of the PICSq were undetermined.

Discussion

In review of the current literature regarding PICS, there is a gap and lack of awareness of providers of PICS. Providers may be unaware of the diagnosis altogether (Inoue et al., 2019; Naylor & Keating, 2008). The theoretical framework applied in this project is the Transitional Care Model. Originally developed by the University of Pennsylvania, the Transitional Care Model has remained relatively unchanged. There are nine core components to the model. Each of these have been shown to improve care and outcomes for chronically ill older adults in clinical trials (Naylor et al. 2018). The model is traditionally applied to the geriatric population. For this project, the model was applied to all adult patients. The addition of critical care treatment complicates the patient's health status and puts adults younger than 65 years of age at risk for conditions they may have not otherwise faced prior to a critical care admission (Colbenson, et al., 2019

Because it is not spoken of or recognized, patients may be experiencing these symptoms but withhold this information from their primary care providers due to a fear of not being understood (Heydon et al., 2019). This project sought to address this gap from both the provider and patient perspective. The educational material given to the providers gave them a stronger foundation in the symptoms and risk factors of PICS. The providers within this office had a heightened awareness of those following up at the primary care level after a hospital stay (especially one involving time spent in critical care), highlighting the importance of this transition stressed by the Transitional Care model. The screening tool provided patients the opportunity to disclose these symptoms.

The results of the provider portion of the project showed that the material needs to be further modified for a remote presentation. When answering questions during the Zoom meeting, many were for clarification of the material on the slides. The providers had questions regarding what to do if their patient screened positive for PICS and the larger importance behind the project. Because no PICS resources are available in the area, symptom management was suggested to the provider. A limitation was the educational presentation did not directly address the theoretical framework of the project. This information is important to provide in order to present the purpose of the project to the providers. In the future, slides about the TCM and its benefits will be provided. Another limitation is the small sample size and the project being implemented at one site within Arundel county.

The average provider rating indicated a need for improvement to the voiceover and slide layout. However, the data imply a positive correlation between provider education and provider confidence for diagnosing PICS This showed that although the educational material required editing for the remote format, the providers learned about the topic and more felt confident addressing it with patients than they had previously.

The results of the patient portion of the project showed that even within a small data set, those who meet the criteria for PICS screening are present. Modifications need to be made to the project in order to assess for the presence of PICS using the screening tool but the algorithm successfully prevents unnecessary screening and paper waste.

The facilitators' willingness to participate in the project enabled its successful execution. For example, facilitators of the project included the staff of the office. Even

through the remote and pandemic based changes to the office and the hospital, the staff worked to complete the pre- and post-intervention material and to screen patients using the PICSq where appropriate. The goal was to receive data from 80% of the providers within the practice. This goal was achieved for the survey with only 60% of the providers completed both the pre- and post-intervention exam.

The barriers most strongly affected the patient-centered results. A barrier to project not originally anticipated was the effect of the remote aspect on the PICSq administration. The MAs were trained to administer the PICSq when indicated and the results were communicated via encrypted message; the patient's ID number was used to avoid violations of HIPAA. If patients indicated they had a symptom associated with PICS, it was unable to be determined if the symptom was specifically related to the critical care stay. This was largely a direct result of the PICSq itself. There was no indication to ask the patient if the patient had a change in symptoms after their hospitalization. Because the MAs only administered the paper without discussion with the patient, the results of the PICSq's completed are null. The lack of an ICD-10 code for billing remained a barrier to PICS diagnosis as well. Without the ability to bill, and the lack of PICS-specific resources to address the symptoms expressed by the patient, the provider buy in was short-lived and not sustainable. Increasing provider knowledge and identification of PICS is crucial to making PICS a billable ICD-10 diagnosis.

Conclusion

Although PICS was defined and recognized by the Society of Critical Care Medicine in 2013, there still remain many obstacles and little provider knowledge about

the topic (Drexhage et al., 2014). Physical, cognitive, and psychiatric conditions that occur as a result of a prolonged ICU stay may affect patients' quality of life in a long-term manner (Needham et al., 2012). Lack of provider knowledge of PICS can also prevent the patient from bringing it to their primary care provider's attention as they transition from the acute care setting back to their community (Inoue et al., 2019).

Provider education about PICS in the primary care setting can bridge this gap. Patients can feel comfortable disclosing these new symptoms and, if necessary, receive the treatment they need. The results of the education highlighted an improvement in provider diagnosis confidence. The more providers that are aware of and have confidence addressing PICS, the more it is addressed in the primary care setting. This ripples down to the patients who then freely report symptoms they may have developed during a hospitalization. Tools such as the algorithm and the PICSq in conjunction with increased provider awareness within the primary care setting promote a more positive transition following an acute care stay. Further steps are needed to adjust the implementation of the PICSq and additional sites should be tested in a variety of socioeconomic and urbanization settings. In the long-term, an increase the rate of identification of PICS can result in a proper ICD-10 diagnosis, well-established provider knowledge of PICS, and outpatient resources for those who suffer from PICS. As providers, the improvement of patient care should be paramount; this project added further insight to enhance the care of PICS patients and provided new avenues to continue upon the path of evolution of this care topic.

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Appendices

Appendix A

Levels of Evidence

Table A.1

Reference	Type of Study	Level of Evidence
Pandharipande, P.P., Girard, T.D., Jackson, J.C., Morandi, A., Thompson, J.L., Pun, B.T., Brummel, N.E., Hughes, C.G., Vasilevskis, E.E., Shintani, A.K., Moons, K.G., Geevarghese, S.K., Canonico, A., Hopkins, R.O., Bernard, G.R., Dittus, R.S., Ely, E.W. (2013). Long-term cognitive impairment after critical illness. *New England Journal of Medicine, 369*(14). 1306-1316. doi:10.1056/nejmoa1301372.	Randomized Control Trial (RCT)	Level I A
White, D. B., Angus, D. C., Shields, A.M., Buddadhumaruk, P., Pidro, C., Paner, C., Chaitin,E., Chang, C.-C. H., Pike, F., Weissfeld, L., Kahn, J. M., Darby, J. M., Kowinsky, A., Martin, S., & Arnold, R. M. (2018). A randomized trial of a family-support intervention in intensive care units. *New England Journal of Medicine, 378*(25), 2365–2375. doi: 10.1056/nejmoa1802637.	RCT	Level I A
Garrouste-Orgeas, M., Flahault, C., Vinatier, I., Rigaud, J.P., Thieulot-Rolin, N., Mercier, E., Rouget, A., Grand, H., Lesieur, O., Tamion, F., Hamidfar, R., Renault, A., Parmentier-Decrucq, E., Monseau, Y., Argaud, L., Bretonniere, C.,	RCT	Level I A

Lautrette, A., Badie, J., Boulet, E., Floccard, B., Forceville, X., Kipnis, E., Soufir, L., Valade, S., Bige, N., Gaffinel, A., Hamzaoui, O., Simon, G., Thirion, M., Bouadma, L., Large, A., Mira, J.P., Amdjar-Badidi, N., Jourdain, M., Jost, P.H., Maxime, V., Santoli, F., Ruckly, S., Vioulac, C., Leborgne, M.A., Bellalou, L., Fasse, L., Misset, B., Bailly, S., & Timsit, J.F. (2019). Effect of an ICU diary on posttraumatic stress disorder symptoms among patients receiving mechanical ventilation: A randomized clinical trial. *Journal of the American Medical Association, 322*(3). 229-239. doi: 10.1001/jama.2019.9058.		
Cuthbertson, B.H., Rattray, J., Campbell, M.K., Gager, M., Roughton, S., Smith, A., Hull, A., Breeman, S., Norrie, J., Jenkinson, D., Hernandez, R., Johnston, M., Wilson, E., & Waldmann, C. (2009). The PRaCTICaL study of nurse led, intensive care follow-up programmes for improving long term outcomes from critical illness: A pragmatic randomised control trial. *British Medical Journal,339*. b3723. doi: 10.1136/bmj.b3723.	RCT	Level I B
Wang, S., Allen, D., Perkins, A., Monahan, P., Khan, S., Lasiter, S., Boustani, M., & Khan, B. (2019a). Validation of a new clinical tool for post-intensive care syndrome. *American Journal of Critical Care, 28*(1). 10-18. doi: 10.4037/ajcc2019639.	Experimental Study	Level I B

Ohtake, P. J., Lee, A. C., Scott, J. C., Hinman, R. S., Ali, N. A., Hinkson, C. R., Needham, D.M., Shutter, L., Smith-Gabai, H., Spires, M. C. Thiele, A., Wienck, C., & Smith, J.M. (2018). Physical impairments associated with post–intensive care syndrome: Systematic review based on the World Health Organization's International Classification of Functioning, disability and health framework. *Physical Therapy*, *98*(8), 631–645. doi: 10.1093/ptj/pzy059.	Systematic Review of RCTS	Level I B
Iwashyna, T.J., Ely, E.W., Smith, D.M., & Langa, K.M. (2010). Long-term cognitive impairment and functional disability among survivor of severe sepsis. *Journal of the American Medical Association, 304*(16). 1787-1794. doi: 10.1001/jama.2010.1553.	Quasi-experimental (Prospective Cohort)	Level II A
Mikkelsen, M.E., Christie, J.D., Lanken, P.N., Biester, R.C., Thompson, B.T., Bellamy, S.L., Localio, A.R., Demissie, E., Hopkins, R.O., & Angus, D.C. (2012). The adult respiratory distress syndrome cognitive outcomes study: Long term neuropsychological function in survivors of acute lung injury. *American Journal of Respiratory and Critical Care Medicine, 185*(12). 1307-1315. doi: 10.1164/rccm.201111-2025oc.	Quasi-experimental (Prospective Multi-center Cohort)	Level II A
Pun, B. T., Balas, M. C., Barnes-Daly, M. A., Thompson, J. L., Aldrich, J. M., Barr, J., Byrum, D., Carson, S. S., Devlin, J. W., Engel, H. J., Esbrook, C. L., Hargett, K. D., Harmon, L., Hielsberg, C., Jackson, J. C., Kelly, T. L., Kumar, V., Millner, L., Morse, A.,	Quasi-experimental (Prospective Multi-center Cohort)	Level II A

Perme, C.S., Posa, P.J., Puntillo, K.A., Schweickert, W.D., Stollings, J.L., Tan, A., D'Agostino McGowan, L., & Ely, E. W. (2019). Caring for critically ill patients with the ABCDEF bundle: Results of the ICU liberation collaborative in over 15,000 adults. *Critical Care Medicine, 47*(1), 3–14. doi: 10.1097/CCM.0000000000003482.		
Lone, N.I., Gillies, M.A., Haddow, C., Dobbie, R., Rowan, K.M., Wild, S.H., Murray, G.D., & Walsh, T.S. (2016). Five-year mortality and hospital costs associated with surviving critical care. *American Journal of Respiratory and Critical Care, 194*(2). 198-208. doi: 10.1164/rccm.201511-2234oc.	Quasi-experimental (Matched Cohort)	Level II A
Jeong, Y.J. & Kang, J. (2019). Development and validation of a questionnaire to measure post-intensive care syndrome. *Intensive Critical Care Nursing.* doi:10.1016/j.iccn.2019.102756.	Quasi-experimental (Methodological Study)	Level II A
Chrispin, P.S., Scotton, H., Rogers, J., Lloyd, D., Ridley, S.A. (1997). Short form 36 in the intensive care unit: Assessment of acceptability, reliability, and validity of the questionnaire. Anaesthesia, 52(1). 15-23. doi: 10.1111/j.1365-2044.1997.015-az014.x.	Quasi-experimental (Statistical study)	Level II A
Daniels, L. M., Johnson, A. B., Cornelius, P. J., Bowron, C., Lehnertz, A., Moore, M., Shen, Y., Schulte, P.J., Pendegraft, R.S., Hall, K.R., & Bauer, P. R. (2018). Improving quality of life in patients at risk for post–intensive care syndrome. *Mayo*	Quasi-experimental (Mixed-Method, Prospective, Observational, Pre-port Interventional)	Level II A

Clinic Proceedings: Innovations, Quality & Outcomes, 2(4), 359–369. doi: 10.1016/j.mayocpiqo.2018.10.001.		
Sivanathan, L., Wunsch, H., Vigod, S., Hill, A., Pinto, R., & Scales, D.C. (2019). Mental illness after admission to an intensive care unit. *Intensive Care Medicine, 45*. 1550-1558. doi: 10.1007/s00134-019-05572-5.	Quasi-experimental (Population-Based)	Level II A
Pfoh, E.R., Chan, K.S., Dinglas, V.D., Cuthbertson, B.H., Elliott, D., Porter, R., Bienvenu, O.J., Hopkins, R.O., & Needham, D.M. (2016). The SF-36 offers a strong measure of mental health symptoms in survivors of acute respiratory failure. A tri-national analysis. *Annals of the American Thoracic Society, 13*(8). 1343-1350. doi: 10.1513/annalsats.201510-705oc.	Systematic Review of Quasi-experimental Studies	Level II A
Hopkins, R.O., Weaver, L.K., Pope, D., Orme, J.F., Bigler, E.D., & Larson-Lohr, V., (1999). Neuropsychological sequelae and impaired health status in survivors of severe acute respiratory distress syndrome. *American Journal of Respiratory and Critical Care Medicine, 160.*50-56. doi: 10.1164/ajrccm.160.1.9708059.	Quasi-experimental (Prospective)	Level II B
Monahan, P.O., Alder, C.A., Khan, B.A., Stump, T., Boustani, M.A. (2014). The Healthy Aging Brain Care (HABC) Monitor: validation of the Patient Self-Report version of the clinical tool designed to measure and monitor cognitive, functional, and psychological health. Clinical	Quasi-Experimental (Cross-sectional Study)	Level II B

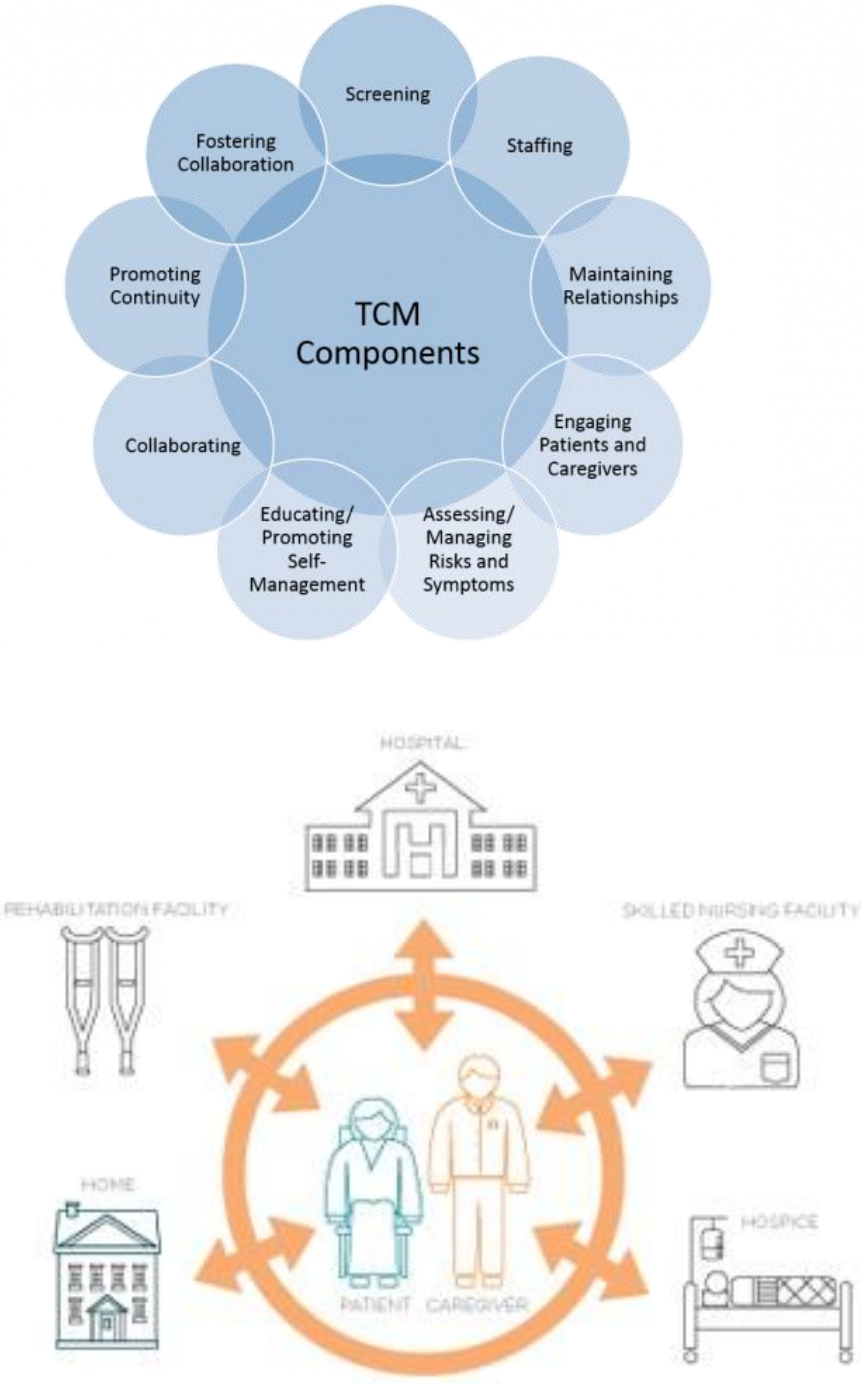
Interventions in Aging, 9. 2123-2132. doi: 10.2147/cia.s64140.		
Jackson, J. C., Pandharipande, P. P., Girard, T. D., Brummel, N. E., Thompson, J. L., Hughes, C. G., Pun, B. T., Vasilevskis, E. E., Morandi, A., Shintani, A. K., Hopkins, R. O., Bernard, G. R., Dittus, R. S., & Ely, E. W. (2014). Depression, post-traumatic stress disorder, and functional disability in survivors of critical illness in the BRAIN-ICU study: A longitudinal cohort study. *The Lancet Respiratory Medicine, 2*(5), 369–379. doi: 10.1016/S2213-2600(14)70051-7.	Quasi-experimental (Longitudinal Prospective Cohort)	Level II B
Drexhage, R., Schoonderbeck, F. J., Leter, E., Vink, S., & Schut, A. F. C. (2014). The post intensive care syndrome: Primary results from an ICU. Follow-Up Clinic. *Intensive Care Medicine, 40,* S250. doi: 10.1007/s00134-013-3451-5.	Quasi-experimental	Level II B
Lee, Y., Kyunghee, K., Changwon, L., & Ji-Su, K. (2019). Effects of the ABCDE bundle on the prevention of post-intensive care syndrome: A retrospective study. *Journal of Advanced Nursing, 76*(2). doi:10.111/jan.14267.	Quasi-experimental (Retrospective)	Level II B
Desai, S.V., Law, T.J., & Needham, D.M. (2011). Long-term complications of critical care. *Critical Care Medicine, 39*(2). 371-379. doi: 10.1097/ccm.0b013e3181fd66e5.	Systematic Review of Quasi-experimental Studies and RCTs	Level II B
Huggins, E.L., Bloom, S.L., Stollings, J.L., Camp, M., Sevin, C.M., & Jackson J.C. (2016). A clinic model: Post-intensive care syndrome and post-	Systematic Review of Quasi-experimental Studies and RCTs	Level II B

intensive care syndrome-family. *AACN Advanced Critical Care, 27*(2). 204-211. doi: 10.4037/aacnacc2016611.		
Held, N., & Moss, M. (2019). Optimizing post-intensive care unit rehabilitation. *Turkish Thoracic Journal, 20*(2). 147-152. doi: 10.5152/turkthoracj.2018.18172.	Systematic Review of Quasi-experimental Studies	Level II B
Vanhorbeek, I., Latronico, N., & Van der Bergh, G. (2020). ICU-acquired weakness. *Intensive Care Medicine.* doi: 10.1007/s00134-020-05944-4.	Systematic Review of Quasi-experimental Studies	Level II B
Brandl, M., Apfelbacher, C., Weiß, A., Brandstetter, S., & Baumeister, S.E. (2020). Incidence estimation in post-ICU populations: Challenges and possible solutions when using claims data. *Gesundheitswesen*. doi: 10.1055/a-1082-0777.	Systematic Review of Quasi-experimental Studies	Level II B
Naylor, M. & Keating, S.A. (2008). Transitional care: Moving patients from one care setting to another. *American Journal of Nursing, 108*(9 Suppl). 58-63. doi: 10.1097/01.naj.0000336420.34946.3a.	Systematic Review of Quasi-experimental Studies	Level II B
Inoue, S., Hatakeyama, J., Kondo, Y., Hifumi, T., Sakuramoto, H., Kawasaki, T., Taito, S., Nakamura, K., Unoki, T., Kawai, Y., Kenmotsu, Y., Saito, M., Yamakawa, K., Nishida, O. (2019). Post-intensive care syndrome: Its pathophysiology, prevention, and future directions. *Acute Medicine & Surgery, 6*. 233-246. doi: 10.1002/ams2.415.	Systematic Review of Quasi-experimental Studies	Level II B
Colbenson, G.A., Johnson, A. & Wilson,	Systematic Review of Quasi-	Level II B

M.E. (2019). Post-intensive care syndrome: Impact, prevention, and management. *Breathe, 15*(2). 98-101. doi: 10.1183/20734735.0013-2019.	experimental Studies	
Jolley, S.E., Bunnell, A.E., & Hough, C.L. (2016). ICU-acquired weakness. *Chest, 150*(5). 1129-1140. doi: 10.1016/j.chest.2016.03.045.	Systematic Review of Quasi-experimental Studies	Level II B
Heydon, E., Wibrow, B., Jacques, A., Sonawane, R., & Anstey, M. (2019). The needs of patients with post-intensive care syndrome: A prospective, observational study. *Australian Critical Care, 33*(2), 116-122, doi: 10.1016/j.aucc.2019.04.002.	Quasi-experimental (Prospective, Observational)	Level II C
Wang, S., Hanneman, P., Xu, C., Gao, S., Allen, D., Golovyan, D., Kheir, Y.N., Fowler, N., Austrom, M., Khan, S., Boustani, M., & Khan, B. (2019b), Critical care recovery center: A model of agile implementation in intensive care unit (ICU) survivors. *International psychogeriatrics.* 1-10. doi:10.1017/S1041610219000553.	Quantitative Analysis	Level III B

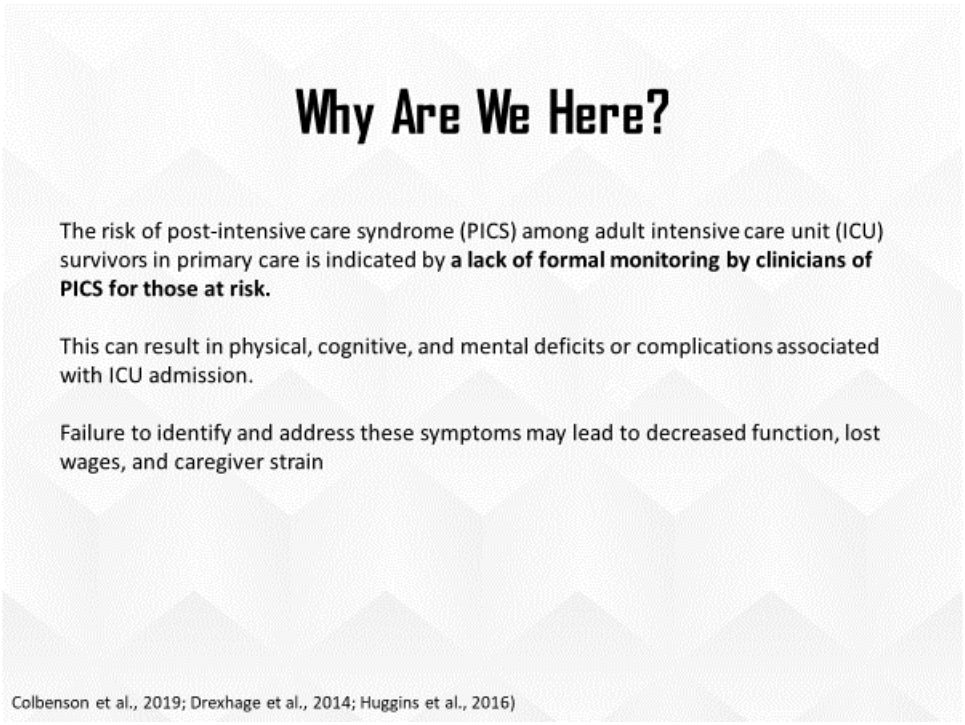
Appendix B

Transitional Care Model



Appendix C

Educational Presentation



Educational Objectives

At the conclusion of this presentation, participants should:

-have a better understanding of PICS and its symptoms

-identify the risk factors and conditions that can cause PICS

-be familiar with the potential screening tools that can be used in the primary care office setting

Risk Factors for PICS

- **Admission to intensive care for ≥48 hours**
- Mechanical ventilation
- Sedation
- Delirium
- Hyper-/Hypoglycemia
- Debilitation
- Age ≥65 years old
- Gender
- Sepsis/Multi-organ Failure

Retrieved from: http://www.healthcarebusinesstech.com/technology-icu-care/

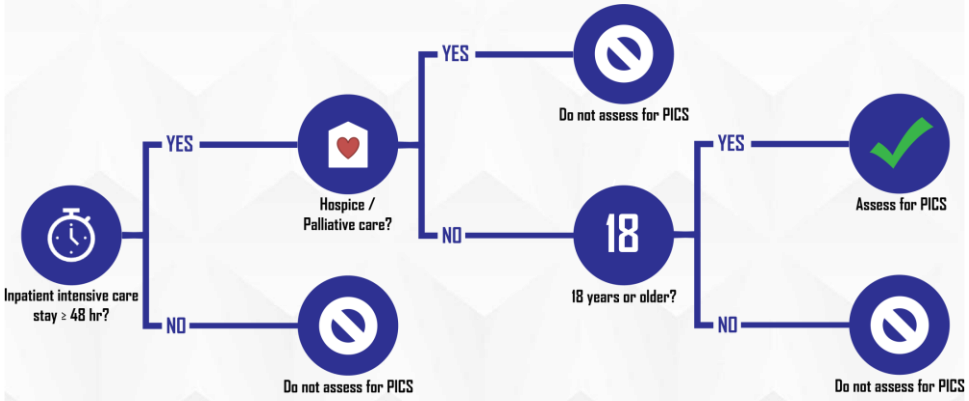
(Drexhage et al., 2014; Inoue et al., 2019)

PICS Symptoms

Physical	Cognitive	Mental
Fatigue	Memory loss	Depression
Weakness	Irritability	Anxiety
Inability to complete activities of daily living (ADLs)	Slow mental processing	Post-traumatic stress disorder (PTSD)

(Drexhage et al., 2014)

Algorithm for PICS Assessment



PICS-Questionnaire (PICSq)

Items	Never	Sometimes	Most often	Always
1. It's hard to memorise numbers.	0	1	2	3
2. People around me say that I repeat what I said before.	0	1	2	3
3. It is hard for me to find the way.	0	1	2	3
4. I cannot concentrate on reading	0	1	2	3
5. Money management is difficult.	0	1	2	3
6. I am confused with date or time.	0	1	2	3
7. My joints are stiff.	0	1	2	3
8. My hand grip is weak.	0	1	2	3
9. I can hardly climb the stairs.	0	1	2	3
10. My sexual performance has deteriorated.	0	1	2	3
11. I get tired easily.	0	1	2	3
12. I feel sick everywhere in my body.	0	1	2	3
13. My heart is stuffy.	0	1	2	3
14. I have nightmares.	0	1	2	3
15. I am worried.	0	1	2	3
16. I am annoyed or angry.	0	1	2	3
17. I am easily startled	0	1	2	3
18. I have no hope.	0	1	2	3

(Jeong & Kang, 2019)

Healthy Aging Brain Care Monitor – Self Report (HABC-M SR)

Cognitive domain (factor 1)

1. Judgment or decision making
2. Repeating the same things over and over, such as questions or stories
3. Forgetting the correct month or year
4. Handling complicated financial affairs such as balancing checkbook, income taxes, and paying bills
5. Remembering appointments
6. Thinking or memory

Functional domain (factor 2)

7. Learning to use a tool, appliance, or gadget
8. Planning, preparing, or serving meals
9. Taking medications in the right dose at the right time
10. Walking or physical ambulation
11. Bathing
12. Shopping for personal items like groceries
13. Housework or household chores
14. Being left alone
15. Your safety
16. Your quality of life
17. Falling or tripping

Psychological domain (factor 3)

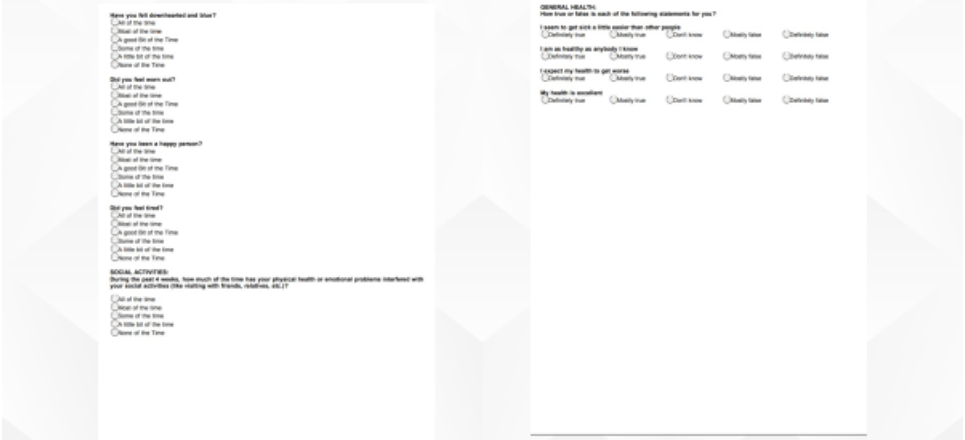
18. Less interest or pleasure in doing things, hobbies, or activities
19. Feeling down, depressed, or hopeless
20. Resisting help from others or getting agitated
21. Feeling anxious, nervous, tense, fearful, or panic
22. Believing others are stealing from you or planning to harm you
23. Hearing voices, seeing things, or talking to people who are not there
24. Poor appetite or overeating
25. Falling asleep, staying asleep, or sleeping too much
26. Acting impulsively without thinking through the consequences of your actions
27. Wandering, pacing, or doing things repeatedly

(Wang et al., 2019)

Short Form-36 (SF-36)

(Pfoh et al., 2016)

SF-36 Continued



(Pfoh et al., 2016)

Community Resources

There are currently **NO** resources for PICS in the community

Possible resource options:
-online support groups
-flyers and patient/family education
-in-person support groups
-Critical care rehabilitation clinics (long-term)

Retrieved from: https://www.abc.net.au/news/science/2020-03-17/coronavirus-online-support-groups/12060530

Retrieved from: https://healthydebate.ca/tags/critical-care

Retrieved from: https://tmsforacure.org/resources/support-groups-2/

Questions?

References

Colbenson, G.A., Johnson, A. & Wilson, M.E. (2019). Post-intensive care syndrome: Impact, prevention, and management. *Breathe, 15*(2). 98-101. doi: 10.1183/20734735.0013-2019.

Drexhage, R., Schoonderbeck, F. J., Leter, E., Vink, S., & Schut, A. F. C. (2014). The post intensive care syndrome: Primary results from an ICU. Follow-Up Clinic. *Intensive Care Medicine, 40,* S250. doi: 10.1007/s00134-013-3451-5.

Huggins, E.L., Bloom, S.L., Stollings, J.L., Camp, M., Sevin, C.M., & Jackson J.C. (2016). A clinic model: Post-intensive care syndrome and post-intensive care syndrome-family. *AACN Advanced Critical Care, 27*(2). 204-211. doi: 10.4037/aacnacc2016611.

Inoue, S., Hatakeyama, J., Kondo, Y., Hifumi, T., Sakuramoto, H., Kawasaki, T., Taito, S., Nakamura, K., Unoki, T., Kawai, Y., Kenmotsu, Y., Saito, M., Yamakawa, K., Nishida, O. (2019). Post-intensive care syndrome: Its pathophysiology, prevention, and future directions. *Acute Medicine & Surgery, 6*. 233-246. doi: 10.1002/ams2.415.

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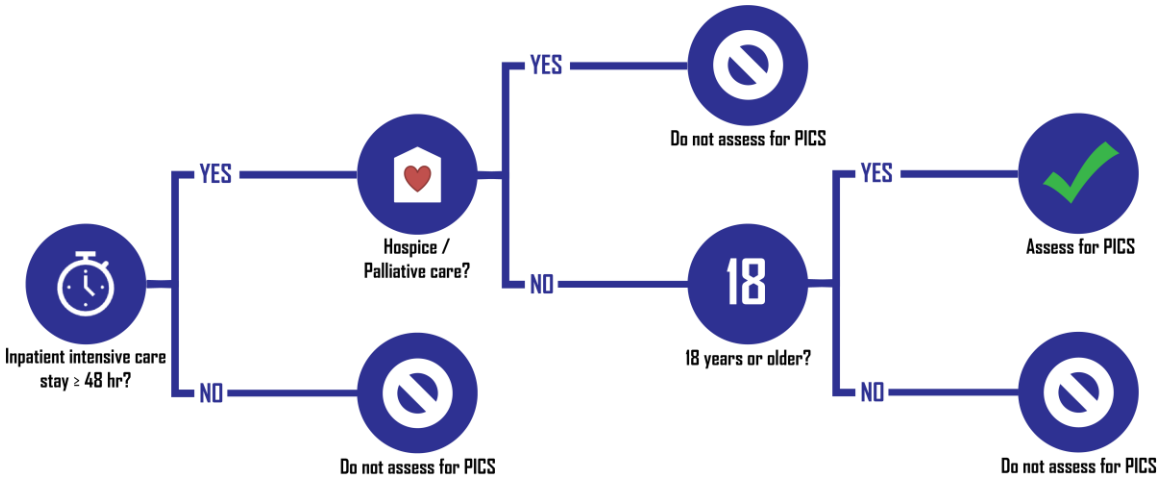
Jeong, Y.J. & Kang, J. (2019). Development and validation of a questionnaire to measure post-intensive care syndrome. *Intensive Critical Care Nursing*. doi:10.1016/j.iccn.2019.102756.

Pfoh, E.R., Chan, K.S., Dinglas, V.D., Cuthbertson, B.H., Elliott, D., Porter, R., Bienvenu, O.J., Hopkins, R.O., & Needham, D.M. (2016). The SF-36 offers a strong measure of mental health symptoms in survivors of acute respiratory failure. A tri-national analysis. *Annals of the American Thoracic Society, 13*(8). 1343-1350. doi: 10.1513/annalsats.201510-705oc.

Wang, S., Allen, D., Perkins, A., Monahan, P., Khan, S., Lasiter, S., Boustani,M., & Khan, B. (2019). Validation of a new clinical tool for post-intensive care syndrome. *American Journal of Critical Care, 28*(1). 10-18. doi: 10.4037/ajcc2019639.

Appendix D

Algorithm



Appendix E

Screening Tools

Figure E.1

Post-Intensive Care Syndrome Questionnaire

Items	Never	Sometimes	Most often	Always
1. It's hard to memorise numbers.	0	1	2	3
2. People around me say that I repeat what I said before.	0	1	2	3
3. It is hard for me to find the way.	0	1	2	3
4. I cannot concentrate on reading	0	1	2	3
5. Money management is difficult.	0	1	2	3
6. I am confused with date or time.	0	1	2	3
7. My joints are stiff.	0	1	2	3
8. My hand grip is weak.	0	1	2	3
9. I can hardly climb the stairs.	0	1	2	3
10. My sexual performance has deteriorated.	0	1	2	3
11. I get tired easily.	0	1	2	3
12. I feel sick everywhere in my body.	0	1	2	3
13. My heart is stuffy.	0	1	2	3
14. I have nightmares.	0	1	2	3
15. I am worried.	0	1	2	3
16. I am annoyed or angry.	0	1	2	3
17. I am easily startled	0	1	2	3
18. I have no hope.	0	1	2	3

Figure E.2

Healthy Aging Brain Care Monitor- Self Report

Cognitive domain (factor 1)

1. Judgment or decision making
2. Repeating the same things over and over, such as questions or stories
3. Forgetting the correct month or year
4. Handling complicated financial affairs such as balancing checkbook, income taxes, and paying bills
5. Remembering appointments
6. Thinking or memory

Functional domain (factor 2)

7. Learning to use a tool, appliance, or gadget
8. Planning, preparing, or serving meals
9. Taking medications in the right dose at the right time
10. Walking or physical ambulation
11. Bathing
12. Shopping for personal items like groceries
13. Housework or household chores
14. Being left alone
15. Your safety
16. Your quality of life
17. Falling or tripping

Psychological domain (factor 3)

18. Less interest or pleasure in doing things, hobbies, or activities
19. Feeling down, depressed, or hopeless
20. Resisting help from others or getting agitated
21. Feeling anxious, nervous, tense, fearful, or panic
22. Believing others are stealing from you or planning to harm you
23. Hearing voices, seeing things, or talking to people who are not there
24. Poor appetite or overeating
25. Falling asleep, staying asleep, or sleeping too much
26. Acting impulsively without thinking through the consequences of your actions
27. Wandering, pacing, or doing things repeatedly

Figure E.3

Short Form-36

SF-36 QUESTIONNAIRE

Name:_____ **Ref. Dr:**_____ **Date:** _____

ID#: _____ **Age:** _____ **Gender: M / F**

Please answer the 36 questions of the **Health Survey** completely, honestly, and without interruptions.

GENERAL HEALTH:
In general, would you say your health is:
◯ Excellent ◯ Very Good ◯ Good ◯ Fair ◯ Poor

Compared to one year ago, how would you rate your health in general now?
◯ Much better now than one year ago
◯ Somewhat better now than one year ago
◯ About the same
◯ Somewhat worse now than one year ago
◯ Much worse than one year ago

LIMITATIONS OF ACTIVITIES:
The following items are about activities you might do during a typical day. Does your health now limit you in these activities? If so, how much?

Vigorous activities, such as running, lifting heavy objects, participating in strenuous sports.
◯ Yes, Limited a lot ◯ Yes, Limited a Little ◯ No, Not Limited at all

Moderate activities, such as moving a table, pushing a vacuum cleaner, bowling, or playing golf
◯ Yes, Limited a Lot ◯ Yes, Limited a Little ◯ No, Not Limited at all

Lifting or carrying groceries
◯ Yes, Limited a Lot ◯ Yes, Limited a Little ◯ No, Not Limited at all

Climbing several flights of stairs
◯ Yes, Limited a Lot ◯ Yes, Limited a Little ◯ No, Not Limited at all

Climbing one flight of stairs
◯ Yes, Limited a Lot ◯ Yes, Limited a Little ◯ No, Not Limited at all

Bending, kneeling, or stooping
◯ Yes, Limited a Lot ◯ Yes, Limited a Little ◯ No, Not Limited at all

Walking more than a mile
◯ Yes, Limited a Lot ◯ Yes, Limited a Little ◯ No, Not Limited at all

Walking several blocks
◯ Yes, Limited a Lot ◯ Yes, Limited a Little ◯ No, Not Limited at all

Walking one block
◯ Yes, Limited a Lot ◯ Yes, Limited a Little ◯ No, Not Limited at all

Bathing or dressing yourself
Yes, Limited a Lot Yes, Limited a Little No, Not Limited at all

PHYSICAL HEALTH PROBLEMS:
During the past 4 weeks, have you had any of the following problems with your work or other regular daily activities as a result of your physical health?

Cut down the amount of time you spent on work or other activities
Yes No

Accomplished less than you would like
Yes No

Were limited in the kind of work or other activities
Yes No

Had difficulty performing the work or other activities (for example, it took extra effort)
Yes No

EMOTIONAL HEALTH PROBLEMS:
During the past 4 weeks, have you had any of the following problems with your work or other regular daily activities as a result of any emotional problems (such as feeling depressed or anxious)?

Cut down the amount of time you spent on work or other activities
Yes No

Accomplished less than you would like
Yes No

Didn't do work or other activities as carefully as usual
Yes No

SOCIAL ACTIVITIES:
Emotional problems interfered with your normal social activities with family, friends, neighbors, or groups?

Not at all Slightly Moderately Severe Very Severe

PAIN:
How much bodily pain have you had during the past 4 weeks?

None Very Mild Mild Moderate Severe Very Severe

During the past 4 weeks, how much did pain interfere with your normal work (including both work outside the home and housework)?

Not at all A little bit Moderately Quite a bit Extremely

ENERGY AND EMOTIONS:
These questions are about how you feel and how things have been with you during the last 4 weeks. For each question, please give the answer that comes closest to the way you have been feeling.

Did you feel full of pep?
- ◯ All of the time
- ◯ Most of the time
- ◯ A good Bit of the Time
- ◯ Some of the time
- ◯ A little bit of the time
- ◯ None of the Time

Have you been a very nervous person?
- ◯ All of the time
- ◯ Most of the time
- ◯ A good Bit of the Time
- ◯ Some of the time
- ◯ A little bit of the time
- ◯ None of the Time

Have you felt so down in the dumps that nothing could cheer you up?
- ◯ All of the time
- ◯ Most of the time
- ◯ A good Bit of the Time
- ◯ Some of the time
- ◯ A little bit of the time
- ◯ None of the Time

Have you felt calm and peaceful?
- ◯ All of the time
- ◯ Most of the time
- ◯ A good Bit of the Time
- ◯ Some of the time
- ◯ A little bit of the time
- ◯ None of the Time

Did you have a lot of energy?
- ◯ All of the time
- ◯ Most of the time
- ◯ A good Bit of the Time
- ◯ Some of the time
- ◯ A little bit of the time
- ◯ None of the Time

Have you felt downhearted and blue?

- All of the time
- Most of the time
- A good Bit of the Time
- Some of the time
- A little bit of the time
- None of the Time

Did you feel worn out?

- All of the time
- Most of the time
- A good Bit of the Time
- Some of the time
- A little bit of the time
- None of the Time

Have you been a happy person?

- All of the time
- Most of the time
- A good Bit of the Time
- Some of the time
- A little bit of the time
- None of the Time

Did you feel tired?

- All of the time
- Most of the time
- A good Bit of the Time
- Some of the time
- A little bit of the time
- None of the Time

SOCIAL ACTIVITIES:

During the past 4 weeks, how much of the time has your physical health or emotional problems interfered with your social activities (like visiting with friends, relatives, etc.)?

- All of the time
- Most of the time
- Some of the time
- A little bit of the time
- None of the Time

GENERAL HEALTH:
How true or false is each of the following statements for you?

I seem to get sick a little easier than other people
Definitely true | Mostly true | Don't know | Mostly false | Definitely false

I am as healthy as anybody I know
Definitely true | Mostly true | Don't know | Mostly false | Definitely false

I expect my health to get worse
Definitely true | Mostly true | Don't know | Mostly false | Definitely false

My health is excellent
Definitely true | Mostly true | Don't know | Mostly false | Definitely false

Appendix F

Survey

1 On a scale of 0 to 5, 0 being unfamiliar and 5 being extremely familiar, what is your experience with PICS?

2 On a scale of 0 to 5, 0 being not confident and 5 being extremely confident, how do you feel about your ability to diagnosis PICS?

3 Which screening tool are you most likely to incorporate into your practice?

- PICSq
- HABC M-SR
- SF-36

4 On a scale of 0 to 5, 0 being poor and 5 being excellent, how would you rate the educational presentation provided?

5 On a scale of 0 to 5, 0 being unlikely and 5 being extremely likely, how useful would the described the toolkit be for your practice?

6 On a scale of 0 to 5, 0 being unlikely and 5 being extremely likely, how likely are you to incorporate a PICS screening tool into your practice?

Appendix G

Toolkit Table of Contents

Appendix H

Multiple Choice Exam

(completed Pre- and Post-education)

1. Which of the following is NOT a risk factor for PICS?
a) Age > 65 years old
b) Mechanical ventilation
c) Nutritional support
d) Delirium

2. Which of the following is NOT a tool used to screen for PICS?
a) PHQ-9
b) SF-36
c) HABC M-SR
d) PICSq

3. Which of the following is NOT a category of PICS symptoms?
a) Physical
b) Cognitive
c) Psychological
d) Functional

4. Which of the following is a physical symptom of PICS?
a) Anxiety
b) Fatigue
c) Memory Loss
d) Irritability

5. Which of the following conditions now solely falls under the category of PICS?
a) PTSD
b) ICU-acquired weakness
c) Alzheimer's disease
d) COPD

6. Which of the following does NOT contribute to the difficulty of diagnosis PICS?
a) Secondary mortality

b) Lack of an ICD-10 code
c) High prevalence of PICS
d) Lack of provider awareness

7. What have been directly shown to be successful in the prevention of PICS?
a) ICU diaries
b) Foley catheter care
c) Implementation of the ABCDEF bundle
d) 1:1 sitters

8. Which of the following is NOT an effective resource for patients with PICS?
a) In-person support groups
b) Online data sheets
c) Critical care rehabilitation referral
d) Telemedicine follow-up care

9. Which nursing model/theory best represents identification and treatment of PICS?
a) Theory of comfort
b) Transitional care model
c) Health promotion model
d) Change Theory

10. Which resources are provided by your facility for PICS?

a) N/A, none are currently offered
b) Online information on the facility website
c) Information sheets in the office
d) Support groups

Appendix I

Permission from PICSq Author

Hi,

Thank you for your interest in the PICSq.

We will grant you the permission to use the scale for your research.

This questionnaire was originally written in Korean and we translated it into English for publication with the help of an English editor.

If there is any part you would like the English expression to be modified while using PICSq, please let us know.

For your reference, we have ended the study of PICSq's cut scores and are under review in a Journal.

Best wishes,

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