DECREASED TIME-TO-TREATMENT DELAY THROUGH CLINICAL GUIDELINE IMPLEMENTATION FOR IMAGE-GUIDED IMAGE BIOPSIES IN CANCER DIAGNOSIS

by

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ABSTRACT

Background: International guidelines have been established defining the ideal period from referral to diagnosis of malignancy as two weeks. Increased time-to-treatment initiation is associated with a one to three percent increased mortality risk for each week of delayed treatment. Image-guided biopsy has emerged as a transformative tool in cancer diagnosis, impacting the rapid identification and treatment of malignancy.

Clinical Problem: A rurally based oncology institute associated with a larger non-profit healthcare system in Montana identified concerns with extended time-to-treatment initiation related to delayed image-guided biopsy. The average wait time for image-guided biopsy was sixty-seven days.

Methods: Utilizing the Replicating Effective Programs (REP) Implementation framework, an evidence-based clinical practice guideline was developed to define optimal referral-to-diagnosis timeframe for diagnosis or rule-out of malignancy via image-guided biopsy using the second edition of the Appraisal of Guidelines for Research and Evaluation (AGREE II) tool.

Interventions: A guideline advisory committee including individuals from relevant professional groups was recruited to act as expert appraisers. Four-phase appraisal of the clinical practice guideline using the AGREE II tool took place over six weeks. The guideline was rated for overall quality based on a seven-point rating scale and appraisers were asked if they would recommend the guideline for use in the target facility.

Results: The guideline received an average rating of 6.2 and was recommended for use by 100% of appraisers, with 18% recommending modifications during pre-implementation. During implementation, the guideline received an average rating of 6.7 and was recommended for use by 100 % of appraisers. The final guideline and appraisal data were presented to health system leadership and the guideline was successfully adopted into facility policy.

Conclusion: Quality improvement initiatives will need to be implemented to identify and address systems-based complexities that could pose barriers to meeting the goal timeframe as defined by the guideline.

CHAPTER ONE

BARRIERS IN TIME-TO-TREATMENT INITIATION: A REVIEW OF THE LITERATURE

Background and Significance

Cancer continues to cast a profound shadow over public health in the United States, flaunting its status as one of the leading causes of death. This disease's impact is felt worldwide, affecting individuals and families in ways that extend beyond statistics. In the year ahead, it is projected that 1.96 million individuals will be diagnosed with new malignancy, and more than 600,000 people will die as a result of cancer in the United States alone (American Cancer Society, 2023). Early cancer diagnosis with prompt and targeted treatment remains the goal of national and international cancer policies with a two-fold goal of reducing overall malignancy-related healthcare burden and decreasing cancer-related morbidity and mortality (Venchiarutti et al., 2023). Cancer presents a global health crisis. As the battle rages on against this devastating disease, it is prudent to acknowledge the major advances in cancer care that have led to earlier diagnoses and improved time to treatment initiation (TTI), resulting in increased patient survival and quality of life.

Time to treatment in oncologic care is defined as the period between diagnosis and the start of definitive treatment (Cone et al., 2020). Significant psychological distress has been documented in patients who experience a treatment delay of greater than seven days (Yingjun et al., 2022). Even a four-week delay in cancer care may impact morbidity and chances of poor outcomes in surgical, radiation, and medical oncologic treatments (Hanna et al., 2020).

Increased TTI is associated with a one to three percent increased risk of mortality for each week of delayed treatment (Khorana et al., 2019). Prolonged diagnostic time may contribute to extended time to treatment, resulting in advanced cancer stage, poor survival outcomes, increased complexity of treatment, and greater psychological distress for patients.

Individualized cancer care is paramount in the delivery of best-practice treatment in oncology in the United States, resulting in the inability to develop a blanket policy for optimal TTI. The increasing complexity of the health system, confounding insurance requirements, and rippling effects of COVID-19 have led to an increased TTI in the United States (Khorana et al., 2019). Policies on the reduction of diagnostic and treatment delays have proliferated throughout Europe, as well as the United States, and Canada (Gorin, 2019), but no standardized protocol for TTI exists. Professional opinions on optimal TTI vary depending on specific variables such as cancer categorization, staging, histology, and patient comorbidities, but it is the consensus of U.S. healthcare providers that TTI is worsening (Khorana et al., 2019). Although defined guidelines are not published in the United States; in the interest of mitigating increased risk associated with TTI, international guidelines have been published by The National Health Service (NHS) and adopted worldwide. These guidelines recommend a 62-day window from referral to treatment for (any) cancer patient (Cancer Research UK, 2023). Current recommendations advise a maximum two-week period, known as the two-week wait (TWW) between referral and diagnosis or rule-out of malignancy. Once diagnosis is determined, the therapeutic plan should be in motion within 31 days of the decision to treat. Maintaining compliance with this 62-day target has resulted in improved patient

psychological well-being as well as enhanced one to five-year survival rates with various cancers (Gorin, 2019; Slade & Talbot, 2007; Di Girolamo et al., 2018).

Initial diagnosis of malignancy is complex and involves many specialties. Although cancer care is guided by the oncologist; pathologists, and radiologists often are the medical providers responsible for the initial diagnosis of cancer (Sorace, 2010). Successful and expedited diagnosis of malignancy depends heavily on precise workflows between specialties that ensure that standards of care, such as the 62-day pathway and TWW, are met. Diagnostic procedures such as image-guided biopsy serve as pivotal determinants in ensuring swift and effective intervention in cancer care. Image-guided biopsy has emerged as a transformative tool in cancer diagnosis, significantly impacting the rapid identification and treatment of malignancy (Tselikas et al., 2019). Image-guided biopsies are used to determine progression, restaging, and amelioration of disease. These biopsies are not only being utilized to initially diagnose and stage cancers but are used throughout treatment to determine disease progression and treatment efficacy (Tam et al., 2016). Real-time, precision-guided access to suspicious lesions, allows for targeted, accurate infiltration of tumors for pathology, reducing the risk of sampling errors and ensuring definitive diagnosis. Image-guided biopsy not only lends to decreased TTI through the precise and timely diagnosis of malignancy through quick access to next-generation sequencing and advanced molecular evaluation, but it is also considered to be safer, less invasive, more cost-effective, demonstrates reduced risk of bleeding or clotting, reduced infection risk, and requires less time under anesthesia. Image-guided biopsy allows access to progressive tumors quicker, decreasing morbidity and complexity of treatment. The use of this means of diagnosis also allows for reduced healing

time before initiating therapies, ergo reducing TTI (W. McKinley, personal communication, September 30, 2023).

Integration of policies focused on prompt scheduling of these advanced, expedited diagnostic techniques has helped to reduce overall referral to diagnosis time, decreasing morbidity and mortality for this patient population. Timely, precise diagnosis leads to timely treatment decisions, enabling healthcare teams to formulate personalized treatment plans while adhering to national and international recommendations for TTI (Odisio & Wallace, 2014). Image-guided biopsy has proven to be the most efficient and precise means of diagnosis of malignancy. Disruption or delay of image-guided biopsy outside of the maximum NHS-recommended two-week timeframe may exacerbate the severity of the disease, limit treatment options, and increase the risk of unfavorable outcomes.

Objective

In an era where timely access to healthcare services is paramount, the need to expedite the referral-to-treatment journey for cancer patients stands as a critical imperative. To inform the anticipated quality improvement project, a literature review was conducted to identify key barriers to timely image-guided biopsy and isolate evidence-based solutions to improve delay in procedure scheduling.

Methods

A comprehensive review of the literature was conducted from August to September 2023. The review was guided by PRISMA-ScR (Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews). Literature supporting concepts

significant to the intervention of interest was discovered using CINAHL, Web of Science, UpToDate, PubMed Central, and Google Scholar. Medical subject headings (MSH) terminology used for the discovery of literature included: time-to-treatment delay, cancer or oncology, image-guided biopsy, cancer diagnosis and/or treatment, time-to-treatment standards, interventional radiology scheduling, healthcare scheduling prioritization, and image-guided procedure prioritization.

Included articles focused on delayed interventional radiology procedures, causes of cancer time-to-treatment delay, quality improvement initiatives for expedited biopsy scheduling or decreased treatment delay, and improved scheduling processes in healthcare. Key data fields such as study aims, patient population, reported time-to-treatment delay, delay reduction, involved departments/disciplines, barriers to treatment delay, suggested solutions, and outcomes were extracted, with the data analyzed to address the objective as stated above. An exhaustive review of the literature revealed most recent research focused on the impact of COVID-19 and healthcare staffing shortages on cancer treatment delay rather than the broad concept of delay in oncologic TTI and standardization of treatment timelines. Due to this, the date range of research was expanded to 20 years to ensure inclusion of pertinent findings. Policies to reduce the total diagnostic interval in malignancy have been a major focus in Europe for 20 years as well (Gorin, 2019). Criteria inclusion incorporated a date range of 2003 to 2023 as well as the following criteria: 1) publication in an English-translated, peer-reviewed journal, 2) involved treatment of the adult oncologic population nationally or internationally, 3) addressed time-to-treatment delay in cancer, 4) identified quality improvement initiatives with multidisciplinary healthcare involvement, 5) described healthcare scheduling improvement processes, 6) identified barriers

to timely cancer treatment or diagnosis, or 7) identified possible solutions to prioritization of procedure scheduling in interventional radiology.

Results

The initial search identified 95 titles, of which 35 articles met the inclusion criteria. Using the level of effectiveness rating scheme as outlined by Melnyk & Fineout-Overholt (2023) (Table A1), this search generated studies integrating subject matter valuable to this proposed quality improvement project, including three level VII articles, three level VI studies, six level V studies, eleven level IV studies, four level III studies, and eight level I studies (case reviews: n=2, 0.6%; cohort studies: n=10, 29%; literature reviews: n=6, 17%; qualitative studies: n=1, 0.3%, quasi-experimental studies: n=4, 11%; commentaries: n=2, 0.6%; conceptual frameworks: n=2, 0.6%; cross-sectional studies: n=1, 0.3%; systematic reviews: n=6, 17%). Most studies (16/35, 46%) focused on the perceived barriers and solutions to the appropriate time to treatment initiation for cancer patients (Majeed et al., 2018) (Hansen et al., 2011; Chiarelli et al., 2017; Bleicher, 2018; Cone et al., 2020; Botey et al., 2021; Vidaver et al., 2016; Walter et al., 2012; Stokstad et al., 2019; Basu et al., 2019; Keim-Malpass et al., 2023; Al-Azri, 2016; Lyratzopoulos et al., 2014; Weaver et al., 2020; Shreyamsa et al., 2020; Malalasekera et al., 2018). Others (12/35, 34%) explored the implementation of multi-disciplinary, systems-based approaches (triage systems, scheduling improvement, benchmarking, EHR integration, and time-to-treat programs) to decrease TTI delay (Clauser et al., 2011; Gassert et al., 2014; Tarousi et al., 2022; Kaplan et al., 2015; Venchiarutti et al., 2023; Lee et al., 2016; Mullin et al., 2020; Lin et al., 2021; Nouraei et al., 2007; Lo et al., 2007; Qu et al., 2020; Murphy, 2022). The remainder (7/35, 20%) focused on

the impact of COVID-19 on treatment delay secondary to postponed interventional radiology procedures and the subsequent development of guidelines for prioritization of procedures based upon acuity (Denys et al., 2020; Wallis, 2020; How & Pua, 2020; The Society of Interventional Radiology, 2020; Palmer, 2020; Cherian et al., 2022; Garg et al., 2021). Major themes identified upon review of the literature included systems-related barriers in TTI, development of acuity-based procedure prioritization models secondary to prolonged TTI experienced during COVID-19, optimization of systems processes using multidisciplinary approaches and implementation of benchmarks, and time-to-treat programs focused on expedited procedure scheduling for image-guided biopsy.

Synthesis of Literature

System-Based Barriers in TTI

Of the articles focused on perceived barriers to TTI, 56% (9/16) determined that systems-related delays accounted for a substantial portion of total treatment delay (Al-Azri, 2016; Majeed et al., 2018; Hansen et al., 2011; Chiarelli et al., 2017; Botey et al., 2021; Vidaver et al., 2016; Stokstad et al., 2019; Basu et al., 2019; Malalasekera et al., 2018). Patient-driven delay was discussed as another considerable factor in prolonged TTI. These patient-centered deferrals primarily focused on behavioral, illness, and appraisal factors as defined by The Andersen Model of Total Patient Delay (Walter et al., 2012) and accounted for significant postponement according to 44% (7/16) of articles within this literature review (Al-Azri, 2016; Basu et al., 2019; Hansen et al., 2011; Keim-Malpass et al., 2023; Majeed et al., 2018; Shreyamsa et al., 2020; Vidaver et al., 2016). Many articles discussed the significant impact systems barriers have on patient-driven delay, particularly regarding the psychosocial

impacts of disorganized scheduling and referral processes. Systems-based issues led to an average TTI greater than 30 days in 37% (13/35) of included studies, equating to a 12-15% increase in mortality (Hansen et al., 2011; Keim-Malpass et al., 2023; Lin et al., 2021; Lo et al., 2007; Majeed et al., 2018; Malalasekera et al., 2018; Mullin et al., 2020; Shreyamsa et al., 2020; Stokstad et al., 2019; Vidaver et al., 2016; Wallis et al., 2020; Weaver et al., 2020; Basu et al., 2019). Systematic barriers were primarily identified as poor provider awareness of processes, disjointed scheduling, and referral issues, with noted focus on significant waiting times for appointments and lengthy processes for referrals between providers.

Multiple factors may impact the severity of systems-based delay, including human resources limitations, supply and demand, disorganization of systems, and knowledge deficits (Gorin, 2019). Several studies (17%, 6/35) suggest healthcare employees responsible for the organization of referrals and prioritized scheduling may lack the medical background to conduct appropriate triage (Botey et al., 2021; Clauser et al., 2011; Denys et al., 2020; Gassert et al., 2014; Kaplan et al., 2015; Keim-Malpass et al., 2023). Implementation of protocols and staff education has been proven to mitigate this issue. Healthcare is facing an unprecedented challenge as hospitals and clinics become saturated with patients requiring care. The number of patients requiring care frequently overwhelms available healthcare professionals available to provide care (Lo et al., 2007). As healthcare evolves, facility-based systems re-design is necessary to mitigate the disorganization of systems. The barriers to these systems are typically multifaceted, requiring specialized, multidisciplinary intervention for improvement (Lee et al., 2016). Knowledge deficits extended from providers to patients, with a frequently cited need for education focused on concerning symptoms of cancer (Denys et al., 2020;

Murphy, 2022). Each of these factors must be addressed to provide a comprehensive plan for quality improvement.

COVID-19 Impact on Treatment Delay

Routine system-based delays during the COVID-19 pandemic were, in large part, due to the need to postpone many outpatient procedures in the interest of reducing the spread of disease. It became the focus of many professional organizations to develop and institute specific guidelines in coordination with multidisciplinary teams to prioritize essential procedures such as image-guided biopsy to reduce prolonged TTI. Acuity-based triage systems were implemented throughout many healthcare systems and discussed as effective measures for the mitigation of treatment delay in 20% (7/35) of articles included in this literature review (Botey et al., 2021; Cherian et al., 2022; Denys et al., 2020; Garg et al., 2021; Gassert et al., 2014; How & Pua, 2020; Mullin et al., 2020).

Of the acuity-based initiatives developed during the pandemic, the most widely used tool was the Interventional Radiology-Procedure Acuity Scale (IR-PAS) (Figure A2). This was a standardized triage protocol developed by The Society of Interventional Radiology COVID-19 Taskforce (Garg et al., 2021). The development of this tool aimed to optimize healthcare recourses and adherence to standard protocols, such as pre-determined facility TTI benchmarks guided by recommendations such as the TWW. Sustainable IR procedural guidelines were essential to avoid the postponement of time-sensitive procedures and treatments. Fananapazir, M.D., and his team at the University of California-Davis adapted the IR-PAS and further developed a five-tier approach, suggesting an ideal timeframe for each tiered procedure (Figure A3) (Palmer, 2020). Biopsy for cancer diagnosis in each triage

protocol is classified as tier two, with the ideal time from referral to procedure being two weeks, aligning with NHS recommendations for referral-to-diagnosis time. Upon lifting of restrictions associated with infection prevention concerns during the pandemic, the Society of Interventional Radiology published a conceptual framework prioritizing procedures, with cancer diagnostic procedures such as biopsy being of the highest priority (Table A2) (Society of Interventional Radiology, 2020). This tool as adapted for the post-COVID healthcare world provides a framework allowing for the prioritization of image-guided biopsy based on triage principles, defining a standardized benchmark of two weeks for procedure prioritization.

Quality Improvement Recommendations

Recommendations for quality improvement for systems-based delay were discussed in 100% (35/35) of the studies included in this review. Of those articles, 34% (12/35) discuss the integration of facility or system-wide guidelines or benchmarks for optimal TTI as a viable option for improvement in system delay (Botey et al., 2021; Chiarelli et al., 2017; Hensen et al., 2011; Kaplan et al., 2015; Malalasekera et al., 2018; Nouraei et al., 2007; Stokstad et al., 2019; Vidaver et al., 2016; Bleicher, 2018; Cone et al., 2020; Gassert et al., 2014; Garg et al., 2021). Another 29% (10/35) of studies recommend the integration of centralized, computerized algorithmic scheduling systems within the electronic health record (EHR) (Botey et al., 2021; Cherian et al., 2022; Clauser et al., 2011; Kaplan et al., 2015; Lee et al., 2016; Lin et al., 2021; Murphy, 2022; Nouraei et al., 2007; Tarousi et al., 2022; Venchiarutti et al., 2023). Multidisciplinary teams' approach to scheduling and process improvement was also discussed in 29% (10/35) of studies, suggesting the involvement of leaders from departments such as IT, radiology, oncology, and scheduling would provide greatest benefit in

the development of a quality improvement initiative (Vidaver et al., 2016; Venchiarutti et al., 2023; Stokstad et al., 2019; Mullin et al., 2020; Majeed et al., 2018; Lo et al., 2007; Lin et al., 2021; Lee et al., 2016; Kaplan et al., 2015; Chiarelli et al., 2017). Provider and patient education regarding the importance of early diagnosis and prompt scheduling was an area of suggested improvement in 37% (13/35) of the studies (Al-Azri et al., 2016; Basu et al., 2019; Kaplan et al., 2015; Keim-Malpass et al., 2023; Lyratzopoulos et al., 2014; Majeed et al., 2018; Qu et al., 2020; Shreyamsa et al., 2020; Weaver et al., 2020; Botey et al., 2021; Cone et al., 2020; Hensen et al, 2011; Lee et al., 2016; Lin et al., 2021; Mullin et al., 2020). Provider education on processes, appropriate communication, and referral chain demonstrated a significant impact on TTI, addressing one of the multifaceted areas of systems delay. Patient education assists with the reduction of appraisal and behavioral postponement as outlined by The Andersen Model of Patient Delay (Walter et al., 2012), effectively limiting patient impact to TTI delay.

Benchmarking to Define TTI. In the absence of defined standards, it is expected variability in wait times for procedure appointments may be experienced. Setting benchmarks, even at a facility level, may help to guide the prioritization and organization of patient's needs (Kaplan et al., 2015). Setting benchmarks is instrumental in the improvement process as without a measurable goal, an organization is unable to determine improvement in TTI. Time to treatment benchmarks of 52-62 days have been determined to be reasonable according to multiple studies (20%, 2/10) as well as per guidelines published by NHS (Vidaver et al., 2016; Kaplan et al., 2015; National Health Service: Kettering General Hospital, 2023).

Electronic Health Record Integration. Decision support during the scheduling process being integrated into the EHR may aid in the accurate prioritization of procedures for cancer diagnosis. Information Technologies may support patient-centered cancer care in a multitude of ways, including not only scheduling assistance but also patient education and support. Embedded electronic guidelines may be integrated into the EHR to influence procedure selection in the evaluation of referrals and scheduling (Clauser et al., 2011). Studies have shown that electronic "triggers" in the health record may help guide schedulers and other healthcare providers through decision points, greatly improving efficiency and decreasing time between referral and procedure appointments (Kaplan et al., 2015). One study reviewed the implementation of an electronic protocol for the prioritization and optimization of workflow in an Interventional Radiology department at the University of Colorado Hospital (Gassert et al., 2014). This involved a multilayer solution accounting for the referral process, physician review, insurance authorization, procedure scheduling, pre-procedural nursing evaluation, resource allocation, and patient prioritization. Findings from this study suggest that protocol integration into the EHR may result in measurable improvement via standardization of information collection, reduction of lost or misplaced information, smoothing of communication, and delayed wait times for both referral information and diagnostic results (Gassert et al., 2014).

Multidisciplinary Teams Approach. The evidence available on the benefits of multidisciplinary teams in quality improvement is abundant. Involvement of all specialties involved in the care of patients is essential to best patient outcomes. Employing a multidisciplinary approach for implementation of quality improvement initiatives has

demonstrated increased efficiency in multiple studies (60%, 6/10). One study followed a multidisciplinary QI initiative guided by oncology navigation and three oncology specialties to schedule patients ideally in greater than seven days, and no more than 14 days from referral date (Lin et al., 2021). A root-cause analysis was conducted, showing the most common barrier to initiating treatment was scheduling delays (37.5%). Using a multidisciplinary approach, this intervention successfully reduced the time from referral to appointment, facilitating the initiation of treatment for lung cancer patients (Lin et al., 2021). This is just one evidence-based example of the impact of multidisciplinary teams' approaches to improving systems-based processes impacting TTI for cancer care.

Patient, Staff, & Provider Education. Educational limitations such as poor health literacy in the patient population, lack of knowledge of evolving cancer for providers, and unfamiliarity with specific guidelines and standards for support staff are frequently cited as responsible for systems-related delays in healthcare. Patients with lower levels of education or poor health literacy are less likely to understand the importance of prompt scheduling of diagnostic studies and timely treatment. Patient education was a potentiating factor to systems-based delays such as delayed scheduling in 40% (14/35) of studies reviewed (Al-Azri et al., 2016; Basu et al., 2019; Bleicher, 2018; Clauser et al., 2011; Hansen et al., 2011; Keim-Malpass et al., 2023; Lee et al., 2021; Lin et al., 2021; Majeed et al., 2018; Malalasekera et al., 2018; Qu et al., 2020; Shreyasma et al., 2020; Vidaver et al., 2016; Weaver et al., 2020).

Delayed referral process, registration issues, insurance misunderstandings, and scheduling delays are the most cited issues in this review of literature. These complications are typically secondary to a lack of knowledge on the part of the support staff responsible for

these processes. The specialized nature of these referrals, dependence on standardized guidelines, and the typical non-urgent nature of outpatient procedures may lead to a misconception of the importance of the prioritization of scheduling and referral. Educational needs for staff are noted as a significant factor in 43% (15/35) of the literature (Al-Azri et al., 2016; Botey et al., 2021; Chiarelli et al., 2017; Clauser et al., 2011; Gassert et al., 2014; Hansen et al., 2011; Kaplan et al., 2015; Lee et al., 2016; Lin et al., 2021; Lo et al., 2007; Majeed et al., 2018; Mullin et al., 2020; Nouraei et al., 2007; Qu et al., 2020; Vidaver et al., 2016).

Clinician knowledge of suspicious cancer symptoms, practice changes, standards of care, or systems processes may lead to poor prioritization of patient diagnostic needs. Consistent updating of practice standards and providing educational sessions for providers has demonstrated better adherence to TTI recommendations, effectively reducing referral to diagnosis time through prompt scheduling of image-guided biopsy (or other diagnostic imaging or procedures). Much of the concern for provider lack of knowledge falls in the primary care sector (Malalasekera et al., 2018). Often it can be difficult for those non-specialized providers to maintain awareness of the systems within specialty departments specific to referrals or ordering of tests/biopsies. Without including specific criteria in each referral there may be hiccups due to poor communication. Communication, inappropriate referral, and knowledge deficit of referring providers was noted in 31% (11/35) included studies (Basu et al., 2019; Botey et al., 2021; Chiarelli et al., 2017; Hansen et al., 2011; Lo et al., 2007; Lyratzopoulos et al., 2014; Malalasekera et al., 2018; Qu et al., 2020; Shreyamsa et al., 2020; Stokstad et al., 2019; Vidaver et al., 2016).

Triage Systems. Implementation of triage-based or acuity-guided systems has traditionally been cited as an effective scheduling improvement strategy. Some studies suggest that acuity-based scheduling is unreliable due to the specific nature of the system (Kaplan et al., 2015). However, use of this process for scheduling of specific, urgent procedures such as image-guided biopsy, is meant to focus on only one specific need in a visit, effectively negating the suggested inefficacies of the process. Implementation of triage systems for case evaluation and procedure scheduling has been shown to reduce time to biopsy in 23% (8/35) of studies investigated in this review of literature (Botey et al, 2021; Cherian et al., 2022; Lo et al., 2007; Mullin et al., 2020; Denys et al., 2020; Garg et al., 2021; Hansen et al., 2011; How & Pua, 2020).

Discussion

Principal Findings

Based upon this review of literature, delay in time-to-treatment initiation is multifaceted and impacted by both patient-driven and systems-related complications. System-based barriers account for a substantial portion of total treatment delay. Prolonged TTI may be improved through multidisciplinary approaches to quality improvement in system-based delays. Consensus by multidisciplinary teams on facility-accepted benchmarks is essential for the accurate collection of data related to TTI and timely diagnosis of malignancy. Triage-based scheduling has been identified as an effective means for decreasing scheduling delays in TTI for those patients requiring image-guided biopsy for diagnosis or rule-out of malignancy. There is an inherent need for patient, provider, and staff education on the importance of expedited diagnosis in cancer care no matter the implemented quality improvement intervention.

Of the suggested approaches to improvement in time to treatment and time to diagnosis delay, the most poignant is the establishment of benchmarks and quality measures. Healthcare systems worldwide have been tasked with the identification of methods for measuring quality of care. Implementation of benchmarks, policies, and quality standards have been associated with long-lasting quality improvement (Willmington et al., 2022). It has been suggested that TTI metrics should become key components of what defines high-value oncologic care (Mehta & Sheni, 2022). Longitudinally measuring established quality metrics related to timely treatment of cancer may improve performance and outcomes (Mehta & Sheni, 2022). The lack of standardized expectations and quality metrics in the timely diagnosis and treatment of malignancy on the national, state, organizational, and facility levels significantly contributes to increased morbidity and mortality. It is clear based on the adaptation of policies and models developed throughout the COVID pandemic that the benchmark of two weeks for referral to diagnosis using image-guided biopsy is widely accepted and recognized as best practice (Palmer, 2020; Garg et al., 2021). Integrating policies minimizing system-level delays to starting treatment, including a reduction in diagnostic delay, could potentially improve survival for cancer patients (Hanna et al., 2020).

Limitations

Due to the heterogenicity of the articles included in this review, as well as differences in patient populations, geographical locations, impact of current events, and details in reporting, it was challenging to provide a concise summarization of the evidence. Some included reviews did not exclusively discuss the scheduling process for image-guided biopsy or interventional procedures, but rather generalized scheduling issues and systems-related

delays in cancer diagnosis. Others were not specific to the diagnosis or rule out of malignancy but focused on any interventional radiology procedure. Multiple articles focused on generalized discussion of the wide variety of factors impacting delay did prove challenging in the isolation of factors of greatest impact on TTI. While specific interventions were varied and no one approach was identified as best practice in reducing TTI, the evidence clearly demonstrates the need for established evidence-based practice guidelines addressing time to diagnosis and time to treatment standards.

Conclusions

Any delay in the diagnosis and treatment of cancer can lead to a significant increase in morbidity and mortality. Quality improvement initiatives are essential to mitigating the devastating effects of these delays. Based upon this review of literature, best-practice interventions for the improvement of systems-based TTI delay include a multidisciplinary approach to improving biopsy scheduling delay through the integration of triage, patient and provider education, information technology, and facility-wide consensus on benchmark standards. It is clear, that to successfully implement systematic change, multidisciplinary teams must first tackle the quality improvement process with a common goal in mind. The development of strict clinical practice guidelines and benchmarks lends to consistency in the quality of care and sets the standard for facility integration of evidence-based practices and interventions as outlined in this review of the literature. System-wide change is required to address a complex process such as scheduling for image-guided biopsy. To trigger system-wide change, guidelines for process standardization and best practices must first be established. Only then can projects focused on process improvement be initiated.

CHAPTER TWO

DEVELOPMENT OF A CLINICAL PRACTICE GUIDELINE TO REDUCE TIME-TO-TREATMENT INITIATION FOR PATIENTS REQUIRING IMAGE-GUIDED BIOPSY: QUALITY IMPROVEMENT PROPOSAL

Introduction & Problem

Time to treatment initiation (TTI) has been identified as a substantial factor in the morbidity and mortality of patients undergoing oncologic treatment. Health systems worldwide struggle with the timely treatment of malignancy (Hanna et al., 2020). For each week of delay, the risk of mortality increases by one to three percent (Khorana et al., 2019). Delays of 20 weeks and greater have been associated with poor survival rates and significantly reduced quality of life (Hanna et al., 2020). Studies worldwide illuminate the significant impact of delay on mortality for all cancer types across treatment modalities including surgical intervention, chemotherapy, and radiation therapy. Even considering the wide variety of cancer types and treatments, research suggests a delay of four weeks was associated with an increased risk of death (Hanna et al., 2020).

International Implications

International guidelines addressing the concern of delayed TTI have been published by The National Health Service (NHS) and adopted worldwide (2023). These guidelines recommend a 62-day window from referral to treatment for (any) cancer patient (Cancer Research UK, 2023). Current recommendations advise a maximum two-week period, known as the two-week wait (TWW) between referral and diagnosis or rule-out of malignancy. Once

diagnosis is determined, the therapeutic plan should be in motion within 31 days of the decision to treat. Maintaining compliance with this 62-day target has resulted in improved patient psychological well-being as well as enhanced one to five-year survival rates with various cancers (Gorin, 2019; Slade & Talbot, 2007; Di Girolamo et al., 2018). Recent studies show that 62.8% of people in the UK were diagnosed and initiated treatment within two months (or 62 days) of referral after integration of NHS guidelines, however, 74.8% of patients positive for malignancy met the two-week standard for referral to diagnostic evaluation, and 71.6% of people had been diagnosed, or had cancer ruled out within 28 days. (Lowes, 2023).

National Implications

Although data on the percentage of patients in the US diagnosed or treated within a specific timeframe is unavailable, it is the consensus of U.S. healthcare providers that TTI is worsening (Khorana et al., 2019). Many professional societies have developed recommendations for fast tract programs with a focus on a 30-day goal from diagnosis of cancer to treatment, with wait times of no longer than 8 weeks, however, there is no current published guideline in the United States defining a standardized time to treatment goal or, more specifically, a time to diagnosis goal, for patients battling malignancy (Elit, 2015). A study conducted by Khorana et al., (2019) evaluated TTI in a population of 3,672,561 cancer patients, revealing a median TTI of 27 days. This study suggested many clinical and socioeconomic factors impacting cancer care in the United States, with predictors of increased TTI including rurality of treatment and treatment at an academic medical center. Surprisingly, the average TTI at academic medical centers in the United States is noted as six weeks (Abraham & Bolwell,

2019). For patients diagnosed and treated in rural facilities, an additional eight days was attributed to their TTI delay, resulting in a minimum of 35 days (or five weeks), suggesting a baseline 15% increase in mortality related to delayed diagnosis and treatment of malignancy.

State Implications

The incidence of malignancy in Montana was estimated as three percent above the national rate as of 2021 (Montana DPHHS, 2021). Rurality is a major factor in cancer incidence, severity, and survival rate. TTI delay for Montana patients is often extended due to complex challenges of rurality. These barriers include limited availability of treatments or providers, transportation barriers, financial issues, poor health literacy, facility, and technology deficiencies, staffing shortages, lack of access to current research and clinical trials, and other systematic limitations due to lack of structure and support from established health systems or academic centers (Morris et al., 2022). Over 76% of Montana's population is classified as living in rural and frontier areas (Montana Cancer Control Programs, 2021). Rural cancer patients experience a 10% higher mortality rate (Morris et al., 2022), and only three percent of medical oncologists practice in rural areas (Charlton & Schlichting, 2015). Due to the complexity of challenges faced in the diagnosis of malignancy, rural Montana facilities must develop and maintain strict guidelines for the timely and proper referral, diagnosis, and treatment of malignancy.

Problem Statement

A rurally based oncology institute associated with an independent, non-profit health system serving a 24-county region in Montana identified concerns with extended TTI related

to delayed image-guided biopsy for patients requiring diagnosis or rule-out of malignancy. Researchers suggest that policies focusing on minimizing system-level delays to cancer treatment initiation could improve population-level survival outcomes (Hanna et al., 2020). Often systems-based change requires the integration of guidelines or benchmarks to provide a measurable goal. International guidelines recommend a standardized timeline for cancer diagnosis and treatment of 62 days, with a maximum of two weeks' wait between referral and diagnosis. The identified health system has no established policy for the guidance of time to treatment initiation and endorses no defined timeline for referral to diagnosis of malignancy. The current wait time for diagnostic image-guided biopsy at this facility is estimated as two months or greater. This DNP project aims to establish a clinical practice guideline for facility-wide approval and implementation in the interest of defining a standard of care for the timely diagnosis of cancer. The purpose of this quality improvement initiative is to develop an organizational-specific clinical practice guideline to decrease wait time from referral to diagnosis (or referral to scheduled biopsy) to a maximum of two weeks, in alignment with international standards. This guideline will establish a standard of workflow providing a set goal for system redesign focused on streamlining the image-guided biopsy scheduling process to decrease TTI.

Organizational Microsystem Assessment

The involvement of all specialties concerned with the care of patients is essential to positive patient outcomes. Employing a multidisciplinary approach for the implementation of a quality improvement initiative has demonstrated increased efficiency throughout the literature. A multidisciplinary team of facility stakeholders was recruited for participation in this project.

Stakeholders identified for project involvement included care team members and provider groups within interventional radiology and the Cancer Institute. Additionally identified were members of the facility's evidence-based practice committee. This group was systematically paired down to a smaller invested group of stakeholders which will be discussed in the context section of this paper.

The cancer institute consists of a provider group including three medical oncologists, two radiation oncologists, two traveling neurologic and gynecologic oncology specialists/surgeons, and three oncology-specialized advanced practice providers. In addition, members of the care team involved in this project include two specialized oncology registered nurse navigators.

The interventional radiology provider group consists of two interventional radiologists who are shared part-time with another local hospital group. The interventional radiology department employs one scheduling specialist who is dedicated exclusively to the approval and scheduling of IR procedures. IR administrative members and IR charge nurses are heavily involved in the biopsy approval and scheduling process and, therefore, were identified as possible stakeholders for this project as well.

Identified possible stakeholders were surveyed during the needs assessment and asked to pinpoint perceived barriers to the timely scheduling of image-guided biopsies for the diagnosis of malignancy. When considering causes of delay, all stages as outlined per The Andersen Model of Total Patient delay (Figure B1.) should be considered (Walter et al., 2021). This includes appraisal, illness, behavioral, scheduling, and treatment concerns. The themes identified within the needs assessment aligned well with the Andersen Model but were primarily systems-based issues. Identified barriers included time constraints within the biopsy approval processes,

pharmacological concerns with blood thinners and herbal supplements, scheduling complexities with CT, ultrasound, and IR, lack of acuity-based scheduling processes, lack of a defined timeframe for scheduling, limited provider availability, inconsistent approval criteria between providers, and frustrations with CMS requirements for 30-day history and physicals before procedures. The current state of biopsy scheduling is complex and multifaceted. A swim lane illustration of the current process can be viewed in Figure B2.

To better understand the current impact of scheduling delays during the needs assessment, data were extracted from the EHR by administrative members of the Interventional Radiology staff. Parameters for data collection included patients undergoing image-guided biopsy within the facility from July 1-October 1, 2023. This search revealed 126 patients, of whom 32 were positively identified as diagnosed with malignancy and treated at the cancer institute. A review of referral and scheduling dates for these 32 patients revealed an average wait time of 67 days for image-guided biopsy. Only six of these patients were scheduled for biopsy within two weeks of the order being placed by the PCP or oncologist. Upon review of a randomly selected sample of six of the 32 patients, three had initiated treatment for their malignancy within 62 days of referral to IR. Each patient was observed to struggle with both internal and external barriers within all stages of the Andersen Model, but process barriers were the greatest obstacle. These findings suggest an ongoing issue with the timely scheduling of these essential procedures.

Rationale

Due to the complex nature of the identified issues within the scheduling process, identified need for change by facility stakeholders, and the lack of current defined standards of

care for timely diagnosis of malignancy using image-guided biopsy, it was determined that establishing a clinical practice guideline to guide a much larger systems-based QI initiative and process redesign would be essential for success.

Utilizing the Replicating Effective Programs (REP) implementation framework, a thorough, evidence-based clinical practice guideline will be developed utilizing the AGREE II tool to define a two-week standard for scheduling patients requiring image-guided biopsy for diagnosis or rule out of malignancy. REP is a valuable framework for the implementation of healthcare interventions and the integration of evidence-based practices in the healthcare setting (Kilbourne et al., 2007). This framework provides a roadmap for the implementation of evidence-based interventions, such as clinical practice guidelines, into the healthcare setting.

The second edition of the Appraisal of Guidelines for Research & Evaluation (AGREE II) tool is the most used guideline appraisal tool and was developed in the interest of addressing variability in guideline quality and is recommended in the development of clinical practice guidelines (Paniccia et al., 2021). Guidelines developers utilize this tool to follow a structured and rigorous development methodology and conduct an internal assessment of the guidelines created (Bruouwers et al., 2010). This instrument is designed to assess guidelines developed at many levels, including those developed for independent, rurally based healthcare systems.

REP implementation framework is divided into four phases: pre-conditions, pre-implementation, implementation, and maintenance & evolution (Kilbourne et al., 2007). These phases are described in detail in Figure B3 within the appendices. The AGREE II tool integrates nicely with the REP framework as it provides a structure for guideline development (pre-implementation), as well as a coordinated, reliable means of guideline evaluation

(implementation). Recommendations or modifications are collected using the AGREE II tool, which also lends well to the maintenance & evolution phase of REP implementation. The AGREE II tool will be utilized and implemented throughout the phases of the REP implementation framework during the six-week project period.

Specific Aims

An organization-specific, comprehensive clinical practice guideline (e.g., workflow/process) will be compiled from existing evidence-based approaches using the AGREE II user's manual. This guideline will be evaluated using the AGREE II tool by both internal stakeholders as well as external content experts to determine guideline quality and feasibility. The purpose of this quality improvement initiative is to develop an organizational-specific clinical practice guideline to decrease wait time from referral to diagnosis (or referral to scheduled biopsy) to a maximum of two weeks, in alignment with international standards. This guideline will establish a standard of care, providing a set goal for system redesign focused on streamlining the image-guided biopsy scheduling process to decrease TTI. A logic model outlining the specific aims and goals of this project may be viewed in Figure B4 within the appendices. Refer to Tables 1-11 below for a thorough review of SMART goals as they pertain to the short- and long-term impacts of the implementation of this clinical practice guideline.

Context

The identified participating departments include a rurally located cancer institute and connected interventional radiology department affiliated with the largest health system in northcentral Montana serving about 164,000 residents in a vast, 13-county-region (Association

of Community Cancer Centers, 2020). These departments function within the inpatient and outpatient realms of the local hospital system, with patients scheduled for appointments concurrently. The select primary participants and stakeholders for this project include oncology and interventional radiology supervisors, an oncology nurse practitioner, an oncology nurse navigator, an interventional radiologist, an interventional radiology charge nurse, an interventional radiology administrative navigator, the interventional radiology scheduling specialist, and this author.

Implementation Summary

This project will utilize the AGREE II tool to develop, evaluate, and integrate a clinical practice guideline defining a two-week standard of care for referral to diagnosis of malignancy using image-guided biopsy. As outlined in the REP implementation framework, this project will be implemented in four phases from August 2023 to April 2024. A detailed timeline is included in Figure B5.

The pre-conditions phase, from August to December 2023 will continue to focus on needs assessment, literature review, data collection, identification of barriers, and drafting of the initial guideline. The pre-implementation phase, extending from January 2024 to February 2024, will involve education of and input from a Community Working Group (CWG) for guideline development, guideline evaluation pilot testing, education of stakeholders on the AGREE II tool, and preparation for guideline presentation and evaluation. The implementation phase will be six weeks, from March 1, 2024, to April 12, 2024, and will include the dissemination of the finalized guideline. The finalized guideline will be presented to four priority stakeholders who will utilize

the AGREE II tool to evaluate the finalized guideline determining guideline quality and feasibility of implementation.

Once the evaluation is complete, the CWG will reconvene to collect AGREE II data and determine if modifications should be made before policy presentation for facility integration. If the guideline is accepted, the maintenance and evolution phase will extend past the intended timeline of this project. The maintenance and evolution phase will ideally include multiple quality improvement initiatives focused on comprehensive system redesign which is required to effectively address all stages of Andersen's Model of Total Patient Delay contributing to delayed TTI for patients requiring image-guided biopsy for diagnosis or rule out of malignancy.

Intervention & Implementation

The Pre-conditions phase of the REP framework focuses on the identification of needs, isolation of effective interventions, consideration of project setting, identification of implementation barriers, and initial drafting of the intervention package (Kilbourne et al., 2007). The pre-conditions phase began in August 2023 and extended through December 2023. During this time, interviews were conducted at the facility of interest to identify systems issues impacting the quality of patient care. Upon selection of the priority issue, stakeholders were identified and surveyed regarding perceived barriers to timely scheduling of image-guided biopsy for cancer diagnosis. The AGREE II tool was selected based on expert recommendations (Bruouwers et al., 2010). This tool consists of 23 key items organized within six domains followed by two global rating items. The AGREE II is designed to assess guidelines developed by local, regional, national, or international groups or affiliated governmental organizations. These include original versions and updates of existing guidelines.

Each domain captures a unique dimension of guideline quality. These domains include scope and purpose, stakeholder involvement, the rigor of development, clarity of presentation, applicability, and editorial independence (Bruouwers et al., 2010). This author will utilize the AGREE II User's Manual and available training to develop a preliminary clinical practice guideline based on current evidence collected through the previous review of the literature.

The pre-implementation phase, from January 2024 to February 2024, will focus on convening a group of stakeholders to participate in a Community Working Group (CWG). The facility's evidence-based practice (EBP) committee will function as the CWG for this project. Stakeholders not typically involved in EBP who will participate in the CWG include IR scheduling specialists and administrative navigators. During this phase, this author will present the draft guideline and current literature. This author will also provide education to members of the EBP committee on the AGREE II tool and guideline development. Throughout this phase, the EBP committee will review the initial draft and advise on guideline modifications and improvements before piloting guideline dissemination to selected internal and external assessors. Each section of the guideline will be structured based on the AGREE II domains and content as outlined per the AGREE II User's Manual. CWG team members will make recommendations based upon a multidisciplinary understanding of facility and patient needs to best meet the content requirements of the AGREE II domains. Once the guideline and AGREE II Tool User's Manual have been reviewed by the CWG, pilot testing will be conducted using external content experts outside of the project facility. After pilot testing, modifications will be integrated based on input from external assessors and CWG recommendations. The finalized guideline as well as the AGREE II training and User's Manual will then be prepared for dissemination to selected

priority stakeholders or program champions. AGREE II recommends guidelines be assessed by at least two appraisers, preferably four, as this will increase the reliability of the assessment (Bruouwers et al., 2010). These four appraisers will be internal stakeholders not involved in the CWG, most likely an oncology nurse practitioner, an oncology nurse navigator, an interventional radiologist, and an interventional radiology charge nurse.

The implementation phase will be six weeks, from March 1, 2024, to April 12, 2024, and will consist of the selection of priority stakeholder appraisers, education on the AGREE II tool and User's Manual, dissemination of the REP guideline package including the finalized guideline and AGREE II evaluation tool, and data collection/scoring of AGREE II guideline evaluations. This author and members of the CWG will be available to appraisers if questions arise on the appropriate use of the AGREE II evaluation tool. Education on the use of the AGREE II tool and User's Manual will be provided to appraisers on week one. Additionally, during week one, appraisers will be presented with the proposed guideline for evaluation. In weeks two and three, appraisers will complete their evaluation of the presented guideline. During weeks three and four the AGREE II evaluations collected from each appraiser will be scored by this author and members of the CWG. Once scoring is complete, results will be reviewed and interpreted by the CWG and input or suggestions on the refinement of the guideline will be discussed. Throughout week five, improvements will be made based on the appraiser's suggestions/feedback. By the end of week six, a refined version of the guideline will be presented to system executives and leadership involved in risk and quality for AGREE II scoring and consideration for integration into facility policy.

The maintenance and evolution phase of the REP framework will ideally extend past the intended timeline for this quality improvement initiative. If approved by the risk and quality departments and integrated into policy, this clinical practice guideline will provide a standard of care that should trigger a comprehensive systems redesign focused on the common goal of reducing TTI delay for patients requiring image-guided biopsy. Staff education and stakeholder involvement in the development of this guideline will also help to increase awareness across all involved departments of the importance of expedited diagnosis or rule-out of malignancy. Greater attention to this issue will stimulate greater buy-in and understanding of the importance of timely scheduling and optimal TTI. It will be the duty of the EBP committee, quality improvement department, and facility-based engineers to develop further quality improvement plans focused on reaching the goals as outlined in the integrated clinical practice guideline.

Evaluation & Analysis

Evaluation of the developed clinical practice guideline will occur as outlined above by external content experts during the pre-implementation phase, priority stakeholder evaluation during weeks two and three of implementation, and through evaluation by risk and quality leadership during week six of implementation. The involvement of the stakeholders and members of the CWG will be essential to the success of this project, therefore CWG members will be surveyed during week six of implementation to evaluate their knowledge and perception of the newly developed clinical practice guideline. They will also be evaluated on their knowledge related to the AGREE II tool, their confidence level with the feasibility of guideline integration, and will provide an overall satisfaction score with the efficiency of the REP process.

Guideline evaluation will be based on the scoring of the AGREE II tool. A quality score is calculated for each of the six AGREE II domains. This is based upon a seven-point rating scale ranging from one (strongly disagree) to seven (strongly agree). The six domain scores are independent and are not aggregated into a single quality score (Bruouwers et al., 2010). These domain scores will help to inform this author and the CWG of areas for improvement or guideline modification during the pre-implementation process. An overall assessment is provided at the end of the AGREE II evaluation requiring the user to make a judgment as to the quality of the guideline, considering the criteria considered in the assessment process. The user is also asked whether they would recommend use of the guideline (Bruouwers et al., 2010). During the pre-implementation scoring by external content experts, the goal is that overall guideline quality will be rated as greater than three by 100% of appraisers. Evaluation within the implementation phase will be conducted with the goal of overall guideline quality being rated as greater than five by 100% of appraisers. Additionally, during this phase, evaluation will be conducted with the goal of 75% of appraisers recommending use of the guideline. By the end of week six, when the guideline is evaluated by system executives and risk and quality leadership, overall guideline quality will be rated as greater than six with 100% of appraisers recommending use of the guideline.

CWG member surveys will be evaluated using a three-point Likert scale indicating whether they agree, neither agree nor disagree, or agree. The statement “I am confident in identifying the timeframe during which patients should be scheduled for image-guided biopsy” will be used to evaluate knowledge perception regarding the newly developed clinical practice guideline. The statement “I feel comfortable using the AGREE II tool for evaluation of clinical

practice guidelines" will be used to evaluate knowledge perception related to the AGREE II tool. Finally, "I am confident that this tool will be successfully integrated into our facility standards of care" will measure their confidence in the feasibility of guideline integration. To measure overall satisfaction a three-point Likert scale indicating whether they are satisfied, neutral, or dissatisfied with the efficacy of the REP implementation framework used to conduct this quality improvement project. Upon final collection of evaluation data, the end goals are that 90% of CWG members will have completed the survey, 90% will report they are confident in identifying the ideal scheduling timeframe as defined by the clinical practice guideline, 70% will report they are comfortable using the AGREE II tool for evaluation of clinical practice guidelines, 60% will report confidence in guideline feasibility, and 80% will report satisfaction with project framework efficacy.

As implementation of this guideline is in the interest of stimulating recognition of the need for systems-based redesign for the referral and scheduling of patients requiring image-guided biopsy for diagnosis or rule out of malignancy, two long-term goals are also included for this project. After three months of guideline integration into facility practice, a minimum of 45% of all patients requiring image-guided biopsy for cancer diagnosis or rule-out will be scheduled for an appointment within two weeks of referral. Additionally, once the guideline is approved, a minimum of 60% of patients who undergo image-guided biopsy with a positive cancer diagnosis will begin treatment within sixty-two days of the initial referral.

Conclusion

As this proposal demonstrates, systematic change is required to address barriers to timely diagnosis and treatment of malignancy. Development and implementation of this clinical practice

guideline will be an essential first step to a necessary comprehensive system redesign and quality improvement initiative in the interest of decreasing TTI for patients requiring image-guided biopsy for diagnosis or rule-out of malignancy.

Table 1.SMART Goal #1

<table>
<tr><td colspan="3">SMART Goal #1: Overall guideline quality will be rated as greater than 3 by 100% of appraisers during the pre-implementation phase of project execution.

• This goal is set at a score of 3 or more as it is understood that during the pre-implementation phase, there will be a likely need for adjustments, refinement, and additional information to reach a higher level of quality.</td></tr>
<tr><td colspan="3">Description of strategies to be utilized to accomplish the goal including needed resources:
• AGREE II User’s Manual
• The project lead and site representative will develop a preliminary clinical practice guideline for timely diagnosis of malignancy through image-guided biopsy based upon the guidance of the AGREE II User’s Manual.
• A team of stakeholders will provide information, feedback, and discussion on the barriers and concerns with meeting the defined timeline as recommended by international guidelines.
• External assessors (4) will be selected by the site representative and project lead to provide non-biased feedback on guideline quality and feasibility.
• Educational material will be created to help external assessors understand the appropriate use of the AGREE II Tool.</td></tr>
<tr><td>Data to be Collected</td><td>Method of Collection and who is responsible</td><td>Planned Data Analysis</td></tr>
<tr><td>AGREE II Evaluations from each selected external assessor.</td><td>Electronic versions of the draft guideline and AGREE II tool will be supplied via email to assessors. These will be emailed back to the project lead upon completion and scored using the AGREE II User’s Manual by the project lead.</td><td>The project lead will review the evaluation and calculate quality totals for each domain, collecting any feedback for modifications. Then the overall quality and feasibility scores will be calculated, and feedback collected for modification.</td></tr>
</table>

Table 2. SMART Goal #2

<table>
<tr><td colspan="3">SMART Goal #2: Overall guideline quality will be rated as greater than 5 by 100% of appraisers during the initial implementation phase of project execution.

• This goal is set to a score of 5 as it is assumed that this draft of the clinical practice guideline will be an improvement upon the pre-implementation draft, however, there will still likely be room for improvement and modifications will need to be made prior to presentation to risk and quality.</td></tr>
<tr><td colspan="3">Description of strategies to be utilized to accomplish the goal including needed resources:
• AGREE II User’s Manual
• The project lead, with the assistance of the evidence-based practice team, will modify the preliminary clinical practice guideline for timely diagnosis of malignancy through image-guided biopsy based upon the guidance of the AGREE II User’s Manual, external evaluator feedback, facility needs, and current evidence.
• Internal assessors (4) will be selected by the site representative and project lead to provide feedback on guideline quality and feasibility.
• Educational material will be created to help internal assessors understand the appropriate use of the AGREE II Tool.</td></tr>
<tr><td>Data to be Collected</td><td>Method of Collection and who is responsible</td><td>Planned Data Analysis</td></tr>
<tr><td>AGREE II Evaluations from each selected internal assessor.</td><td>Electronic versions of the draft guideline and AGREE II tool will be supplied via email to assessors. These will be emailed back to the project lead upon completion and scored using the AGREE II User’s Manual by the project lead.</td><td>The project lead will review the evaluation and calculate quality totals for each domain, collecting any feedback for modifications. Then the overall quality and feasibility scores will be calculated, and feedback collected for modification.</td></tr>
</table>

Table 3. SMART Goal #3

<table>
<tr><td colspan="3">SMART Goal #3: During the initial implementation phase of project execution, 75% of appraisers will recommend the use of the presented clinical practice guideline.

• Change is a difficult thing to accept. The issue of TTI delay in this population is multifaceted and many stakeholders may have a difficult time seeing how this guideline will help to set the stage for future quality improvement. It is likely that some will not feel the guideline is feasible in the current state, leading to these appraisers not recommending its use.</td></tr>
<tr><td colspan="3">Description of strategies to be utilized to accomplish the goal including needed resources:
• AGREE II User’s Manual
• The project lead, with the assistance of the evidence-based practice team, will modify the preliminary clinical practice guideline for timely diagnosis of malignancy through image-guided biopsy based upon the guidance of the AGREE II User’s Manual, external evaluator feedback, facility needs, and current evidence.
• Internal assessors (4) will be selected by the site representative and project lead to provide feedback on guideline quality and feasibility.
• Educational material will be created to help internal assessors understand the appropriate use of the AGREE II Tool.</td></tr>
<tr><td>Data to be Collected</td><td>Method of Collection and who is responsible</td><td>Planned Data Analysis</td></tr>
<tr><td>AGREE II Evaluations from each selected internal assessor.</td><td>Electronic versions of the draft guideline and AGREE II tool will be supplied via email to assessors. These will be emailed back to the project lead upon completion and scored using the AGREE II User’s Manual by the project lead.</td><td>The project lead will review the evaluation and calculate quality totals for each domain, collecting any feedback for modifications. Then the overall quality and feasibility scores will be calculated, and feedback collected for modification.</td></tr>
</table>

Table 4. SMART Goal #4

<table>
<tr><td colspan="3">SMART Goal #4: Upon final evaluation by risk and quality leadership, overall guideline quality will be rated as 6 or greater.

• This goal is set at 6 or greater as it is understood that due to the evolving nature of clinical practice, the naiveite of the project lead and team, and the multifaceted nature of the problem there will likely be continuous room for improvement in the creation of such clinical practice guidelines.</td></tr>
<tr><td colspan="3">Description of strategies to be utilized to accomplish the goal including needed resources:
• AGREE II User’s Manual
• The project lead, with the assistance of the evidence-based practice team, will modify and finalize the clinical practice guideline for timely diagnosis of malignancy through image-guided biopsy based upon the guidance of the AGREE II User’s Manual, internal and external assessor feedback, facility needs, and current evidence.
• The site representative and project lead will present the finalized clinical practice guideline to the Director for Risk and Quality.
• Educational material will be created to help this assessor to understand the appropriate use of the AGREE II Tool.</td></tr>
<tr><td>Data to be Collected</td><td>Method of Collection and who is responsible</td><td>Planned Data Analysis</td></tr>
<tr><td>AGREE II Evaluations from the Director of Risk and Quality.</td><td>Electronic versions of the draft guideline and AGREE II tool will be supplied via email to the assessor. These will be emailed back to the project lead upon completion and scored using the AGREE II User’s Manual by the project lead.</td><td>The project lead will review the evaluation and calculate quality totals for each domain, collecting any feedback for modifications. Then the overall quality and feasibility scores will be calculated, and feedback collected for modification. This will be the determining factor for approval and integration into facility policy.</td></tr>
</table>

Table 5. SMART Goal #5

<table>
<tr><td colspan="3">SMART Goal #5: Upon final evaluation by the Director of Risk and Quality, 100% of appraisers will recommend use of the guideline.

• This goal is set at 100% with the understanding that successful implementation of this project relies on the approval of this one priority stakeholder.</td></tr>
<tr><td colspan="3">Description of strategies to be utilized to accomplish the goal including needed resources:
• AGREE II User’s Manual
• The project lead, with the assistance of the evidence-based practice team, will modify and finalize the clinical practice guideline for timely diagnosis of malignancy through image-guided biopsy based upon the guidance of the AGREE II User’s Manual, internal and external assessor feedback, facility needs, and current evidence.
• The site representative and project lead will present the finalized clinical practice guideline to the Director for Risk and Quality.
• Educational material will be created to help this assessor to understand the appropriate use of the AGREE II Tool.</td></tr>
<tr><td>Data to be Collected</td><td>Method of Collection and who is responsible</td><td>Planned Data Analysis</td></tr>
<tr><td>AGREE II Evaluations from the Director of Risk and Quality.</td><td>Electronic versions of the draft guideline and AGREE II tool will be supplied via email to the assessor. These will be emailed back to the project lead upon completion and scored using the AGREE II User’s Manual by the project lead.</td><td>The project lead will review the evaluation and calculate quality totals for each domain, collecting any feedback for modifications. Then the overall quality and feasibility scores will be calculated, and feedback collected for modification. This will be the determining factor for approval and integration into facility policy.</td></tr>
</table>

Table 6. SMART Goal #6

SMART Goal #6: 90% of CWG members who respond to the post-implementation survey will report they are confident in identifying the ideal scheduling timeframe as defined by the clinical practice guideline by the end of project implementation.		
Description of strategies to be utilized to accomplish the goal including needed resources: • 3-point Likert scale indicating whether they agree, neither agree nor disagree, or agree. • The statement "I am confident in identifying the timeframe during which patients should be scheduled for image-guided biopsy" will be used to evaluate knowledge perception regarding the newly developed clinical practice guideline.		
Data to be Collected	**Method of Collection and who is responsible**	**Planned Data Analysis**
A post-implementation CWG team survey will be dispersed during week 6 of project implementation.	A link to an anonymous survey-monkey questionnaire will be emailed to members of the CWG.	Data will be collected and reviewed by the project lead one week post project implementation.

Table 7. SMART Goal #7

SMART Goal #7: 70% of CWG members who respond to the post-implementation survey will report they are comfortable using the AGREE II tool for evaluation of clinical practice guidelines by the end of project implementation.		
Description of strategies to be utilized to accomplish the goal including needed resources: • 3-point Likert scale indicating whether they agree, neither agree nor disagree, or agree. • The statement "I feel comfortable using the AGREE II tool for evaluation of clinical practice guidelines" will be used to evaluate knowledge perception related to the AGREE II tool.		
Data to be Collected	**Method of Collection and who is responsible**	**Planned Data Analysis**
A post-implementation CWG team survey will be dispersed during week 6 of project implementation.	A link to an anonymous survey-monkey questionnaire will be emailed to members of the CWG.	Data will be collected and reviewed by the project lead one week post project implementation.

Table 8. SMART Goal #8

SMART Goal #8: 60% of CWG members who respond to the post-implementation survey will report confidence in guideline feasibility by the end of project implementation.		
Description of strategies to be utilized to accomplish the goal including needed resources: • 3-point Likert scale indicating whether they agree, neither agree nor disagree, or agree. • The statement "I am confident that this tool will be successfully integrated into our facility standards of care" will measure their confidence in the feasibility of guideline integration.		
Data to be Collected	**Method of Collection and who is responsible**	**Planned Data Analysis**
A post-implementation CWG team survey will be dispersed during week 6 of project implementation.	A link to an anonymous survey-monkey questionnaire will be emailed to members of the CWG.	Data will be collected and reviewed by the project lead one week post project implementation.

Table 9. SMART Goal #9

SMART Goal #9: 80% of CWG members who respond to the post-implementation survey will report satisfaction with project framework efficacy by the end of project implementation.		
Description of strategies to be utilized to accomplish the goal including needed resources: • 3-point Likert scale indicating whether they are satisfied, neutral, or dissatisfied. • The CWG members will be asked to rate their level of satisfaction with the efficacy of the REP implementation framework used to conduct this quality improvement project.		
Data to be Collected	**Method of Collection and who is responsible**	**Planned Data Analysis**
A post-implementation CWG team survey will be dispersed during week 6 of project implementation.	A link to an anonymous survey-monkey questionnaire will be emailed to members of the CWG.	Data will be collected and reviewed by the project lead one week post project implementation.

Table 10. SMART Goal #10

<table>
<tr><td colspan="3">SMART Goal #10: Upon approval of the guideline and implementation of a system-wide quality improvement process redesign, it is hoped that after 3 months of implementation, a minimum of 45% of all patients requiring image-guided biopsy for cancer diagnosis or rule-out will be scheduled for an appointment within two weeks of referral.</td></tr>
<tr><td colspan="3">Description of strategies to be utilized to accomplish the goal including needed resources:
Continued work with the facility’s evidence-based practice committee.
Continued review of data by the Interventional Radiology Administrative Team
Provide facility with recommendations for further quality improvement initiative to address multifaceted aspects of total patient delay.</td></tr>
<tr><td>Data to be Collected</td><td>Method of Collection and who is responsible</td><td>Planned Data Analysis</td></tr>
<tr><td>If the facility begins QI initiatives focused on reaching the goal TTI as defined by the new clinical practice guideline.</td><td>Evidence-based practice committee monthly reports.</td><td>Review of plans and participation in QI project planning.</td></tr>
<tr><td>Number of patients scheduled for image-guided biopsy within 2 weeks of referral.</td><td>Data collection via EHR by the Interventional Radiology scheduling team.</td><td>Review of percentage of patients meeting criteria as defined by clinical practice guideline.</td></tr>
</table>

Table 11. SMART Goal #11

SMART Goal #11: Upon approval of the guideline and implementation of a system-wide quality improvement process redesign, it is hoped that a minimum of 60% of patients who undergo image-guided biopsy with a positive cancer diagnosis will begin treatment within sixty-two days of the initial referral.		
Description of strategies to be utilized to accomplish the goal including needed resources: • Continued work with the facility's evidence-based practice committee. • Continued review of data by Oncology Nurse Navigators • Provide facility with recommendations for further quality improvement initiative to address multifaceted aspects of total patient delay.		
Data to be Collected	**Method of Collection and who is responsible**	**Planned Data Analysis**
If the facility begins QI initiatives focused on reaching the goal TTI as defined by the new clinical practice guideline.	Evidence-based practice committee monthly reports.	Review of plans and participation in QI project planning.
Number of patients diagnosed via image-guided biopsy who begin treatment at the cancer institute within 62 days of initial referral.	Data collection via EHR by the Oncology Nurse Navigation team.	Review of percentage of patients meeting criteria as defined by clinical practice guideline.

CHAPTER THREE

DECREASED TIME TO TREATMENT INITIATION THROUGH CLINICAL GUIDELINE IMPLEMENTATION FOR IMAGE-GUIDED BIOPSIES IN CANCER DIAGNOSIS: QUALITY IMPROVEMENT MANUSCRIPT

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Manuscript in Chapter 3

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Abstract

Background: International guidelines have been established defining the ideal period from referral to diagnosis of malignancy as two weeks. Increased time-to-treatment initiation is associated with a one to three percent increased mortality risk for each week of delayed treatment. Image-guided biopsy has emerged as a transformative tool in cancer diagnosis, impacting the rapid identification and treatment of malignancy.

Clinical Problem: A rurally based oncology institute associated with a larger non-profit healthcare system in Montana identified concerns with extended time-to-treatment initiation related to delayed image-guided biopsy. The average wait time for image-guided biopsy was sixty-seven days.

Methods: Utilizing the Replicating Effective Programs (REP) Implementation framework, an evidence-based clinical practice guideline was developed to define optimal referral-to-diagnosis timeframe for diagnosis or rule-out of malignancy via image-guided biopsy using the second edition of the Appraisal of Guidelines for Research and Evaluation (AGREE II) tool.

Interventions: A guideline advisory committee including individuals from relevant professional groups was recruited to act as expert appraisers. Four-phase appraisal of the clinical practice guideline using the AGREE II tool took place over six weeks. The guideline was rated for overall quality based on a seven-point rating scale and appraisers were asked if they would recommend the guideline for use in the target facility.

Results: The guideline received an average rating of 6.2 and was recommended for use by 100% of appraisers, with 18% recommending modifications during pre-implementation. During implementation, the guideline received an average rating of 6.7 and was recommended for use by 100% of appraisers. The final guideline and appraisal data were presented to health system leadership and the guideline was successfully adopted into facility policy.

Conclusion: Quality improvement initiatives will need to be implemented to identify and address systems-based complexities that could pose barriers to meeting the goal timeframe as defined by the guideline.

Introduction

Clinical Problem

Cancer is one of the most feared words in the English language. It has been the most-feared disease in the United States since the 1920s when it became the second leading cause of death (Vrinten et al., 2017). Cancer itself is an indiscriminate killer, stimulating innate fear. In recent years technological advances have helped to alleviate some of this fear through early identification and diagnosis of disease, reduction in treatment delays, and greater understanding of malignancy on a cellular level. Image-guided biopsy is one scientific innovation that has improved cancer-related outcomes. This means of diagnosis not only reduces treatment delay and increases molecular understanding of malignancy through precise and timely diagnosis of disease, but is also considered to be safer, less invasive, more cost-effective, demonstrates reduced risk of bleeding or clotting, reduces infection risk, and requires less time under anesthesia (Tselikas et al., 2019). Disruption or delay of image-guided biopsy may exacerbate the severity of disease, limit treatment options, and increase risk of unfavorable outcomes.

A rurally based oncology institute associated with an independent, non-profit health system in Montana identified concerns with delayed image-guided biopsy for patients requiring diagnosis or rule out of malignancy. An investigative needs assessment analyzing data from July 1-October 1, 2023, revealed an average wait time of 67 days (or 9.5 weeks) for patients treated at this facility who were diagnosed with cancer using image-guided biopsy. International guidelines and guidelines developed and refined during the COVID-19 pandemic in the United States suggest an ideal referral to diagnosis time of two weeks

(Palmer, 2020; Garg et al., 2021; Society for Interventional Radiology, 2020; Cancer Research UK, 2023). For each week of delay in diagnosis and treatment, there is a one to three percent increased risk of mortality (Khorana et al., 2019), translating to a 7.5-22.5% increase in mortality for the patients of this facility.

Review of Literature

Any delay in the diagnosis and treatment of cancer can lead to a significant increase in morbidity and mortality. Quality improvement initiatives are essential to mitigating the devastating effects of these delays. Best-practice interventions for the improvement of systems-based treatment delay include a multidisciplinary approach to improving biopsy scheduling delay through the integration of triage, patient and provider education, information technology, and facility-wide consensus on benchmark standards. Healthcare systems worldwide have been tasked with the identification of methods for measuring quality of care. Implementation of benchmarks, policies, and quality standards have been associated with long-lasting quality improvement (Willmington et al., 2022). It has been suggested that metrics addressing time-to-treatment initiation should become key components of what defines high-value oncologic care. Longitudinally measuring established quality metrics related to timely treatment of cancer may improve performance and outcomes (Mehta & Sheni, 2022).

The lack of standardized expectations and quality metrics in the timely diagnosis and treatment of malignancy on the national, state, organizational, and facility levels significantly contributes to increased morbidity and mortality. It is clear based on the adaptation of policies and models developed throughout the COVID pandemic as well as coinciding international

clinical practice standards, that the benchmark of two weeks for referral to diagnosis using image-guided biopsy is widely accepted and recognized as best practice (Palmer, 2020; Garg et al., 2021). Integrating policies and guidelines minimizing system-level delays to starting treatment, including a reduction in diagnostic delay, could potentially improve survival for cancer patients (Hanna et al., 2020). System-wide change is required to address a complex process such as scheduling for image-guided biopsy. To trigger system-wide change, guidelines for process standardization and best practices must first be established. Only then can projects focused on process improvement be initiated.

Clinical Practice Guideline Development

Conceptual Framework

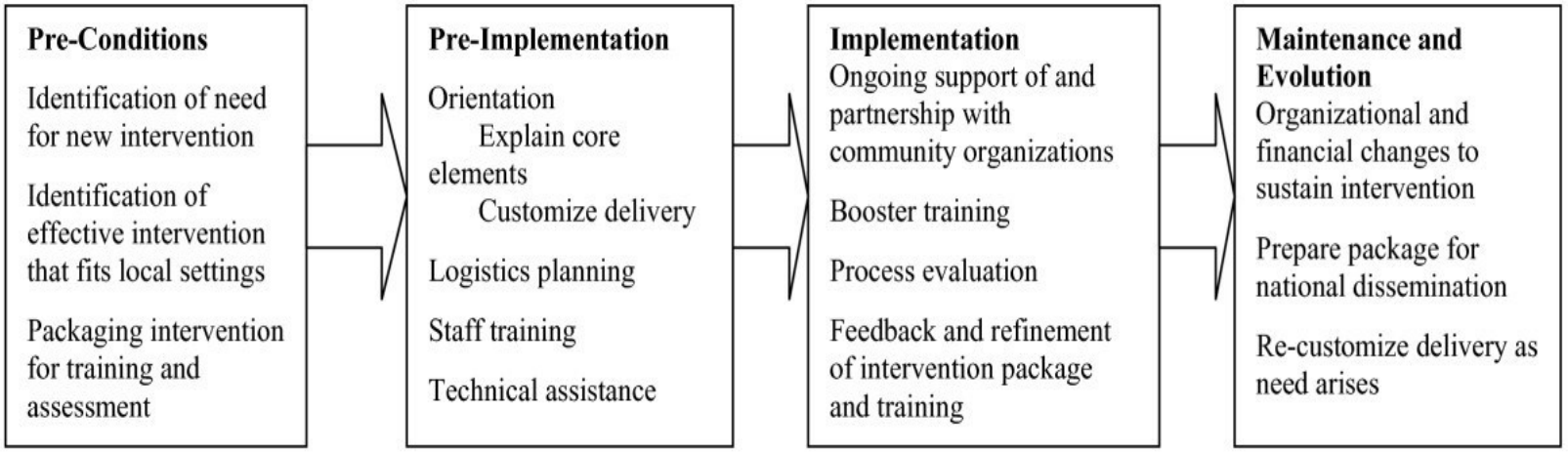
Utilizing the Replicating Effective Programs (REP) Implementation framework, an evidence-based clinical practice guideline was developed following the second edition of the Appraisal of Guidelines for Research & Evaluation (AGREE II) tool user's manual. REP is a valuable framework for the implementation of healthcare interventions and the integration of evidence-based practices in the healthcare setting (Kilbourne et al., 2007). This framework provides a roadmap for the implementation of evidence-based interventions, such as clinical practice guidelines, into the healthcare setting.

The second edition of the Appraisal of Guidelines for Research & Evaluation (AGREE II) tool is the most used guideline appraisal tool and was developed in the interest of addressing variability in guideline quality and is recommended in the development of clinical practice guidelines (Paniccia et al., 2021). Guidelines developers utilize this tool to follow a structured and rigorous development methodology and conduct an internal assessment of the guidelines

created (Bruouwers et al., 2010). This instrument is designed to assess guidelines developed at many levels, including those developed for independent, rurally based healthcare systems.

REP implementation framework is divided into four phases: pre-conditions, pre-implementation, implementation, and maintenance & evolution (Kilbourne et al., 2007). These phases are described in detail in Figure 3.1. The AGREE II tool integrates nicely with the REP framework as this framework provides a structure for guideline development (pre-implementation), as well as a coordinated, reliable means of guideline evaluation (implementation).

Figure 3.1. Replicating Effective Programs Implementation Framework

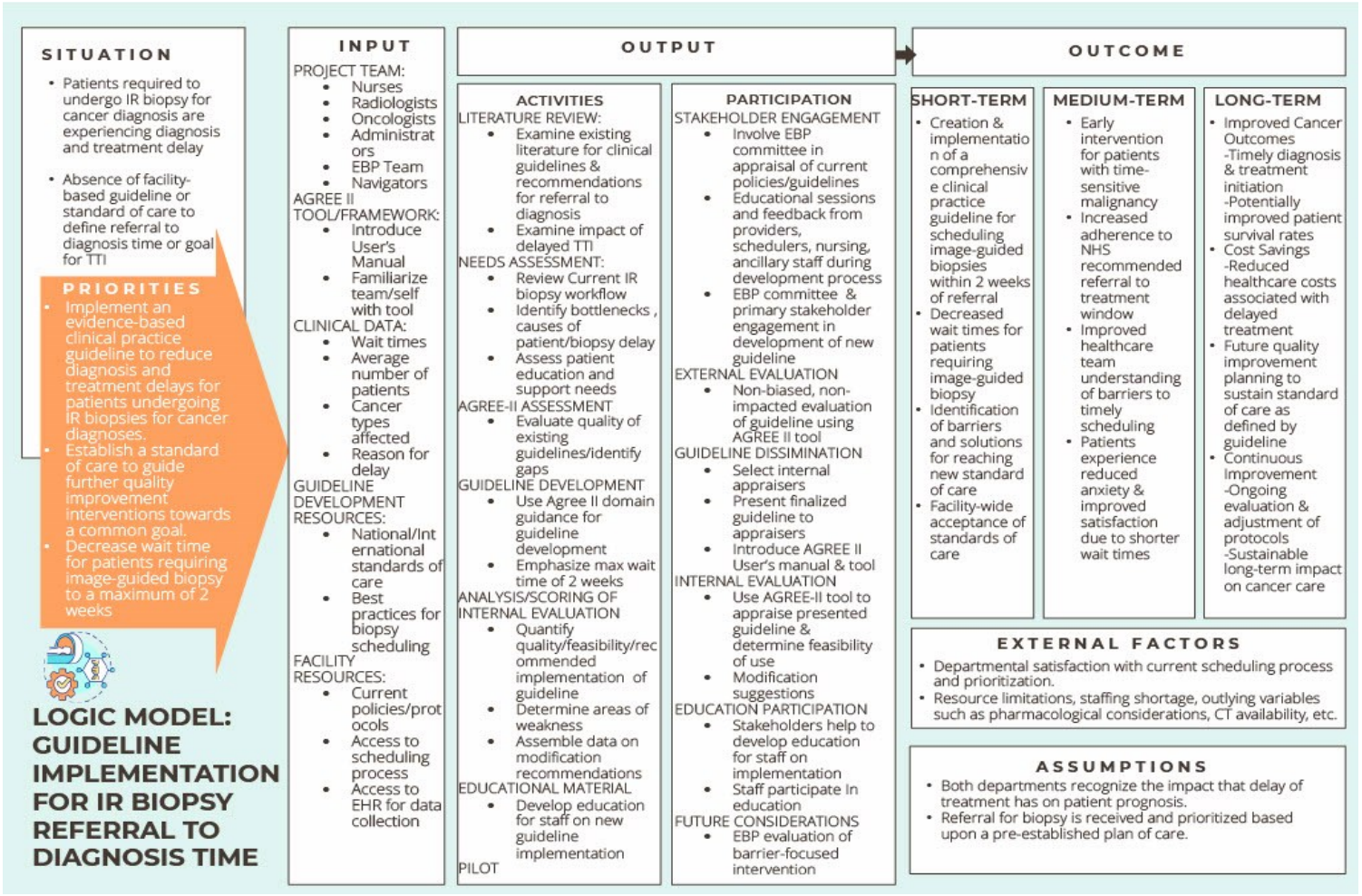


(Kilbourne et al., 2019)

Project Aims

This guideline was developed to decrease wait time from referral to diagnosis of malignancy to a maximum of two weeks, in alignment with international standards. A logic model outlining the specific aims and goals of this project may be viewed in Figure 3.2. The primary goal of this project was for system leadership to approve the clinical practice guideline and integrate it into system policy. Eleven SMART goals were initially set to measure the success of this project, however, the key goals set for the implementation phase were as follows: 1) Upon final evaluation by risk and quality leadership, overall guideline quality will be rated as 6 or greater. 2) Upon final evaluation by the Director of Risk and Quality, 100% of appraisers will recommend use of the guideline. Eventual integration of this guideline into system policy will establish a standard of care for scheduling workflow, providing a set goal for system redesign focused on streamlining the image-guided biopsy scheduling process to decrease time-to-treatment initiation.

Figure 3.2. Quality Improvement Project Logic Model



Methods

Context

This quality improvement project was sponsored and based out of the Benefis Sletten Cancer Institute; a Commission on Cancer Accredited Cancer Treatment Center affiliated with Benefis Health System. Benefis Health System is a not-for-profit community health system that serves nearly 230,000 residents across a 15-county region in Montana. This health system partners with over 250 area physicians, with over 100 physicians and advanced practice professionals employed by Benefis Medical Group (Benefis Health System, 2024). Any number of these healthcare providers may order an image-guided biopsy for diagnosis or rule-out of malignancy before or after referral to the Cancer Institute. Those patients positively identified as suffering from malignancy may be treated at the Sletten Cancer Institute, whose provider group consists of three medical oncologists, two radiation oncologists, two traveling neurologic and gynecologic oncology specialists/surgeons, and three oncology-specialized advanced practice providers. Additional members of the healthcare team at the institute include nurses, medical assistants, research specialists, geneticists, laboratory technicians, radiology professionals, and countless ancillary staff members not specified here.

Interventions

Guideline Advisory Committee Recruitment

The guideline advisory committee was recruited based on the AGREE II user's manual recommending the involvement of individuals from all relevant professional groups. This advisory board of appraisers included one oncology-specialized advanced practice provider,

one medical oncology nurse, one radiation oncology nurse, one oncology research specialized nurse, two medical oncologists, one radiation oncologist, one interventional radiologist, two scheduling specialists, two primary care advanced practice providers, and members of senior leadership for the cancer institute, health system imaging services, quality and safety, risk management, operational development, patient access, and hospital administration. Members of this advisory committee were selected at random to provide appraisal feedback for three guideline drafts within the pre-implementation phase of the project. External experts provided appraisal feedback before the final draft phase. This external expert panel included a medical oncologist and oncology nurse navigator from an outside facility, an oncologic surgeon, a nursing data specialist, and two nursing academic professionals with policy and guideline appraisal experience. Senior leadership members of the advisory committee provided appraisal data during the final implementation phase.

Pre-Implementation: Guideline Development

The first draft of the clinical practice guideline was systematically developed January of 2024, guided by the methodological strategy laid out by the AGREE II User's Manual. Guideline recommendations were developed based on research collected through an extensive review of the literature. The guideline was developed using the AGREE II manual and then formatted based on exemplars as provided by the American Society of Clinical Oncology (ASCO). Guideline development using the AGREE II tool encompasses six domains, each of which captures a unique dimension of guideline quality. The AGREE II domains are illustrated in Figure 3.3. These domains include scope and purpose, stakeholder involvement,

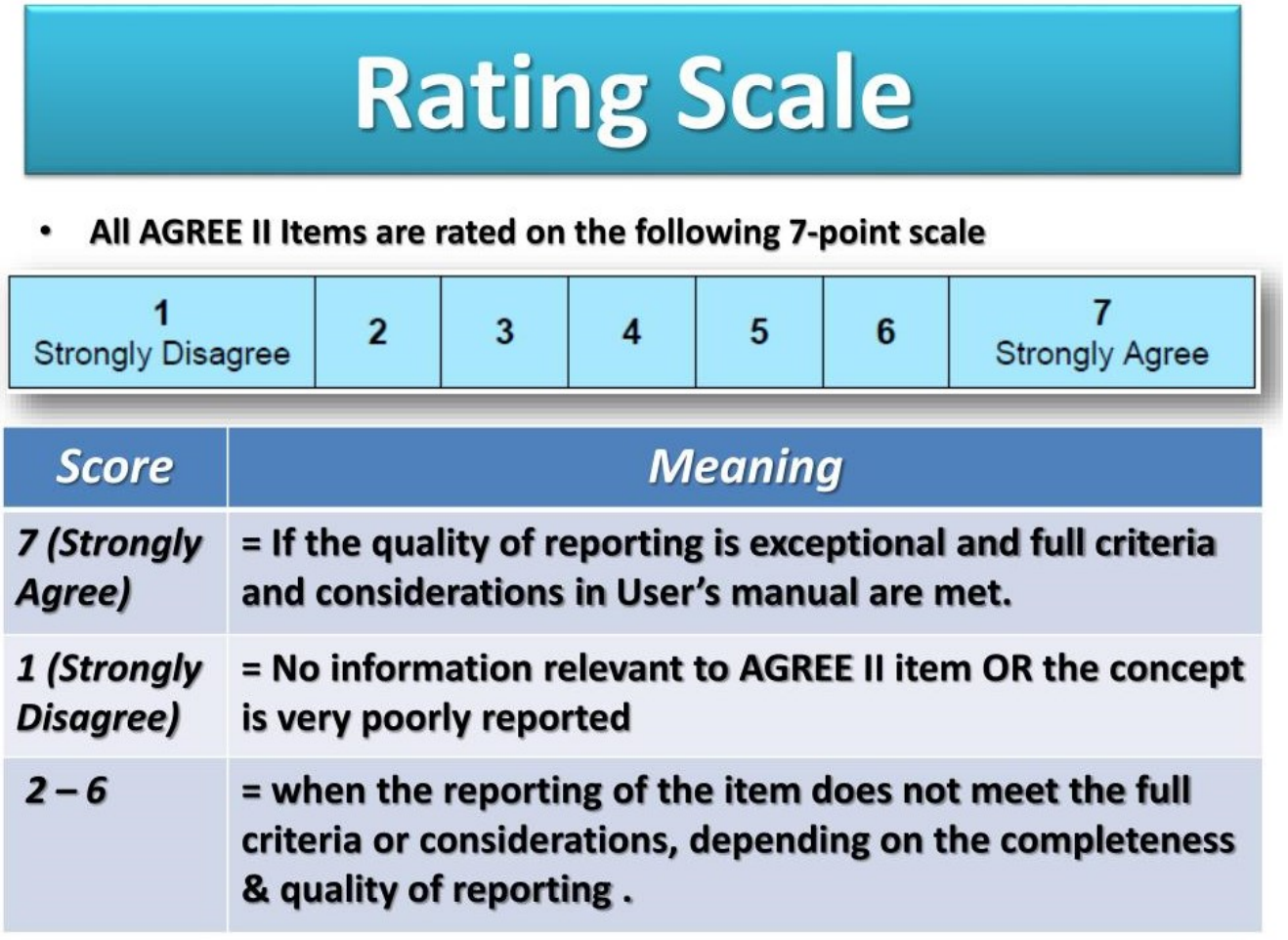
rigor of development, clarity of presentation, applicability, and editorial independence (Bruouwers et al., 2010).

Three editorial versions of the clinical practice guideline were drafted based on appraisal feedback collected from the guideline advisory committee. Each draft was disseminated electronically via institutional email and a link to a SurveyMonkey version of the AGREE II tool was provided. The AGREE II tool consists of 23 key items organized within the six previously discussed domains followed by two global rating items. Each of the 23 items was appraised based on a seven-point rating scale (Figure 3.4). The same seven-point scale was used to rate overall guideline quality, with seven being of highest quality. The final global rating item requested each appraiser to express if they felt the guideline should be used within the target facility by indicating “yes”, “yes, with modifications”, or “no.” Responses were collected using the SurveyMonkey website.

Draft one of the guideline revealed an average quality rating of 6.1 with 100% of appraisers recommending the guideline for use. Primary concerns during this draft phase revolved around AGREE II domain 2, stakeholder involvement. Reflecting feedback from question 4, it was suggested by advisory members that additional scheduling specialists be added to the appraisal committee. Question 5 of the AGREE II tool references the views and preferences of the target population. It was suggested that a survey of this population may enhance guideline quality, ergo patients who had previously undergone image-guided biopsy for diagnosis of malignancy were surveyed, revealing 100% of these patients reporting a desire to be scheduled for and obtain results of image-guided biopsy in an expedited manner.

Figure 3.3. AGREE II Tool Quality Domains

Figure 3.4. AGREE II 7-Point Rating Scale



The second draft of the guideline was appraised revealing an average quality rating of 6.6, with 83% of appraisers recommending the guideline for use, and 17% of appraisers recommending the guideline for use, but with modifications. These modifications primarily focused on AGREE II domain 5, applicability. Future recommendations were requested and concerns with the feasibility of maintaining guideline standards and expressed by the advisory committee during this draft phase. Question 19 asks if the guideline provides advice and/or tools on how the recommendations can be put into practice. Question 20 of the guideline questions whether potential resource implications for applying the recommendations have been considered. Secondary to feedback for these questions, a meeting was conducted with members of the clinical engineering department to begin strategic evaluation to best identify how to maintain guideline standards and fix the internal systematic issues leading to increased complexity of scheduling for image-guided biopsy. Although evaluation by clinical engineering is ongoing, multiple suggestions were made including use of the oncology navigator position, recruitment of an interventional radiology-based oncology nurse navigator, application of acuity or triage-based algorithms such as the Interventional Radiology Procedure Acuity Scale (IR-PAS), and the inclusion of a clinical algorithm or data set defining requirements for providers prior to sending orders for image-guided biopsy.

Draft three was released to external appraisers who rated overall guideline quality as 5.6, with 60% recommending the guideline for use and 40% recommending the guideline for use with modifications. Modifications during this draft phase were focused on AGREE II domains 3 and 5, rigor of development, and applicability. Initially, it had been proposed that the guideline would be the responsibility of the evidence-based practice committee and nurse

practice council. However, during this phase of the appraisal process it was suggested that, as a more practice and provider-based guideline, it may be more appropriate for practice leadership and department medical directors or providers to be responsible for guideline updates and research, rather than nursing. This feedback led to a discussion with senior leadership and members of quality and safety who suggested that the final guideline be presented to provider administrators and, upon approval, be integrated into the PolicyStat system, which would assign the policy to the Sletten Cancer Institute, with an annual review trigger that would become the responsibility of practice and provider administration for that department. This process of guideline update was outlined in the next draft phase. Additional concerns were again focused on future recommendations and full assessment of the current scheduling process to determine major barriers to the completion of early biopsy. It was suggested that best practices in scheduling processes at other centers be explored. Assessment of the adequacy of scheduling software, sufficiency of providers, etc was also recommended. Although significant to the overall success of the application of this guideline, future recommendations will be an ongoing, separate project, essential to the maintenance and evolution phase of the REP process.

Implementation: Guideline Appraisal & Policy Integration

The implementation phase of the project began March 1, 2024, with dissemination of the final draft guideline and AGREE II appraisal tool to senior leadership members of the guideline advisory committee. Overall guideline quality was rated as 6.7, with 100% of appraisers recommending the guideline for use. Editing recommendations primarily focused

on logistics such as legal health system title changes, nomenclature, and recommendations for final presentation and follow-up with physician leadership.

A presentation was then prepared to highlight the guideline development process, overall guideline performance and ratings throughout the pre-implementation and implementation process, and recommendations for further exploration of quality improvement regarding prompt scheduling of image-guided biopsy. On April 5th the presentation and guideline were provided to the System Chief Medical Officer, the President of Great Falls Hospitals, and Executive Vice President of System Clinical Operations, as well as Benefis Sletten Cancer Institute Director of Provider Practices and Medical Director. Also in attendance were the Director of Imaging Services for Benefis Health System and the Doctoral Project Organizational Mentor. All audience members agreed that the guideline was of sufficient quality (average of 6.7) and reflected a high impact-high need area of patient care and recommended implementation into policy. The document was recommended for use by 100% of audience members. It was then prepared and integrated into the PolicyStat system and disseminated throughout the organization by April 12th, effectively meeting the pre-planned 6-week project implementation timeline.

Measures & Analysis

The over-arching goal of this project was the successful implementation of the clinical practice guideline into facility policy through the approval of senior leadership and physician administrators. Eleven SMART goals guided this project and provided measures for success throughout the pre-implementation and implementation phases of the REP process. First, during the pre-implementation phase, the set goal was for overall guideline quality to be rated

as 3 or greater by 100% of appraisers. During implementation, set goals were for overall guideline quality to be rated as greater than 5 by 100% of senior leadership appraisers and for 75% of those appraisers to recommend the use of the presented clinical practice guideline. Upon final presentation and evaluation during the implementation phase, it was the hope that overall guideline quality would be rated as a 6 or greater, with 100% of presentation attendees recommending the guideline for use, resulting in approval and integration of the guideline into policy. The remaining SMART goals were focused on project process evaluation, advisory committee knowledge gain, and evaluation of committee understanding of the AGREE II tool. Long-term SMART goals were established for evaluation 3 months or more after project implementation. These included the goal of a minimum of 45% of all patients requiring image-guided biopsy for cancer diagnosis or rule-out to be scheduled for an appointment within two weeks of referral and for a minimum of 60% of patients who undergo image-guided biopsy with a positive cancer diagnosis to begin treatment within sixty-two days of the initial referral.

Results

An 85% response rate from the guideline advisory committee in the pre-implementation phase resulted in 18% of appraisers rating the guideline quality as 5, 53% rating the guideline quality as 6, and 29% rating the guideline quality as 7, or of highest quality. This resulted in an average overall guideline rating of 6.2, by far meeting the pre-implementation phase SMART goal of 100% of appraisers rating guideline quality as a 3 or greater. During this project phase, 100% of guideline appraisers recommended the guideline for use, with 18% of those recommending modifications prior to the implementation phase.

During project implementation, senior leadership members of the guideline advisory committee rated the overall guideline as an average of 6.7, with 67% of appraisers rating the guideline quality as 7 (highest quality), and 33% rating the guideline as a 6. These appraisers unanimously recommended the guideline for use, effectively meeting the SMART goals of an average quality rating of 5, with a 75% recommendation rate.

Finally, upon presentation to senior-level administration and key administrative members responsible for policy approval and integration, the guideline quality was again rated as an average of 6.7, with 100% of audience members recommending the guideline for use. Set SMART goals required an average rating of 6, with 100% recommendation for use. This resulted in the successful approval and implementation of the clinical practice guideline into facility policy.

The remaining SMART goals required an additional survey of guideline advisory members. A three-point Likert scale was to be used to ascertain appraisers' confidence in identifying the timeframe during which patients should be scheduled for image-guided biopsy, their level of comfort using the AGREE II tool for evaluation of clinical practice guidelines, level of confidence in guideline feasibility, and level of satisfaction with project framework efficacy. Due to time constraints, alteration in advisory committee makeup from the original project plan, and excess workload strain secondary to the integration of a new EHR into the facility, it was decided that these surveys would be omitted. It was initially planned that these surveys would be dispersed and completed during the evidence-based practice committee meeting following guideline implementation, however as the evidence-based practice

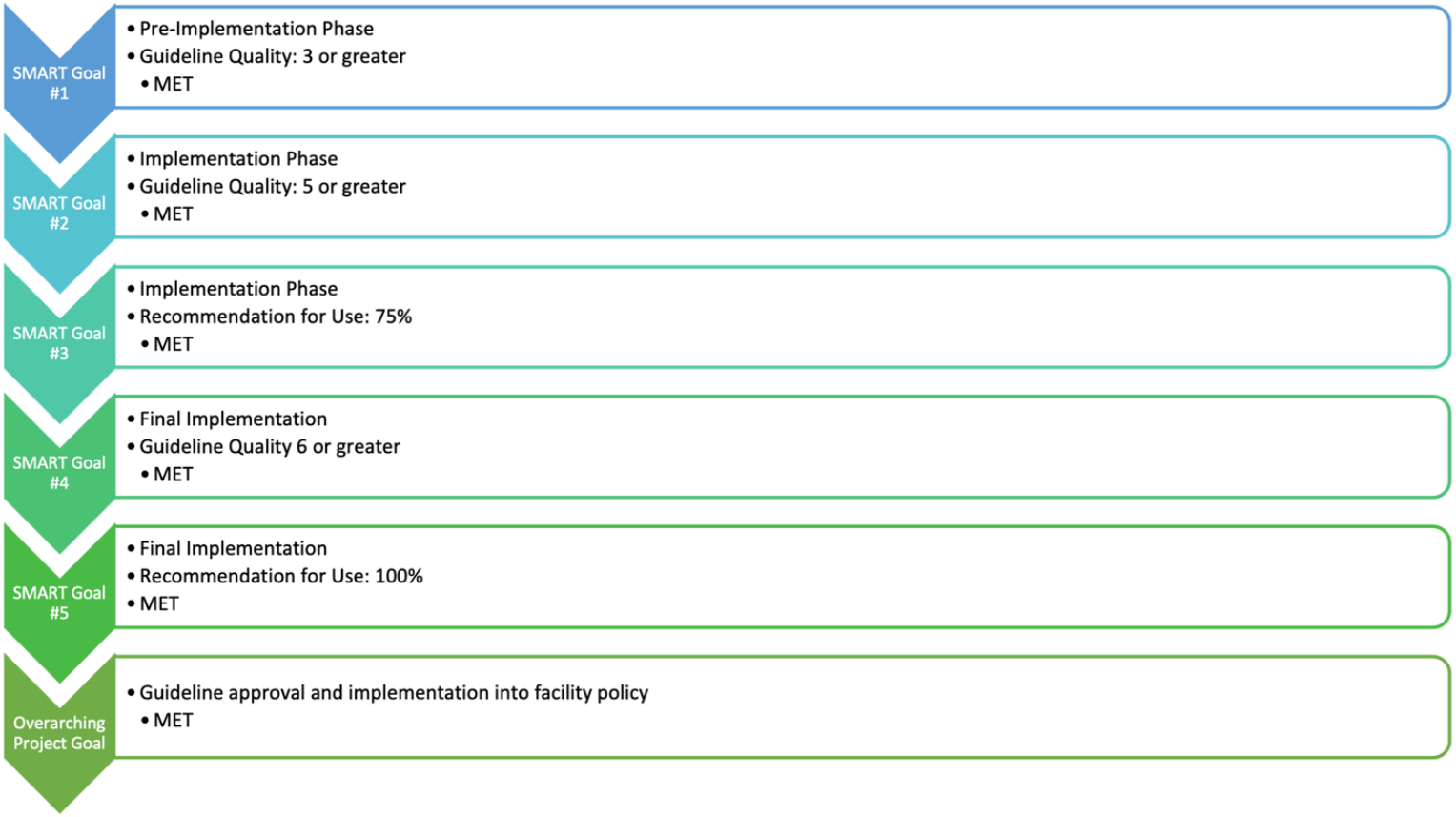
committee was dissolved during the pre-implementation phase of this project, this was not as easily attainable.

The final SMART goals listed for this project cannot yet be achieved as they are specific to the long-term outlook and impact of this project. These goals stated that 3 months post-implementation, a minimum of 45% of all patients requiring image-guided biopsy for cancer diagnosis or rule-out will be scheduled for an appointment within two weeks of referral, and that a minimum of 60% of patients who undergo image-guided biopsy with a positive cancer diagnosis will begin treatment within sixty-two days of the initial referral. After in-depth discussion with clinical engineering, directors of involved departments, and evaluation by EHR integration committees it has been determined that the long-term goals of this project will not provide relevant data until further quality improvement initiatives are implemented. It has been suggested that an internal assessment be conducted after 1 year of guideline integration to determine true patient impact and successful adherence to guideline recommendations.

Table 12. Project & Appraisal Outcomes

Project phase	Response Rate, % (n)	Quality Rating, mean (range) Score, % (n)	Recommendation for use, % (n)
Pre-implementation (guideline advisory committee members)	85 (n)	6.2 (5-7) 5 = 18% (n) 6 = 53% (n) 7 =29% (n)	100% (n) (18% w/modifications)
Project Implementation (senior leadership members of advisory committee)	80 (n)	6.7 (6-7) 6 = 33% (n) 7 = 67% (n)	100% (n)
Policy Approval and Integration	60 (n)	6.7 (6-7) 6 = 33% (n) 7 = 67% (n)	100% (n)

Figure 3.5. SMART Goals Outcomes



Discussion

This project reflects the successful development, appraisal, and integration of an evidence-based clinical practice guideline at an individual, rurally based facility level. Project aims were met; however, the more important themes lie in the questions, hesitations, and concerns brought to light with the implementation of the guideline recommendations. The purpose of this project was to effectively develop a clinical practice guideline, but in the interest of stimulating a greater quality improvement initiative focused on decreasing time-to-treatment delay for these patients requiring image-guided biopsy.

Setting benchmarks, even at a facility level, may help to guide the prioritization and organization of patient and facility needs (Kaplan et al., 2015). Although it is clear through evidentiary support that a set benchmark for scheduling image-guided biopsy is necessary for positive patient outcomes, how this would be achieved became a constantly presented question. The greatest hesitation to the integration of this guideline involved concerns the multitude of processes that would need to be addressed to meet the suggested timeline. There was no question regarding the validity of the two-week wait, the impact of treatment delay on patient outcomes, or the guideline development or implementation process or tools presented.

It became clear throughout the implementation of this essential facility benchmark that interdisciplinary communication is essential to the long-term feasibility of this project. Development of a quality improvement initiative requiring systematic redesign requires a comprehensive understanding of facility processes, departmental functions, and the views, standards, and limitations of specific departments and involved providers. Many of the questions posed required in-depth discussion with each department lead and members of their teams to

address systems-based concerns. Currently, this facility is in the process of transitioning to a new electronic medical record system, which may effectively address some of these issues. It is essential, however, that ongoing evaluation within each involved department continues with the goal of meeting the standard of care now set by this practice guideline.

Limitations

Although this project was successful in its aims and purpose, the outcome would be more influential with greater involvement of the end-users and impacted departments. Healthcare in Montana is in a state of strain with a significantly reduced workforce and increased patient population requiring care. Throughout this project, it was difficult to gather stakeholders in one place to establish an understanding of the factors creating the greatest barriers for each department. Members of each department were interviewed during the pre-conditions phase with results suggesting that assumptions and impressions regarding what the true barriers are in each department were not aligned. From the standpoint of the interventional radiology department, resource issues, procedural requirements, patient readiness, and physician consensus on procedural feasibility have the greatest impact on this issue. Oncology nurses and providers, on the other hand, report impressions of issues with referral and order processes through centralized scheduling and improper prioritization of procedures. If members of these departments were to be collectively gathered it may help to find common ground regarding what barriers to first address related to this issue.

Additionally, a significant barrier to extending the total impact of this project was implementation during the integration of a new electronic health record. This confounded the project because, at this early point in integration, we are unable to understand the impact of

the new system on processes such as referral, approval, and scheduling. Interdisciplinary collaboration with the engineering, information technology, and scheduling departments once workflows are established and appropriately adjusted will help with developing a greater understanding of what the continued barriers are in this issue. Project implementation during the integration of this new health record was also limiting as resources and focus were turned instead to the large EHR go-live. Although an 85% response rate from the advisory committee and prompt response from system leadership were greater than expected, how much time or attention was spent by each appraiser, or the quality of constructive feedback does come into question due to this distraction.

Finally, the omission of the final survey of advisory committee members does impact the overall takeaway of this project as the impact on the understanding of the research supporting this guideline and guideline development and appraisal was not able to be measured. The review of the literature for this project suggested multiple means by which quality improvement teams may create impact for systems-based barriers in time-to-treatment initiation. This included benchmarking, electronic health record integration, multidisciplinary teams' approach, patient, staff, and provider education, and the use of triage systems. Benchmarking and multidisciplinary teams' approach were addressed at length in this project. Electronic health record integration and the use of triage systems are essential topics for future discussion in the maintenance and evolution phase of the REP implementation framework. Patient, staff, and provider education was conducted during this project through the presentation of research and guideline development process and appraisal, however as the final SMART goals were not assessed, the impact of this education could not be measured.

Recommendations: Maintenance & Evolution

Future recommendations lie in the maintenance and evolution phase of the REP implementation framework. This phase of the theoretical framework involves the organizational changes necessary to sustain the intervention. It is this phase of the framework that demonstrates its effectiveness beyond the dissemination of a quality improvement initiative (Kilbourne et al., 2007). This phase of the framework boasts sustainability and its ability to address knowledge gaps.

As discussed above, many questions were posed during the guideline appraisal process related to how the facility would be able to effectively meet the standards set by the guideline. Addressing the limitations as discussed above are one means by which the impact of this project may be expanded. Additionally, thorough assessment will be necessary to determine how the new electronic medical record may impact the efficiency of the IR scheduling process. Recommendations to address systems-based barriers have been collected from members of the clinical engineering, oncology, and interventional radiology departments. These include assessment of provider practices, altered use of the oncology navigator position, recruitment of an interventional radiology-based oncology nurse navigator, application of acuity or triage-based algorithms such as the Interventional Radiology Procedure Acuity Scale (IR-PAS), and the inclusion of a clinical algorithm or data set defining requirements for providers prior to sending orders for image-guided biopsy.

Conclusion

A 7.5-22.5% increase in patient mortality is unacceptable, particularly if it is due to modifiable, systems-based barriers and inadequate quality standards. Implementation of this

clinical practice guideline will provide a facility benchmark, establishing an evidence-based standard of care that will effectively guide future systematic change to improve overall patient outcomes. Further quality improvement initiatives will need to be implemented to identify and address systems-based complexities that could pose barriers to meeting the goal timeframe as defined by the guideline. Improvement of time-to-treatment initiation for patients requiring image-guided biopsy will continue to be an ongoing project, likely requiring years of systematic change to address barriers. However, implementation of this guideline provides the essential steppingstone and will allow for future QI teams to work towards a common goal.

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CHAPTER FOUR

THE DOCTORAL JOURNEY: ADVANCED NURSING ESSENTIALS REFLECTION

Understanding the Core Competencies of Professional Nursing

The journey to completing a Doctorate in Nursing Practice (DNP) is robust; focused on professional, personal, and academic growth. The DNP degree is unique in that is it a practice-focused degree. While still focused on a scholarly approach to the discipline and commitment to the advancement of the profession, it emphasizes how a comprehensive, theoretical understanding of healthcare research and nursing theory impacts practice and individual patient care (Chism, 2023). Understanding how the DNP essentials address core competencies in professional nursing is crucial in ensuring the delivery of high-quality healthcare. The DNP essentials serve as a guiding framework for advanced nursing practice, emphasizing the integration of clinical expertise, evidence-based practice, leadership, and interprofessional collaboration (AACN, 2021). Understanding how these essentials align with core competencies, nurses can effectively navigate complex healthcare systems, advocate for patient-centered care, and drive innovations that enhance healthcare outcomes. The development of a thorough understanding of the DNP essentials not only elevates individual nursing practice but also contributes to the advancement of the nursing profession as a whole.

Foundational Underpinnings of Nursing

Throughout this academic journey, recognizing how the DNP essentials play a crucial role in deepening the understanding of the foundational underpinnings of nursing through encompassing key principles and concepts essential to advanced nursing practice has been important for the integration of academic learning into professional practice. The DNP essentials emphasize a holistic approach to healthcare, integrating principles of nursing science, theory, ethics, and research into clinical practice. By focusing on areas such as systematic healthcare processes, disease prevention and intervention, and population-based health, the DNP essentials highlight the importance of addressing social determinants of health, multifaceted areas of healthcare disparity, and systems-based needs.

Throughout the entirety of the DNP program, essential domains and core competencies and concepts have helped to expand upon the didactic and clinical experience. The development of leadership skills, interprofessional collaboration, and advocacy through scholarship focused on the integration of the DNP essentials helped to empower my ability to enact positive change within the community that I serve. Adherence to the DNP essentials allows nurse practitioners to gain a comprehensive understanding of the fundamental aspects of nursing practice, enabling them to provide high-quality, patient-centered care in diverse healthcare settings. Each unique domain outlined by the DNP Essentials addresses concepts central to nursing practice which serve to bridge the gap between education and practice (AACN, 2021). These domains include knowledge for nursing practice, person-centered care, population health, scholarship for nursing practice, quality and safety, interprofessional

partnerships, systems-based practice, information and healthcare technologies, professionalism, and personal, professional, and leadership development (AACN, 2021).

The didactic components of the DNP program helped to establish an understanding of AACN's key concepts of clinical judgment, communication, compassionate care, diversity, equity and inclusion, ethics, evidence-based practice, health policy, and social determinants of health (AACN, 2021). During the research, development, and implementation of the DNP project, I was able to expand my scope of practice and competency as a nursing leader through the practical application of the AACN core concepts to each domain of the DNP essentials.

Domain 1: Knowledge for Nursing Practice

During my clinical experience, one influential preceptor stated, "Healing is an art. Medicine is a science. Healthcare is a business." Domain 1 of the AACN essentials focuses on the integration and application of established and evolving disciplinary nursing knowledge as well as knowledge from other disciplines (AACN, 2021). Integration of multiple healthcare perspectives and ideals from all disciplines is essential to establishing a comprehensive understanding of healthcare. Nursing is just one of many disciplines that add value to the functionality of our healthcare system. In advanced-level nursing education, one must be able to demonstrate an understanding of how nursing's distinct perspective impacts healthcare, but also recognize where shared perspectives exist with other disciplines (AACN, 2021). During the development of the clinical practice guideline for this DNP project, it became essential to involve and develop an understanding of multiple departments within the target healthcare system. I became deeply involved with clinical engineering and centralized scheduling throughout this process and was exposed to the development of workflow processes for the

integration of healthcare informatics. Before the DNP project experience, interdisciplinary collaboration, and application of concepts from other professions were highlighted during courses such as NRSG 608 and 610, Design of Healthcare Delivery Systems, and Healthcare Informatics. This experience helped to further expand my appreciation for the interdisciplinary model of care and realize the extent to which individual professions impact healthcare system functions and the integration of evidence-based best-practices.

Domain 2: Person-Centered Care

AACN essential domain 2 is entitled "person-centered care", and is focused on the "holistic, individualized, just, respectful, compassionate, coordinated, evidence-based and developmentally appropriate care built upon a scientific body of knowledge that guides nursing practice" (AACN, 2021). Research in this quality improvement initiative was focused on addressing positive patient outcomes for patients requiring image-guided biopsy for cancer diagnosis. Applying concepts from early didactic courses focused on evidence-based practice and health research, I was able to perform a comprehensive review of literature yielding research that helped to provide a basis of understanding for factors involved in prolonged time-to-treatment initiation in cancer diagnosis and treatment. This allowed for the expansion of my understanding of patient and systems-related treatment delays through the application and understanding of The Andersen Model of Total Patient Delay, which identifies and studies appraisal, illness, behavioral, scheduling, and treatment delays in cancer diagnosis and treatment (Walter et al., 2012). Application of this model throughout research and guideline development helped to expand my understanding of person-specific factors such as rurality and health literacy and their impact on treatment delay. Furthermore, other research yielded in

the literature review helped to better understand the physical and psychological impacts of treatment delay on patient populations, significantly expanding my knowledge base in social determinants of health. This part of the DNP project experience was supplemented by courses such as NRSG 608, 612 and 614, which focused on the design of healthcare delivery systems, ethics, law, and policy and vulnerable populations in healthcare.

Domain 3: Population Health

AACN domain 3 focuses on population health, which encompasses collaborative activities among stakeholders for the improvement of a population's health status (AACN, 2021). These concepts were initially addressed in the DNP curriculum through courses such as Vulnerability and Diversity in Health Care, Ethics, Law & Policy in Healthcare, Program Planning and Evaluation of Outcomes in Quality Improvement, and Design of Health Care Delivery Systems (NRSG 614, 612, 611, and 608). These courses helped to develop a greater understanding of individual patient populations and the development of programs based on diverse patient care needs. These collaborative efforts involve relevant individuals and organizations involved in care, including patients and communities themselves. During this project, to create a comprehensive clinical practice guideline, the AGREE II tool required the involvement of members from all relevant professional groups, which was reflected through the recruitment and engagement of the multidisciplinary guideline advisory committee. The AGREE II user manual also required the integration of the views and preferences of the target population. This resulted in the identification, engagement, and survey of patients who would be directly impacted by the integration of the clinical practice guideline. Through this experience, I was able to develop a collaborative approach with relevant stakeholders to address patient outcomes for

cancer patients requiring image-guided biopsy for diagnosis. I was also able to become involved in policy development at the facility level, integrate an evidence-based policy appraisal process, and engage in relationship-building activities with stakeholders throughout the healthcare system and surrounding healthcare community.

Domain 4: Scholarship for the Nursing Discipline

This AACN domain is focused on the discovery, application, integration, and dissemination of evidence-based research. DNP didactic courses like Evidence-Based Practice I and II (NRSG 604 and 605), Statistical Applications (606), and Program Planning (611) helped form a basis of understanding for concepts relevant to this AACN domain. The DNP project implementation process required students to gather, synthesize, translate, and apply research specific to their clinical practice problem to develop a quality improvement initiative to integrate into their target facility. During my project I was able to research factors impacting time-to-treatment initiation in cancer diagnosis, quality improvement suggestions to decrease time-to-treatment initiation in cancer diagnosis using image-guided biopsy, and evidence-based means of guideline development, appraisal, and integration. I utilized this research to develop a clinical practice guideline based on national and international best practices. Then, using a proven appraisal tool, I was able to prove the quality and feasibility of the guideline and integrate it into facility policy. Completing these steps of the DNP project advanced the scholarship of nursing, integrated best practice evidence into nursing/provider practice, and promoted ethical conduct of scholarly activities, successfully integrating the basic principles required for this AACN domain.

Domain 5: Quality and Safety

Quality and safety are the heart of DNP scholarship and are core values of nursing practice. In advanced-level nursing education, to meet quality and safety standards according to the AACN, one must be able to apply quality improvement principles in care delivery, contribute to a culture of patient safety, and contribute to a culture of provider and work environment safety (AACN, 2021). Advocating for policies and processes to promote a culture of safety and excellence in the workplace, establishing benchmarks based on national and international standards, collaborating in process improvement initiatives, and leading the development of quality improvement initiatives are a few examples provided by the AACN of how students may meet this core competency (AACN, 2021). This DNP project employed international best-practice standards to develop a facility-based clinical practice guideline establishing a standard of care to improve patient outcomes. The quality of the established guideline was measured based on evidence-based guideline appraisal means. Data collection suggesting a 7.5-22.5% increased risk of mortality for the target patient population triggered the implementation of this project. Courses such as Statistical Applications, Design of Healthcare Delivery Systems, Health Care Informatics, and Evidence-Based Practice I and II (NRSG 606, 608, 610, 604 & 605) provided the foundational understanding necessary to complete this portion of the DNP project.

Domain 6: Interprofessional Partnerships

Interprofessional collaboration and collaborative efforts amongst team members, patients, families, and other stakeholders enhance the healthcare experience and improve patient outcomes (AACN, 2021). As previously discussed, communication and understanding of common

concepts, knowledge, beliefs, and skills among different disciplines is essential to developing a comprehensive understanding of healthcare and optimizing care delivery. AACN expectations in advanced-level nursing education surrounding this domain lay in communication, partnership, team dynamics, knowledge sharing, and mutual learning and respect. Throughout my DNP education, I have become involved in facility committees, recruited a guideline advisory committee within my DNP project, worked within the interdisciplinary team to develop and communicate standards of care, and collaborated extensively with all members of the healthcare team. During the didactic courses provided by this program students were frequently required to work within teams dedicated to producing high-quality projects focused on core concepts as previously outlined in this paper.

Domain 7: Systems-Based Practice

Healthcare systems continue to become more complex. Coordination of resources to provide safe, quality, and equitable care to diverse populations is the goal of AACN domain 7 (AACN, 2021). Knowledge of macro-, meso-, and microsystems across healthcare settings was gained through courses such as Finance and Budgeting of Healthcare Systems, Program Planning and Evaluation of Outcomes in Quality Improvement, Healthcare Informatics, and Design of Health Care Delivery Systems (NRSG 613, 611, 610, and 608). This knowledge was then utilized to conduct an in-depth microsystems evaluation to identify factors impacting the current state of delay for image-guided biopsy in cancer. Advanced-level nursing education requires the application of systems knowledge across the continuum of care, incorporation of cost-effective care, and optimization of system effectiveness through the application of evidence-based practice (AACN, 2021). This was achieved during the DNP project process through the integration of

evidence-based clinical practice guidelines and complex systematic policy approval at a facility level.

Domain 8: Informatics and Healthcare Technologies

Although less involved in the DNP project implementation; informatics and healthcare technologies were a major theme throughout the DNP scholarship experience. “Information and communication technologies and informatics processes are used to provide care, gather data, form information to drive decision making, and support professionals as they expand knowledge and wisdom for practice” (AACN, 2021). Examples of the application of concepts within this domain include involvement in training and transition to a new electronic health records system during my clinical experience, use of tools such as PolicyStat and SurveyMonkey for data collection and integration into facility policy, data collection using the facility’s previous health records system, and extensive communication through facility email and Microsoft teams to ensure follow-through with guideline appraisal and development.

Domain 9: Professionalism

Cultivation of the professional identity is an important component of DNP education. The DNP educational journey has been shown to enhance students’ professional role development via personal and professional growth through the evolution of students’ views of self, healthcare, and clinical practice because of the curriculum and experiences (Giardino & Hickey, 2020). Through the DNP educational journey, I was able to identify a myriad of personal strengths and weaknesses that helped me to align my personal views, ethics, and expectations with my future goals as a nurse practitioner. I had the opportunity to work with phenomenal providers and

mentors who helped me to better understand my future role and the expectations I would like to set for myself and my future profession. The DNP professional identity is influenced by one's personal identity and unique background and flourishes through engagement and reflection on experiences (AACN, 2021). I have been fortunate throughout this journey to have had the opportunity to focus my final clinical experiences and doctoral project within my original specialty area of interest. These experiences have helped to focus my goals for future professional development. Advanced-level nursing education requires that students demonstrate an ethical comportment reflective of nursing's mission to society, employ a participatory approach to nursing care, demonstrate accountability to the individual, society, and profession, and demonstrate an ethical and professional nursing model for care (AACN, 2021). Participation in my sponsoring facility's nurse practitioner clinical residency program has opened my eyes to how nurse practitioners may professionally and ethically impact the future of the profession, and I look forward to the future opportunity to contribute to this type of program.

Domain 10: Personal, Professional, and Leadership Development

Resiliency, lifelong learning, and responsible use of professional and personal power are characteristics essential to the final AACN domain of the DNP essentials. This domain ascertains that a DNP will demonstrate commitment to personal health and well-being, display flexibility and professional maturity, and exhibit an affinity for nursing leadership. The DNP project experience has provided many opportunities for personal, professional, and leadership growth within my sponsor facility. I have participated in developmental activities as a nursing educator, clinical nurse, and nurse practitioner student throughout my DNP education. As a DNP I will

continue to encourage nursing development through education, quality assurance, and application of evidence-based practices and standards. Flexibility, maturity, and personal grace have been a requirement for the successful completion of this program and will continue to be essential to my future success as a nurse practitioner. Many courses throughout the DNP program have provided students with coping strategies, theoretical leadership models, and means by which to manifest success. These skills and concepts will continue to be influential and prudent throughout my future nurse practitioner career.

Conclusion

The DNP journey through clinical and academic experiences exemplifies the integration and embodiment of the DNP essentials and domains outlined by the AACN. Through rigorous academic preparation and immersive clinical practice, my classmates and I have demonstrated proficiency in leadership, evidence-based practice, quality improvement, and ethical decision-making, among other essential competencies. My commitment to advancing nursing practice and improving patient outcomes reflects a deep understanding of the foundational principles of nursing and a dedication to lifelong learning and professional development. As I embark on my journey as a Doctor of Nursing Practice, I will carry not only the knowledge and skills acquired throughout my education, but also a profound sense of responsibility to lead change, promote health equity, and advocate for the highest standards of care. The reflections provided throughout this paper serve as a testament to the transformative impact of the DNP program in shaping competent, compassionate, and visionary nursing leaders committed to the future of the nursing profession.

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APPENDICES

APPENDIX A

CHAPTER 1 TABLES & FIGURES

Figure A1. PRISMA-ScR

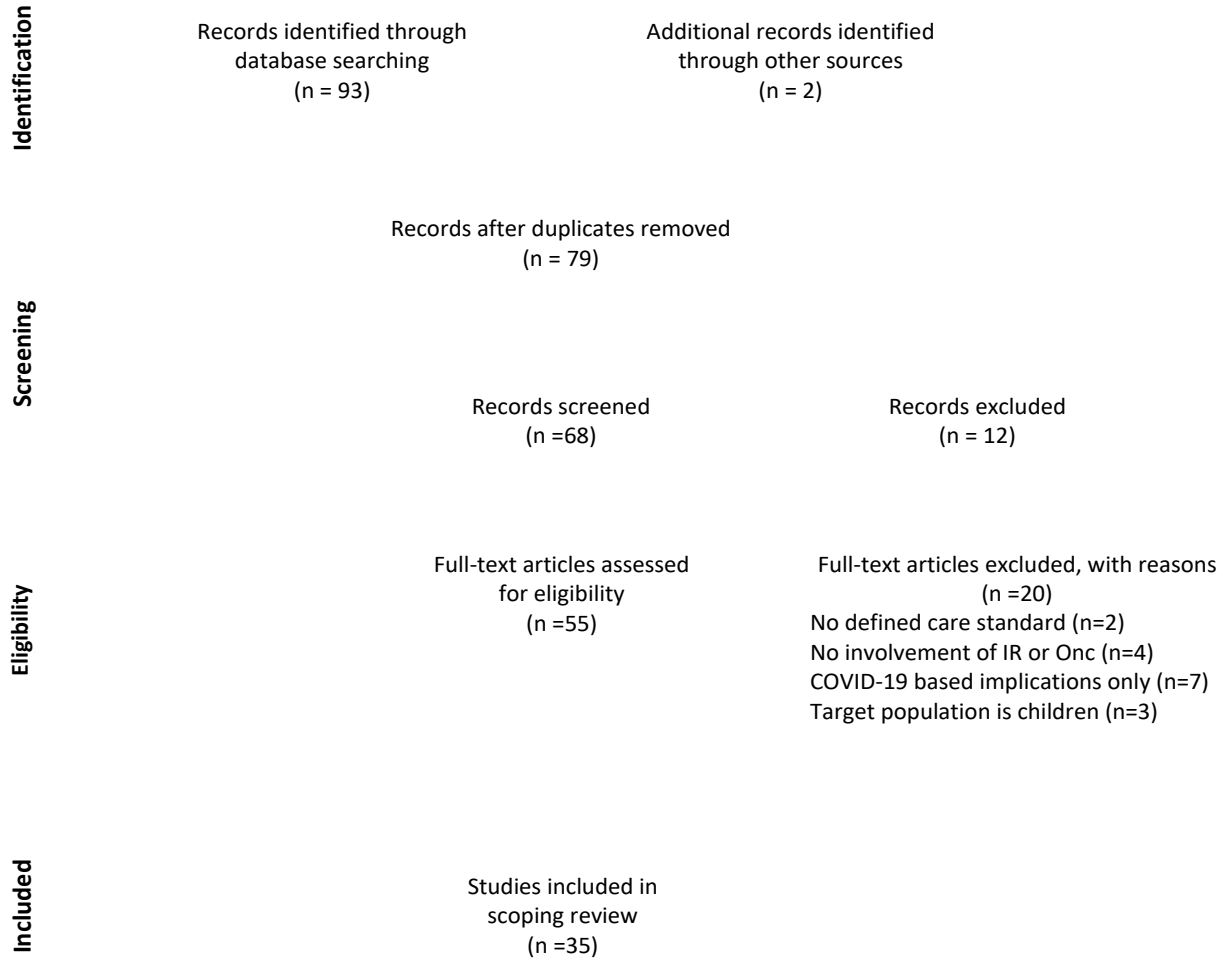


Table A1. Level of Effectiveness Rating Scheme

Level of Evidence	Description
Level 1	Evidence from a systematic review or meta-analysis of all relevant RCTs (randomized controlled trials).
Level 2	Evidence from at least one well-designed RCT (e.g. large multi-site RCT).
Level 3	Evidence from a single well-designed controlled trials without randomization (aka quasi-experimental studies) OR a systematic review of a complete BOE (integrative review of higher and lower evidence) OR mixed methods intervention studies
Level 4	Evidence from well-designed case-control or cohort studies
Level 5	Evidence from systematic reviews of descriptive and qualitative studies (meta-synthesis)
Level 6	Evidence from a single descriptive or qualitative study, EBP, EBQI and QI projects
Level 7	Evidence from the opinion of authorities and/or reports of expert committees, reports from committees of experts and narrative and literature reviews

(Melnyk & Fineout-Overholt, 2023)

Table A2. Framework for IR Procedures in Order of Acuity

Definition	Examples
High priority- Procedures which were postponed, where continued delay beyond what is necessary could lead to harm or poor outcomes for patients	**Non-Vascular:** • Cancer Diagnostic and Therapeutic procedures (biopsies, ablations excluding renal, etc.)# • Thoracentesis/Chest tube for dyspnea • Therapeutic Paracentesis • Gastrostomy/GJ tube placement for nutrition • Joint aspiration for infection* • Percutaneous fluid collection drainage for infection without septic shock* **Vascular:** • Cancer therapy (TACE, TARE, etc.)# • Venous intervention for ulcers in lower extremity • Peripheral Angiogram and intervention for chronic limb threatening ischemia – rest pain or tissue loss • IVC filter placement • Massive iliofemoral DVT without phlegmasia* • Suboptimal function - Fistula/Dialysis access interventions • AAA > 6.5cm • TAA > 6.5cm
Intermediate priority – Procedures which continued delay is likely to cause the patient discomfort or reduced quality of life, however, less likely to portend worse outcomes or injury than high priority cases.	**Non-Vascular:** • Tube change for malfunction or leakage • Removal of tunneled CVC which are no longer needed (not including Ports) • Select renal ablations (e.g., T1a)# • Percutaneous access for nephrolithotomy (in conjunction with Urology) • LP for non-infection/neurologic causes (not including intra-thecal chemotherapy) • Myelography • Interventional Pain procedures like trigger point injections, nerve ablations, joint and facet injections • Bone Augmentation/Vertebroplasty/Kyphoplasty/Sacroplasty*

Table A2. Framework for IR Procedures in Order of Acuity, continued

	Vascular: • Venous Thoracic outlet syndrome intervention for mild symptoms • Endovascular management of asymptomatic peripheral and non-aortic intrabdominal aneurysm# • Chronic mesenteric ischemia interventions • TIPS for Ascites • Uterine fibroid embolization • Pelvic congestion embolization • Prostate artery embolization • Peripheral Angiogram and intervention for claudication • Lower extremity venous interventions for symptomatic spider veins or superficial vein incompetence • Vascular malformations
Low priority- Procedures for which continued delay will likely not lead to significant reduction in quality of life or portend worse outcomes.	**Non-Vascular:** • Thyroid Biopsy (incidental finding) • Botox injections • Cosmetic IR • Fallopian tube recanalization • Routine tube/drain change • Parenchymal liver biopsy for abnormal LFTs • Hysterosalpingogram **Vascular:** • Incidental Vascular anomaly/malformation • IVC Filter removal • Asymptomatic or mildly symptomatic May-Thurner syndrome • Varicose veins, GSV ablations • EVAR - AAA < 6.5 cm • Venous sampling • Port removals for completion of treatment

(Society of Interventional Radiology, 2020)

Figure A2. Interventional Radiology-Procedure Acuity Scale (IR-PAS)

Disease/ Pathology	Tier 1 Postpone Procedure	Tier 2 Postpone procedure if possible	Tier 3 Do not postpone
Fluid collections	Routine tube/drain change	Percutaneous collection drainage for infection without septic shock if the antibiotic trial fails	Percutaneous fluid collection drainage for infection in a patient with septic shock
Biopsies	Thyroid biopsy Liver biopsy for abnormal LFTs	Biopsy for possible cancer diagnosis	Transplant rejection solid organ biopsy
Reproductive tract interventions	Fallopian tube recanalization Hysterosalpingogram Uterine fibroid embolization Prostate artery embolization Pelvic congestion embolization	-	-
Urinary tract interventions	Percutaneous access for nephrolithotomy in conjunction with urology RCC ablation (cryo/RF/microwave)	Nephrostomy tube change for malfunction or leakage	Percutaneous nephrostomy for septic shock
Hepatobiliary interventions	TIPS for ascites	Locoregional therapy for hepatobiliary cancer	Percutaneous cholecystostomy/biliary drain for septic shock
Peripheral artery disease	Peripheral angiogram and interventions for claudication	Peripheral angiogram and intervention for chronic limb-threatening ischemia	Arterial lysis/thrombectomy for acute limb ischemia PAD for Limb ischemia: progressive tissue loss, acute limb ischemia Intravascular management of PAD leading to acute limb ischemia
Arterial aneurysms	Endovascular aneurysm repair for abdominal aneurysm less than 6.5 cm	Endovascular aneurysm repair for abdominal aortic aneurysm more than 6.5 cm and thoracic aortic aneurysm more than 6.5 cm Endovascular management of asymptomatic peripheral and non-aortic intraabdominal aneurysms	Endovascular aneurysm repair/thoracic endovascular aortic repair for symptomatic or ruptured abdominal aortic aneurysm or thoracic aortic aneurysm Endovascular management of symptomatic peripheral and non-aortic intraabdominal aneurysms Endovascular management of pseudoaneurysms
Venous/ Dialysis Access Interventions	Asymptomatic or mildly symptomatic May-Thurner syndrome IVC filter removal Varicose veins Venous sampling Central venous catheter/port removals for completion of treatment	Venous thoracic outlet syndrome intervention for mild symptoms Massive iliofemoral DVT without phlegmasia Venous intervention for ulcers in lower extremity IVC filter placement in low-risk patients Fistula/Dialysis access interventions for suboptimal function Central Venous Catheter or PICC line placement	Fistula/Dialysis access interventions for thrombosis
Bleeding or ischemia			Trauma interventions Pulmonary embolism therapy Stroke Interventions Symptomatic carotid artery stenosis interventions Acute hemorrhage interventions EVAR/TEVAR for dissection with rupture and/or malperfusion Symptomatic acute mesenteric ischemia intervention

(Garg et al., 2021)

Figure A3. Tiered Approach to Cross-Sectional Interventional Procedures

TABLE 1: Tiered Approach to Cross-Sectional Interventional Procedures

Tier	Time Frame	Example
1	Urgent	Cholecystostomy
		Abscess drainage
		Biopsy for lymphoma
2	Perform within 2 wk	Organ biopsy for suspected fast-growing malignancy
3	Perform within 2 mo	Ablation of fast-growing lesions
4	Can be delayed by 2 mo	Biopsy and ablation of slow-growing lesion
		Liver biopsy for staging of fibrosis
5	Can be delayed by 6 mo	Fine-needle aspiration of thyroid nodule

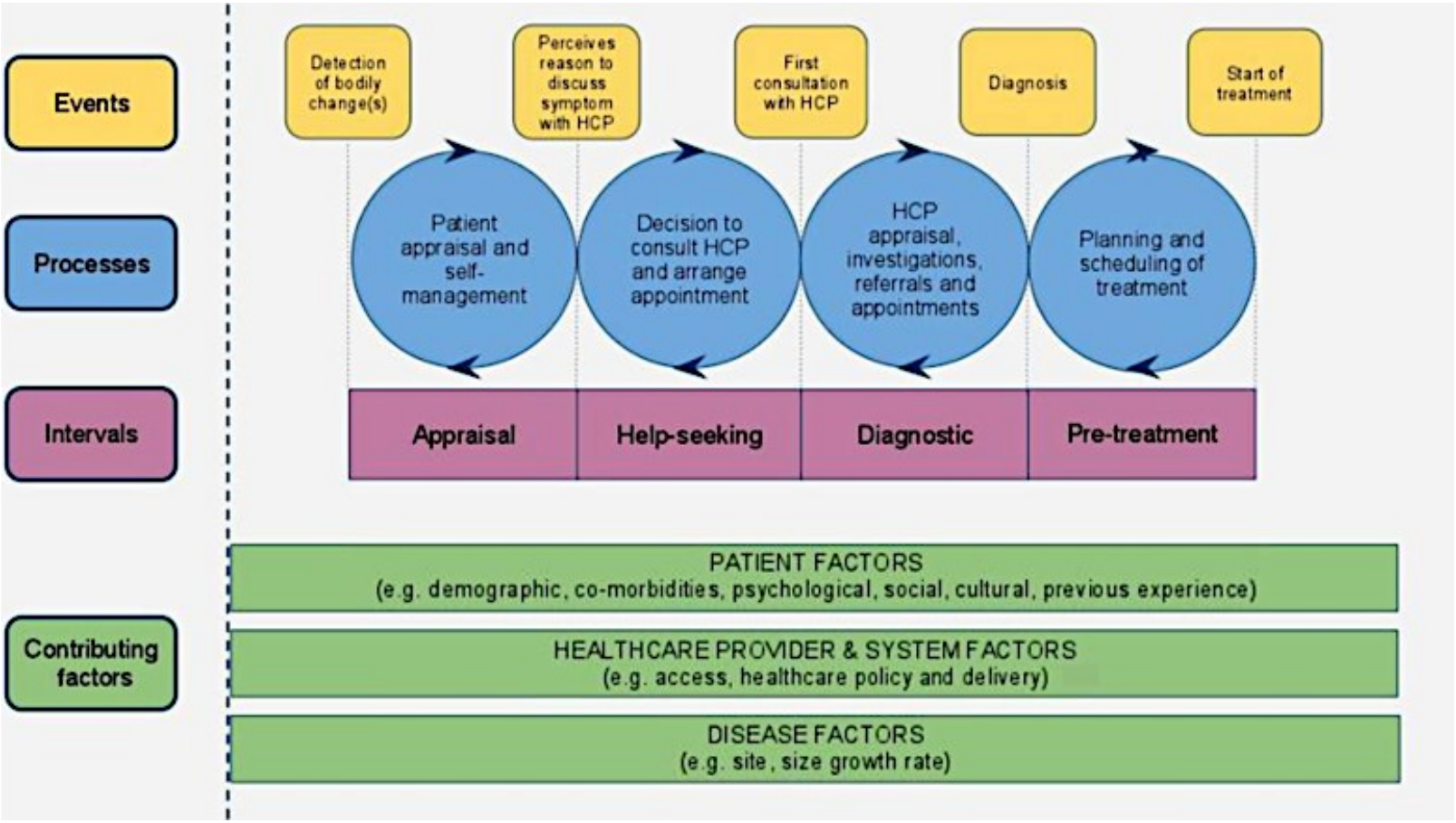
Note—Examples can vary according to clinical scenario.

(Palmer, 2020)

APPENDIX B

CHAPTER 2 TABLES & FIGURES

Figure B1. The Andersen Model of Total Patient Delay



(Walter et al., 2021)

Figure B2. IR Biopsy Current State Swim Lane

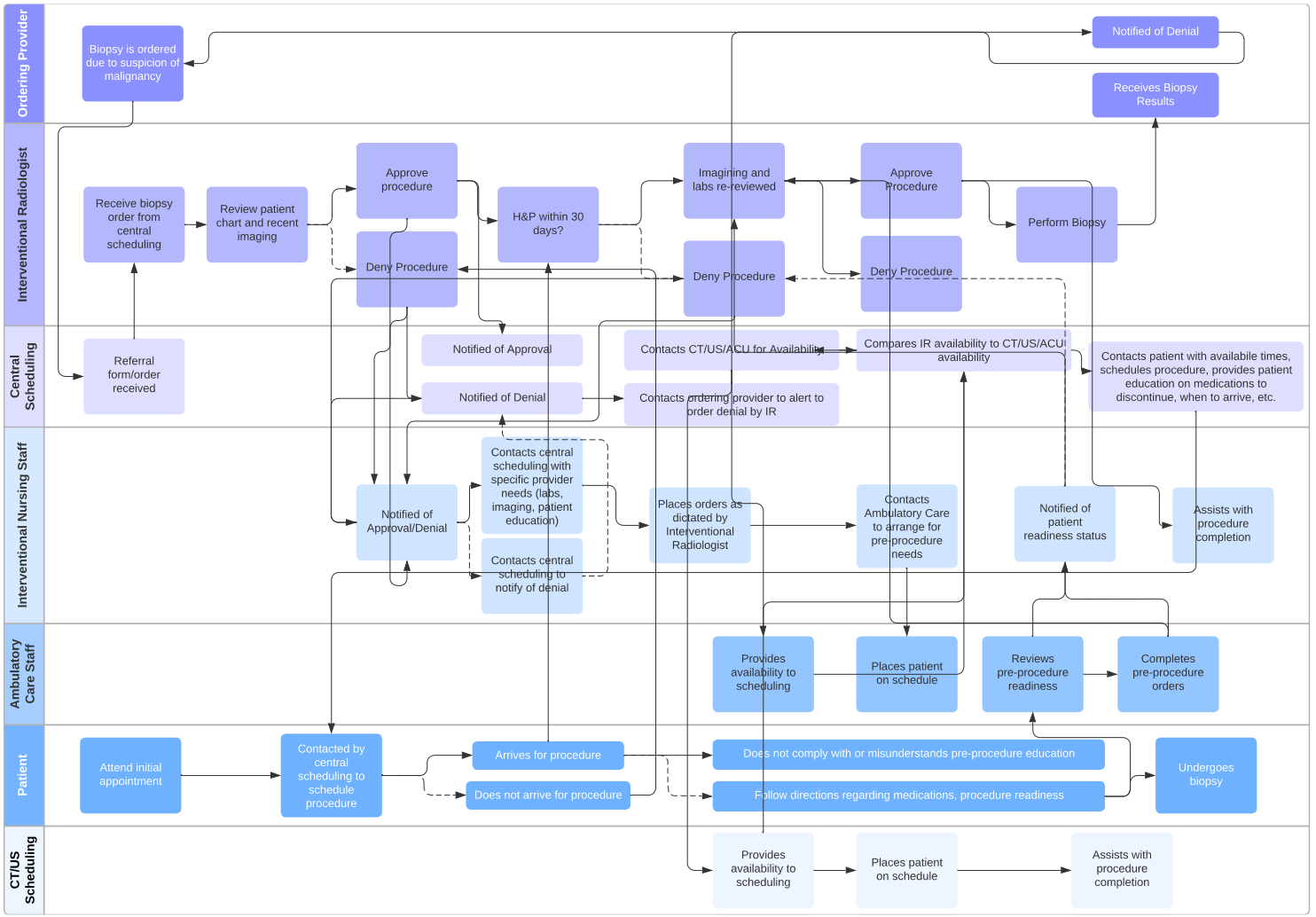
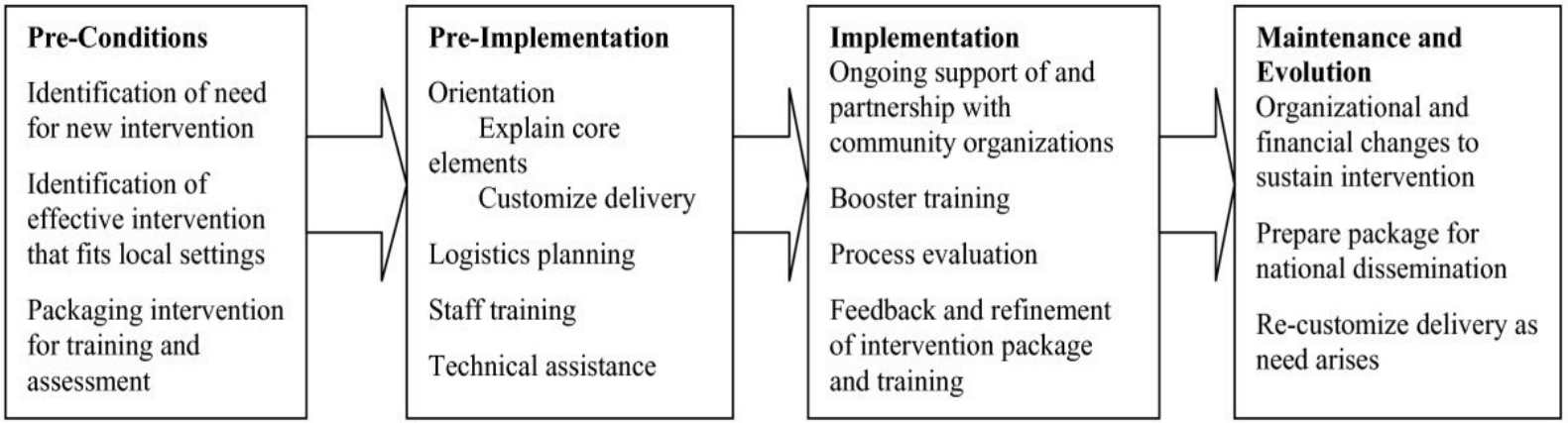


Figure B3. Replicating Effective Programs Implementation Framework



(Kilbourne et al., 2019)

Figure B4. Quality Improvement Project Logic Model

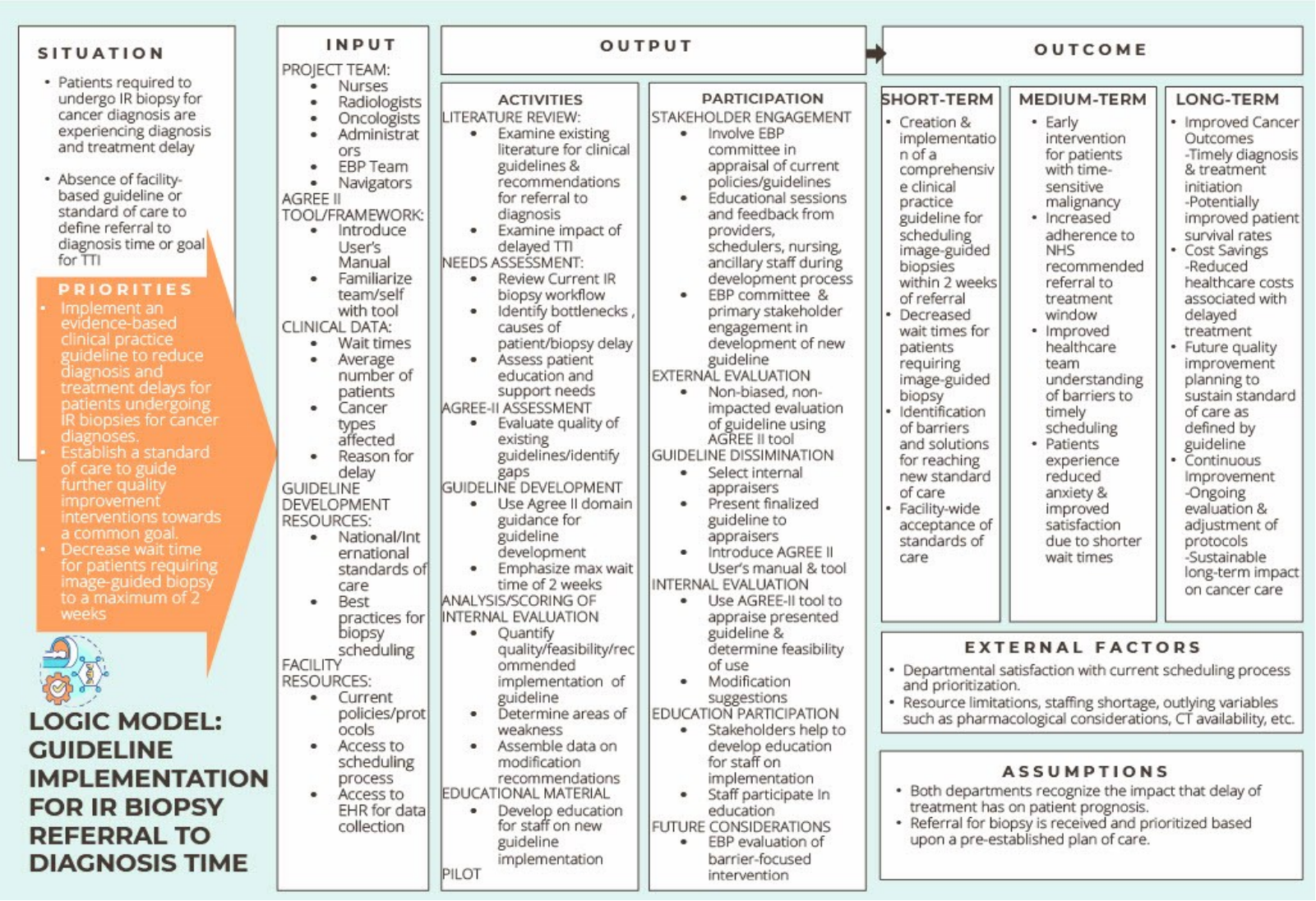


Figure B5. Quality Improvement Project Timeline