**Title (should be congruent with the problem/strategy)**

Your Names:

Student number: ……….

Quality Improvement Project Report

VMHC300

Department of Nursing Science

Of the

FACULTY OF HEALTH SCIENCES

at the

NELSON MANDELA UNIVERSITY

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October 2024

**ABSTRACT**

# DECLARATION

We, the undersigned hereby declare that the attached document, namely …………………………………………… (Title), dated…………………..is composed of our work, and when other authors have been consulted, we have paraphrased and referenced accordingly. This document contains no breach of copyright.

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Signed this……………day of…………………… at the Nelson Mandela University.

Table of Contents

ABSTRACT 1

[DECLARATION 1](#_Toc177036667)

[1.CLARIFICATION OF CONCEPTS 3](#_Toc177036668)

[2.INTRODUCTION 3](#_Toc177036669)

[3.QUALITY STANDARD(S) APPLICABLE TO REPORT / PROJECT 4](#_Toc177036670)

[4.THE PROBLEM NOTED 6](#_Toc177036671)

[5.MANAGEMENT STRATEGY 8](#_Toc177036672)

[5.1THE AIM (GOAL) OF THE PROJECT 8](#_Toc177036673)

[5.2 DECISION-MAKING CRITERIA 9](#_Toc177036674)

[5.3 POSSIBLE SOLUTIONS AND OPTIONS 10](#_Toc177036675)

[5.4 SELECTION OF THE BEST SOLUTION 13](#_Toc177036676)

[5.5 PRE-IMPLEMENTATION OF THE SOLUTION 13](#_Toc177036677)

[5.6 IMPLEMENTATION OF THE SOLUTION 14](#_Toc177036678)

[5.7 EVALUATION 14](#_Toc177036679)

[6.IMPACT 14](#_Toc177036680)

[7.CONCLUSION 15](#_Toc177036681)

[References 16](#_Toc177036682)

# 1.CLARIFICATION OF CONCEPTS

**Clinical Decision Support System (CDSS):** A combination of Health and Information Technology which provides practitioners with knowledge and patient-specific information. It is used to make more accurate clinical decisions and improve patient safety (Margaret Rouse, 2016).

**Computerized provider order entry (CPOE):** Application that allows health care providers to enter medical orders electronically. This includes sending treatment instructions and laboratory orders (Megan Charles, 2018).

**Human-Computer Interaction (HCI):** HCI is the design and improvement of interaction between computers and humans. It allows computers to be more user-friendly and efficient. It is crucial when considering the design of software involving decision-making with an easy-to-use framework. This will help improve usability in carrying out healthcare processes (Daniel Chandler & Rod Munday, 2011).

**Oncology:** The study and treatment of cancer which includes the various forms of therapy and procedures used to treat cancer (National Cancer Institute, 2011).

**Evidence-Based Medicine (EBM):** This is the usage of clinical experience and data to improve healthcare decisions. The evidence is then used and applied to evaluate the performance during clinical practice (Tenny & Varacallo, 2022).

For the QIP project, we will be looking at implementing CDSS within the hospital. Our focus would be catered towards critical decision-making when diagnosing and treating cancer patients. We will also look at how CDSS helps improve patient safety when delivering effective oncology care and how it will improve the overall quality when used in hospitals. Management of the risk in late cancer diagnosis will also be evaluated when compared to having the CDSS in place.

# 2.INTRODUCTION

Cancer misdiagnosis may occur at any stage during the cancer misdiagnosis process. Human error, such as a doctor’s negligence or incompetence when deciding which kinds of cancer tests would be needed, can result in cancer misdiagnosis. Misdiagnosis of cancer may occur during the testing process, such as errors in performing diagnostic imaging or poor cell sample collection for a biopsy.

Our topic is about designing a clinical decision support system (CDSS) directed towards cancer patients, with adherence to Evidence-Based Medicine guidelines. According to (Dotson, 2015), Evidence-Based Medicine is the conscientious, explicit, and judicious use of current best evidence in making decisions about the care of individual patients. The main objective of this system is to provide concrete medical information and aid in the diagnosis of cancer patients, in other words, improving the quality of care they receive.

The following aspects are discussed in the report below, quality standards applicable to the project, identification of the problem including factors that contribute to the problem, and clarification of the most important concepts. By addressing these aspects comprehensively, the purpose of this report is to provide a thorough overview and understanding, planning, and execution of a CDSS tailored for cancer patients, thereby improving patient care and clinical outcomes in oncology practice.

# 3.QUALITY STANDARD(S) APPLICABLE TO REPORT / PROJECT

Quality standards serve as vital frameworks in ensuring consistency, adherence to best practices, and international compatibility across various fields (Jerry, 2020). The goals of cancer diagnosis and treatment programs are to provide the highest quality of life for cancer survivors while also trying to cure or significantly prolong the lives of patients (Organization, 2024). As we embark on the implementation of the Clinical Decision Support System (CDSS) tailored for cancer care, it's essential to uphold these standards. In this section, we will focus on several standards that nurses must adhere to when treating and diagnosing cancer.

National Cancer Control Program (NCCP)

The National Cancer Control Program (NCCP) is a comprehensive framework developed by the government to address the prevention, early detection, diagnosis, treatment, and palliative care of cancer within a country (Agency, 2023). It typically includes strategic plans, policies, and initiatives aimed at reducing the burden of cancer and improving outcomes for patients (Programme, 2023). In practice, the NCCP defines fundamental goals and priorities for cancer control, including but not limited to advocating for healthy lifestyles to prevent cancer, putting screening programs into place for early detection, guaranteeing access to high-quality medical care and supportive services, and strengthening research and surveillance initiatives to track cancer patterns. (Technicians, 2024). Overall, the NCCP serves as a guiding framework to ensure a coordinated and comprehensive approach to cancer control, with the goal to reduce the incidence and mortality of cancer, to improve the quality of life for cancer patients and survivors, and to mitigate the social and economic impact of the disease on individuals and society.

South African Nursing Council (SANC) Guidelines:

The South African Nursing Council (SANC) guidelines provide a framework for nurses delivering cancer care, ensuring high standards of practice and patient-centred care (Council S. A., 2020). Nurses specializing in oncology undergo specialized education and training, adhering to the scope of practice outlined by SANC (Staff, 2023). They uphold ethical principles in their interactions with cancer patients, respecting autonomy and promoting informed decision-making (Mary Johnson, 2024). Continuous professional development is encouraged to keep nurses updated on advancements in cancer care (DAVIDS, 2006). Collaborative teamwork with healthcare professionals ensures holistic and coordinated care throughout the cancer journey, ultimately contributing to improved outcomes for patients across South Africa (Council, 2024).

Evidence-Based Practice (EBP) Guidelines

Evidence-Based Practice (EBP) Guidelines serve as essential tools in nursing practice, integrating research evidence with clinical expertise and patient preferences to inform decision-making. Nurses evaluate and integrate research findings into their practice, tailoring care plans to meet individual patient needs (Dr. Tiffany Avery, 2020). Implementation of EBP guidelines involves adopting standardized protocols and interventions, with ongoing monitoring of patient outcomes to ensure effectiveness (Victoria, 2021). Healthcare organizations and professional bodies are responsible for developing and disseminating EBP guidelines, while nurses are expected to stay updated on current recommendations relevant to their practice (Randa Elsheikh, 2023). Ultimately, EBP guidelines contribute to improved quality and safety in patient care by ensuring that interventions are based on the best available evidence (Town, 2022).

|  |  |  |
| --- | --- | --- |
| **South African Cancer Control Timeline Summarized** | | |
| **Year** | **Event** | **Outcome** |
| 1986 | Pathology Based National Cancer Registry established | Pathology Based National Cancer Registry established. |
| 1991 | South African Bone Marrow Registry (SABMR) established | 65,000 South African donors registered; access to 20 million global donors. |
| 1993 | Tobacco Control Act 83 of 1993 | South Africa first country to regulate tobacco use and sales. SA joins WHO Tobacco Convention in 2005 |
| 1998 | First National Cancer Control Plan (NCCP) developed and approved | Cervical Cancer Policy implemented with national screening guidelines. |
| 2011 | CANCER ALLIANCE established. | Calls to update NCCP; NDoH calls for unified cancer community consultation. |
| 2016 | Consultative meetings on Breast Health Policy held. | Commitment for policy finalization by March 2016, but no further developments. |

*Figure 1: to see the full source timeline visit the web document ( SOUTH-AFRICAN-CANCER-CONTROL-ROADMAP, 2019)*

# 4.THE PROBLEM NOTED

The current problem in the field of Oncology

Currently, the problems that health practitioners face within the oncology wards mainly have to do with the late detection of cancer which leads to complications of treatment. Long-term it can lead to hospital admissions, about 13,9%-21.8% of patients are diagnosed with cancer during emergency admissions (Michael Yule et al., 2017).

**4.1 Problem**: Delay in diagnosing cancer in a patient.

**Nature of the problem**: The problem involves a delay in the diagnosis of cancer because patient’s poor background and lack of income from home that led to be unable to afford medicals and chemotherapy for patient, which can lead to delayed initiation of treatment and potentially worsen patient outcomes. Delays can occur at various stages, including the recognition of symptoms by the patient or health practitioner, referral to specialists, and completion of diagnostic tests.

**Extent and intensity** of **the problem**: A delay in diagnosing cancer can have a significant impact on patient health and well-being. It can lead to the progression of the disease, a need for more aggressive treatment, and a lower chance of survival. (Neal, 2015) The problem affects not only the patient but also their family and caregivers. For example, a delayed cancer diagnosis can be exemplified by colorectal cancer. A study published in the British Journal of Cancer found that delays in diagnosing colorectal cancer significantly affected survival rates. Those who received their diagnosis over a year after their symptoms first showed, had a poorer prognosis compared to those identified within three months. More specifically, the five-year survival rate dropped from 85% for patients diagnosed within three months to around 40% for patients diagnosed a year later. (Neal, 2015)

**Factors/variables contributing to the problem**:

* **Healthcare environment**: Lack of access to diagnostic tools or specialized healthcare services, long waiting times for appointments or test results. (O’Malley, 2005) discovered that unequal distribution of diagnostic equipment and rare health care services has inadequate effects on the diagnosis and treatment of cancer individuals. The study also emphasized that patients from rural setting or those coming from the low-income bracket also spend a lot of time due to health facility related reasons as they—lacking diagnostic centres and specialist.
* **Human resources**: Inadequate training or awareness among healthcare providers regarding cancer symptoms, diagnostic guidelines, or communication with patients.
* **Patient factors**: Lack of awareness about cancer symptoms, fear or stigma associated with cancer, reluctance to seek medical attention.

**4.2 Root Cause Analysis:**

1. **Identify the problem**: Delay in diagnosing cancer in a patient.
2. **Identify Causal Factors**: Determine the underlying causes of delays, such as healthcare system issues, patient-related factors, or healthcare provider-related factors.
3. **Healthcare System Issues:**

* Analyze scheduling and referral processes to identify bottlenecks.
* Evaluate the availability and capacity of diagnostic facilities and personnel.

1. **Patient-Related Factors:**

* Conduct surveys and focus groups to understand patient knowledge, attitudes, and behaviours regarding symptom reporting and healthcare utilization.
* Assess socioeconomic barriers such as transportation, insurance coverage, and access to primary care.
* Evaluation of medical institution documents regarding scheduling and timing of appointments and tests.
* Having interviews and distributing questionnaires to patients, healthcare providers, and administrators.
* Statistical examination of patient results linked to timing of diagnosis.

**4.3 Develop Solutions**: To address the root causes, such as implementing screening programs, improving access to healthcare services, or enhancing patient education and awareness. Our main purpose is to create mobile application that will help the doctors diagnose the patient to show which symptoms a patient have about the cancer.

**4.4 Implement Solutions**: Implement the proposed solutions and monitor their effectiveness.

**4.5 Evaluate Outcomes:** Assess the impact of the solutions on reducing delays in diagnosing cancer. (Brown & Johnson, 2022)

# 5.MANAGEMENT STRATEGY

# 5.1THE AIM (GOAL) OF THE PROJECT

In response to the pressing issue of delayed cancer diagnosis and its detrimental impact on patient outcomes, this project aims to implement a Clinical Decision Support System (CDSS). Cancer misdiagnosis, which frequently results from human error and inefficiencies in the diagnostic procedure, can seriously jeopardize patient health and well-being (Hall et al.). By utilizing technology and evidence-based methods, this project seeks to address these challenges to enhance the timeliness and accuracy of cancer detection.

USING SMART PRINCIPLES

* **SPECIFIC:** The project’s specific objective is to reduce the average time from symptom onset to diagnosis of cancer by 20% within the next 12 months.
* **MEASURABLE:** The project’s success will be measured by tracking the average time taken between the onset of symptoms and diagnosis, both before and after the CDSS was implemented. Through data analysis, the 20% reduction target will be monitored monthly.
* **ACHIEVABLE:** The objective can be achieved through the implementation of a CDSS, specifically designed for cancer patients, which will streamline the diagnostic procedure, provide healthcare professionals with evidence-based decision support, and facilitate timely referrals and intervals.
* **REALISTIC:** Given the potential benefits of CDSS in improving diagnostic efficiency and patient outcomes, achieving a 20% reduction in the average time to diagnosis is a reasonable and feasible project target.
* **TIMELY:** The project timeline spans 12 months, beginning in July 2025, beginning in July 2025, providing ample time for the implementation and evaluation of the CDSS. Ongoing evaluations and adjustments will ensure timely achievement of the goal.

# 5.2 DECISION-MAKING CRITERIA

The option chosen takes into consideration mainly the practical feasibility and the impact it would have on quality management. The system will match symptoms and bring patient awareness. This will potentially prompt earlier medical consultation or intervention. People are diagnosed late because they are unaware which type of cancer they have. With this application, it will help both patients and doctors see the potential symptoms for the cancer that a patient has.

Table : Decision Matrix - Delay in cancer diagnosis

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Decision Matrix: Delay in cancer diagnosis** | | | | | |
| Criteria | Practical  Feasibility  3 | User-Friendliness  2 | Impact on Quality Management  5 | Data Security and privacy  4 |  |
| Problems |
| Worsening symptoms | 3 x 3 = 9 | 2 x 2 = 4 | 3 x 5 = 15 | 2 x 4 = 8 | 36 |
| Extended pain and suffering | Medium –  Real-time updates and monitoring of patient conditions  2 x 3= 6 | 1 x 2 = 2 | 2 = 5 = 10 | 1 x 4 = 4 | 22 |
| Emotional suffering | 2 x 3 = 6 | 2 x 2 = 4 | 3 x 5 = 15 | 3 x 4 = 12 | 37 |
| Increased mortality risk | 3 x 3 = 9 | 3 x 2 = 6 | 3 x 5 = 15 | 1 x 4 = 4 | 34 |

**Method 1**: Rating scale for the criteria

1, 2, 3, 4, 5 (1 = low to 5 = great)

**Method 2**: Rating scale for the problem

1, 2, 3 (1 = low, 2 = medium, 3 = high)

For the table above it was found that emotional suffering scored the highest. Therefore, when designing the system, it would be best to take into consideration how this would be solved.

# 5.3 POSSIBLE SOLUTIONS AND OPTIONS

To address time constraints when diagnosing patients who are unfamiliar with cancer treatment, the solutions proposed will improve upon the existing diagnostic process.

By keeping medical practitioners especially nurses, informed on current developments in cancer research, a CDSS will help bring a better understanding of all possible cancer symptoms. It also helps deal with the possibility of patient errors in terms of providing the symptoms that they have noticed themselves. A misinterpretation of symptoms, improperly conducted tests and failure to offer cancer screenings are some of the most common causes of cancer misdiagnosis (Wilson, 2018).

5.1 Solutions to the problem of late or misdiagnoses of cancer in patients: (These will all make use of the CDSS system)

1. Having an alert system to notify health practitioners if their patient matches key cancer symptoms or prompt a specialist to review the symptoms.
2. Allow specific information to be displayed about the diagnosis, treatment, and long-term side effects. This will help develop a plan moving forward so that a constructed decision is made with evidence-based recommendations.
3. Have a prompt that helps make recommendations for initial testing based on the symptoms of the patient, while considering their medical history.
4. Electronic health record (EHR) system that updates in real-time for better communication and tracks each patient. It would also alert and notify the severity of a patient's current condition when arriving at the hospital, this allows management to delegate who is best suited to care for the patient now.
5. Have the CDSS notify healthcare providers when the symptom of a patient worsens or if they show more symptoms related to cancer, allowing a more effective way to prevent the condition from worsening

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Member 1: Max Naidoo** | | | | | |
| **Decision-making criteria** | **Option 1:** **Notify symptom matches** | **Option 2: Inform/educate on cancer** | **Option 3: Prompt for additional testing** | **Option 4: EHR for patient condition** | **Option 5: Symptom severity tracking** |
| Feasible | 7 | 6 | 10 | 5 | 8 |
| Cost-effective/ affordable | 4 | 8 | 5 | 4 | 4 |
| Enhances quality management | 8 | 5 | 7 | 6 | 8 |
| Aligned with the institution’s values | 9 | 7 | 6 | 8 | 7 |
| **Total score per option for group member 1** | **28** | **26** | **28** | **23** | **27** |
| **Member 2: Nkanini Avela** | | | | | |
| Feasible | 8 | 7 | 7 | 6 | 9 |
| Cost-effective/ affordable | 6 | 6 | 4 | 3 | 4 |
| Enhances quality management | 7 | 3 | 8 | 7 | 9 |
| Aligned with the institution’s values | 8 | 9 | 5 | 7 | 7 |
| **Total score per option for group member 2** | **29** | **25** | **24** | **23** | **29** |
| **Member 3: Sanele Zolwana** | | | | | |
| Feasible | 9 | 5 | 8 | 6 | 8 |
| Cost-effective/ affordable | 6 | 7 | 4 | 4 | 5 |
| Enhances quality management | 10 | 6 | 6 | 8 | 7 |
| Aligned with the institution’s values | 9 | 6 | 8 | 7 | 7 |
| **Total score per option for group member 3** | **34** | **24** | **26** | **25** | **27** |
| **Member 4: Yandisa Zide** | | | | | |
| Feasible | 5 | 6 | 10 | 7 | 7 |
| Cost-effective/ affordable | 4 | 7 | 6 | 3 | 4 |
| Enhances quality management | 7 | 5 | 7 | 6 | 7 |
| Aligned with the institution’s values | 8 | 7 | 6 | 7 | 7 |
| **Total score per option for group member 4** | **24** | **25** | **29** | **23** | **25** |
| **Member 5: Nxam Asemahle** | | | | | |
| Feasible | 8 | 6 | 9 | 5 | 8 |
| Cost-effective/ affordable | 5 | 8 | 4 | 4 | 5 |
| Enhances quality management | 8 | 7 | 8 | 7 | 8 |
| Aligned with the institution’s values | 9 | 8 | 7 | 7 | 7 |
| **Total score per option for group member 5** | **30** | **29** | **28** | **23** | **28** |
| **TOTAL GROUP SCORE EACH OPTION** | **145** | **129** | **135** | **117** | **136** |

# 5.4 SELECTION OF THE BEST SOLUTION

Implementing an alert system to notify health practitioners if their patient matches key cancer symptoms will significantly streamline the work of practitioners by reducing the need for extensive testing to diagnose cancer. This system allows patients to undergo initial screenings, and if cancer is detected, it can recommend appropriate treatment methods or prompt a specialist to review the symptoms. As a result, healthcare providers can quickly identify and address potential cancer cases, enhancing the efficiency of the diagnostic process (Chieh-Liang Wu, 2021).

Furthermore, an alert system minimizes the chances of medical errors by producing clear, accurate, and legible information. This ensures that patients receive timely treatment, as practitioners will be promptly notified if a patient shows signs of cancer, enabling early intervention before the disease progresses. Additionally, this system improves the overall quality of care, reducing the likelihood of complaints related to diagnostic errors or delays, and fostering a more efficient and patient-centred approach in the organization (Chieh-Liang Wu, 2021).

# PRE-IMPLEMENTATION OF THE SOLUTION

In this pre-implementation section, we outline the purpose and functionality of the app, designed to help patients self-diagnose by analysing symptoms and providing the highest probability of potential cancer types. Based on the symptoms entered, the app recommends possible solutions or treatment methods, assisting patients concerned about their health risks, particularly those seeking early cancer detection. Key features include symptom input, cancer probability results, treatment recommendations, and the ability to schedule appointments with specialists.

The user journey begins with a welcoming screen that offers a brief introduction to the app. After clicking "Next," users are directed to the login screen, where they can log in or create a new account. Upon successful login or signup, they are taken to a phone number verification page. Collecting details like phone number, email, and username is essential for securing accounts, enabling password recovery, and ensuring personalized communication, which builds trust and enhances security.

Once verified, users reach the home page, the central hub for all services. Here, they can select options such as diagnosis, results, treatment recommendations, specialists, and scheduling. The page also features a calendar displaying upcoming appointments, allowing users to effortlessly manage their healthcare activities.

The diagnosis screen enables practitioners to select symptoms and then proceed through detailed questions, including yes/no answers, symptom timelines, and a pain intensity scale. This step-by-step process ensures a thorough collection of information, which is confirmed by the user to support accurate diagnosis.

The result screen displays cancer probabilities through visually appealing graphs showing percentages. A "Recommendation" button leads users to further options, including nearby specialists and detailed, graphically presented testing methods. Users can then navigate to the specialist screen, which provides information on specialist roles, contact details, and availability. Finally, the scheduling screen allows users to book appointments with specialists directly, helping them take actionable steps based on their diagnosis results.

A questionnaire (Annexure A) was also made for gathering more information on whether practitioners have made use of a similar system before in their career. The questionnaire can be answered in the format of an interview, or after the practitioner has made use of our implementation.

The questionnaire can also be used as a form of feedback on the implementation. This will determine whether it can be seen as an effective method to support those in practise of oncology, or if such a system would have more downsides when being implemented. The main goal is to receive constructive feedback from those who have made use of our implementation. As well as interview those in the field of oncology where possible.

# IMPLEMENTATION OF THE SOLUTION

# EVALUATION

# 6.IMPACT

## Nursing Management

## Nursing Care

## Patient Outcomes

# 7.CONCLUSION

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# Annexure A

# General Information:

## Interviewer Details

Full Name:

Age:

Gender:

Occupation:

## Interviewee Details

Full Name:

Age:

Gender:

Occupation:

Years of Experience:

Date of Interview:

The following table is with the regards on the Interviewee’s opinion on implementing the CDSS.

## Check the box if you agree or disagree

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Statement | Strongly Agree | Agree | Neutral | Disagree | Strongly Disagree |
| I have experience with using multiple CDSS in my practice. |  |  |  |  |  |
| Using a CDSS would help deliver quality care. |  |  |  |  |  |
| Implementing a CDSS would be easy. |  |  |  |  |  |
| A CDSS would positively impact the decision-making process. |  |  |  |  |  |
| The CDSS will be helpful when engaging with patients’ treatment plans. |  |  |  |  |  |
|  |  |  |  |  |  |

The table above will be marked after the discussion of using a Clinical Decision Support System (CDSS). The interviewee will also be assessed on their knowledge of such a system, and whether they have made use of it or a similar system in practice.

# General Questions

1. Do you have any concerns about the implementation of this new system?
2. How often do you engage with patients from the Oncology ward?
3. Do you think there would be a steep learning curve when introducing this new system?
4. Would you recommend the CDSS to your colleagues?
5. What are the risks you are concerned about?
6. Do you think this could be applied to more than just the oncology sector?

# Interview concluded. Thank you for your time!

**Signatures of interviewer and Interviewee**

Names: