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# **Gordon Institute of Business Science**

University of Pretoria

**An evaluation of knowledge translation in the South African primary healthcare  
setting**

**Marcelle Myburgh**

**02583046**

A research project submitted to the Gordon Institute of Business Science, University of Pretoria, in partial fulfilment of the requirements for the degree of Master of Business Administration.

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## **ABSTRACT**

Knowledge translation describes the process of getting knowledge into practice, leading to a healthy workforce and economy. Knowledge translation is particularly challenging at the primary healthcare level, which manifests as a research to practice gap.

This research aimed to explore and describe knowledge translation from both a knowledge translation organisation's and knowledge user's point of view at the South African primary healthcare level. A qualitative dominant, mixed methods approach was used. Twelve semi-structured interviews were conducted with nine organisations to evaluate their knowledge translation strategies. An online survey collected responses from primary healthcare workers to assess their knowledge needs and preferences. Lastly, the Thinking Processes of Theory of Constraints were applied to the public sector to identify ways in which knowledge translation can be optimised within the Department of Health system.

This research found that the organisations' strategies were inextricably linked to the knowledge translation context. Barriers to knowledge translation in the public and private sector as well as urban and rural areas differed in many respects. Organisations were successful in overcoming many of these barriers, but barriers that reside at the Department of Health (DOH) policy level, remain difficult to address.

The 82 survey respondents were mostly doctors from the urban private sector. They represented a distinct subset of practitioners who preferred using the internet to access knowledge and identified no significant barriers to staying up to date.

The Thinking Processes identified possible solutions to getting new DOH guidelines into practice in a fast, reliable and coordinated manner. This requires increased collaboration between knowledge translation organisations and the DOH as well as the design of a system for updating the DOH guidelines on an annual basis.

## **KEYWORDS**

Knowledge translation

Theory of Constraints

Thinking Processes

Primary healthcare workers

## **DECLARATION**

I declare that this research proposal is my own work. It is submitted in partial fulfilment of the requirements for the degree of Master of Business Administration at the Gordon Institute of Business Science, University of Pretoria. It has not been submitted before for any degree or examination in any other University. I further declare that I have obtained the necessary authorisation and consent to carry out this research.

Marcelle Myburgh

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## LIST OF ABBREVIATIONS

ART	Antiretroviral treatment
ARV	Antiretroviral
CCC	Core conflict cloud
CIHR	Canadian Institutes of Health Research
CLR	Categories of legitimate reservation
CoP	Community of Practice
CPD	Continuing Professional Development
CRT	Current reality tree
CSF	Critical success factors
CTSA	Clinical and Translational Science Award
DHIS	District health information system
DIKW	Data-information-knowledge-wisdom
DOH	Department of Health
EC	Evaporating cloud
FRT	Future reality tree
GDP	Gross Domestic Product
GP	General practitioner
HCW	Healthcare workers
HIV	Human immunodeficiency virus
IMCI	Integrated Management of Childhood Illness
IO	Intermediate objectives
IOM	Institute of Medicine
KT	Knowledge translation
MDR	Multidrug resistant
NC	Necessary conditions
NGO	Non-government organisation
NHRC	National Health Research Committee
NIMART	Nurse initiated management of antiretroviral therapy
PALSA PLUS	Practical approach to lung health and HIV/AIDS in South Africa
PCR	Polymerase chain reaction
PEPFAR	President's Emergency Plan For AIDS Relief
PMTCT	Prevention of Mother-to-Child Transmission
PRT	Prerequisite tree
RTC	Regional training centre
SA	South Africa
SECI	Socialisation, externalisation, combination and internalisation
TB	Tuberculosis
TOC	Theory of Constraints
TP	Thinking processes
TT	Transition tree
UDE	Undesirable effects
UK	United Kingdom
US	United States
WHO	World Health Organization



## **CHAPTER 1: INTRODUCTION TO THE RESEARCH PROBLEM**

### **1.1. Introduction**

This research project focuses on the healthcare industry. It assesses the flow of new knowledge as a result of research from the source, to the healthcare practitioner and ultimately to the patient.

The healthcare industry is a knowledge-based community (Bose, 2003). The continuous release of new medical research evidence makes lifelong learning by healthcare workers (HCW) essential in order to keep their knowledge and skills up to date (Vermaak, Reid, & Horwood, 2009).

It is important that the time it takes for new knowledge to find its way to the patient is as quick as possible, to enable society to reap the maximum benefit of this knowledge (Nicolini, Powell, Conville, & Martinez-Solano, 2008).

### **1.2. The research problem**

The failure to translate knowledge from research into practice is present worldwide at all levels of care in both developed and developing countries (Grol, 2001). The World Health Organization (WHO) described closing the research to practice gap as one of the main concerns currently facing public health (World Health Organization, 2005a).

When healthcare systems do not use the available research knowledge optimally, it leads to increased healthcare costs and wasted resources as well as a reduced quality of life for patients with increased morbidity and mortality (Buchan, 2004; Chassin & Galvin, 1998; Drolet & Lorenzi, 2011; Grimshaw, Eccles, Lavis, Hill, & Squires, 2012; Straus, Tetroe, & Graham, 2011). When the best available evidence is used for patient management, it leads to a healthy workforce, which in turn benefits the local economy whilst attracting foreign investment (Department of Health, 2011). This point is best illustrated in South Africa by the introduction of antiretroviral treatment (ART) which has increased the population's life expectancy from 49.2 years in 2003 to 60.5 years in 2011 (Bor, Herbst, Newell, & Bärnighausen, 2013).

Although progress has been made in better meeting the information needs of healthcare workers in research and tertiary level environments, little progress has been made in better meeting the information needs of healthcare workers at the

primary and district level (Bailey & Pang, 2004; Cuellar-Montoya, Maldonado, & Moncayo, 2004; Godlee, Pakenham-Walsh, Ncayiyana, Cohen, & Packer, 2004).

Knowledge translation is a term that describes getting knowledge into practice and consists of three parts: synthesis, dissemination and exchange (Canadian Institutes of Health Research, n.d.). Recognising the failure to translate research into practice has led to increased awareness of the importance of active dissemination and implementation knowledge translation strategies (Grimshaw *et al.*, 2001; Ward, House, & Hamer, 2009a). In translating knowledge from research into action, three knowledge translation blocks, T1, T2 and T3 have been described (Drolet & Lorenzi, 2011). The T3 knowledge translation block specifically describes the gap between research that has proven clinical benefit and the application of that benefit in practice (Drolet & Lorenzi, 2011). Many models and frameworks exist to describe knowledge translation, of which Graham *et al.* (2006) knowledge to action cycle model is one of the most widely used in the literature (Straus, Tetroe, & Graham, 2013). This model divides knowledge translation into two processes: knowledge creation and the action cycle which represents putting knowledge into action (Graham *et al.*, 2006).

The success of a knowledge translation strategy depends largely on adapting it to the specific context where it will be used and it needs to take into account the specific audience receiving the knowledge as well as the barriers and facilitators for the application of the knowledge in that context (Santesso & Tugwell, 2006; Straus *et al.*, 2013). Contextual factors that may delay or stop the knowledge translation process, includes political, cultural, economic and social factors (Berwick, 2003; Greenhalgh, Robert, Macfarlane, Bate, & Kyriakidou, 2004). One of the other causes of the research to practice gap is ironically the ever-increasing volume of available medical knowledge (Nicolini *et al.*, 2008). Medical knowledge is estimated to double every five years which makes translating this large amount of knowledge into practice difficult (Nicolini *et al.*, 2008; Mattox, 2000).

### **1.3. The need for this research**

Even though a large amount of research has been done on how to close the research to practice gap, the evidence remains incomplete (Grimshaw *et al.*, 2012). Ward *et al.* (2009a) agree there is a lack of high quality evidence that shows which knowledge translation approach will have the most success when considering the knowledge users and their context. The success of different knowledge translation practices in

developed countries is not conclusive, with little data available for developing countries (Santesso & Tugwell, 2006). A review by Grimshaw *et al.* (2004) that evaluated the effectiveness and cost of different dissemination and implementation methods for guidelines and evidence-based messages, found that there was a lack of generalised evidence to inform decision making under different circumstances. This means that decision makers rely on their own judgement regarding how to use limited resources to maximise benefit to the population (Grimshaw *et al.*, 2004).

Globally, there are growing concerns from governments regarding the growing gap between research and practice (Green, Ottoson, García, & Hiatt, 2009). Closing the research to practice gap by effective knowledge translation strategies ensures that the resources invested in public and private healthcare research is put to its optimal use. In the United States, biomedical research is a 100 billion dollar enterprise producing knowledge, which, if implemented effectively, can benefit patients' health (Brehaut & Eva, 2012; Moses III & Martin, 2011). There is evidence in both high-income and low-income countries that implementation of research proven healthcare interventions has failed (Haines, Kuruvilla, & Borchert, 2004). Finding effective methods to increase the uptake of evidence-based healthcare interventions should be a priority not only for researchers but also for practitioners and policy makers (Haines *et al.*, 2004). According to the Canadian Institutes of Health Research (CIHR) (2010) in Canada, the disease burden in low and middle-income countries has not changed much over time, which suggests a fundamental gap between available knowledge and clinical practice in these countries.

In 2011, the National Health Research Committee (NHRC) identified knowledge translation as one of the seven priorities for health research in South Africa (Mayosi, Mekwa *et al.*, 2012). The NHRC states the reason for this as follows: "there is a virtual absence of national planning, coordination and translation of research into health innovations, policy, programmes and practice" (Mayosi, Mekwa *et al.*, 2012, p. 2). Several organisations are involved in knowledge translation to primary healthcare workers in both the public and private sector in South Africa, but their knowledge translation strategies have not been formally evaluated.

In order to not only gather and investigate the current situation in South Africa, but also identify possible ways to improve knowledge translation, the Thinking Processes of the Theory of Constraints (TOC) will be used. TOC is a management philosophy that works on the principle of providing a focus for continuous improvement of a system (Goldratt

& Cox, 2004; Kim, Mabin & Davies, 2008). The Thinking Processes (TP) stem from TOC and provide a systematic approach to evaluating non-physical constraints (Dettmer, 2007; Goldratt, 1994 as cited in Rahman 1998; Scheinkopf, 1999).

When dealing with policy constraints, three questions need to be answered (Dettmer, 2007):

1. What to change?
2. What to change to?
3. How to cause the change?

Scrutiny of the academic literature revealed that Goldratt's Thinking Processes have not been applied to the field of knowledge translation as a model to optimise the flow of information from research into practice.

In light of the lack of research into the knowledge translation strategies of organisations in South Africa and the absence of the application of TP to knowledge translation, it is the conviction of the researcher that this study contributes unique and valuable new insights to the current knowledge translation literature.

#### **1.4. Research objectives**

This research is both explorative and descriptive and aims to investigate knowledge translation at the primary healthcare level in both the public and private sector in South Africa. This research considers knowledge translation from both a knowledge translation organisation's point of view, as well as a knowledge user's point of view and finally makes use of systems thinking to come up with suggestions to optimise the process.

The research was divided into three objectives:

- Firstly, this research evaluates the knowledge translation strategies used by organisations involved in translating knowledge to primary healthcare workers in both the private and public sector in South Africa. This research uses the Graham *et al.* (2006) knowledge to action model as a basis to evaluate different aspects of the organisation's knowledge translation approach. It included evaluating the following:
  - the organisation's involvement in knowledge creation

- the organisation's dissemination and implementation approach
- the organisation's perception of the facilitators and barriers to knowledge translation in the South African context
- the organisation's suggestions on improving knowledge translation in South Africa
- Secondly, this research evaluates knowledge users, which in this study are represented by primary healthcare workers. It involves evaluating
  - their knowledge needs
  - ways in which they are currently obtaining knowledge
  - ways in which they would prefer to obtain knowledge
  - awareness of the South African human immunodeficiency virus (HIV) guidelines released in 2013

Where relevant, the quantitative data is compared to the data obtained from the knowledge translation organisations, to identify any similarities or differences.

- Thirdly, this research uses systems thinking in an attempt to optimise knowledge translation in Department of Health, who is responsible for the primary healthcare in the South African public sector. The Thinking Processes of TOC will be used to answer firstly, "what to change?" and secondly, "what to change to?" Since TOC is a philosophy of optimisation, it provides ways in which knowledge translation in the public sector can be improved. The question "how to cause the change?" involves organisation specific implementation of the suggestions, which is beyond the scope of this research.

### **1.5. Research scope**

The South African organisations involved in translating knowledge to primary healthcare workers in the public and private sector were interviewed. This included:

- non-governmental organisations
- university affiliated organisations
- private organisations
- government organisations

Primary healthcare workers include the following groups:

- nurses
- general practitioners

- medical officers
- family physicians
- clinical associates
- dentists

The Thinking Processes, which form part of Theory of Constraints, are applied to the data relating to knowledge translation in the public health sector to determine:

- firstly, what needs to be changed.
- secondly, what it needs to change to.

### **1.6. The relationship between the research problem and objectives**

Failure of knowledge translation has been described worldwide, which manifests as a research to practice gap (Grol, 2001). Context plays an important role in determining the success of a knowledge translation strategy, as different barriers and facilitators are present in each environment (Santesso & Tugwell, 2006; Straus *et al.*, 2013).

The objective of this research is to explore and describe the knowledge translation strategy of knowledge translation organisations as well as the knowledge needs and preferences of primary healthcare workers. These different viewpoints provide context specific information about knowledge translation in South Africa, which adds to the limited information available regarding knowledge translation in the context of a developing country.

Suggestions of how knowledge translation can possibly be improved will be provided, using systems thinking, specifically the Thinking Processes of TOC. To the knowledge of the researcher, the application of Goldratt's Thinking Processes to knowledge translation will be a first in the knowledge translation field. The suggestion provided by this research will address the research problem of how the research to practice gap can be closed more effectively in the public sector at the primary healthcare level in the South Africa.

### **1.7. Structure of the report**

Chapter 1 has introduced the research problem, the research objectives, the scope and the importance of this research project. Chapter 2 consists of a review of the literature with a focus on knowledge management, knowledge translation and the Thinking Processes of Theory of Constraints. Chapter 3 defines the purpose of the research by

stating the research questions that aim to answer the research problem. Chapter 4 describes the research methodology used, which includes both a qualitative and quantitative approach. Chapter 5 presents the results as well as an analysis of the results. Chapter 6 discusses the results in terms of answering the research questions as well as the relationship of the results with the existing literature. Chapter 7 highlights the main findings of this research, discusses research limitations, and gives recommendations in terms of future research on this topic.

## **CHAPTER 2: LITERATURE REVIEW**

### **2.1. Definition and characteristics of knowledge**

The “knowledge pyramid”, also known as the data–information–knowledge–wisdom (DIKW) hierarchy, is a model that shows the relationship between the concepts of data, information and knowledge (Rowley, 2007). The DIKW model is central to the field of knowledge management and was originally the idea of Russell Ackoff in 1989 (Rowley, 2007). Data is used to create information, information is used to create knowledge, and knowledge is used to create wisdom (Rowley, 2007).

Ackoff (1989) defines data as symbols that are acquired by the observation of objects, activities, or the environment (Ackoff, 1989 as cited in Rowley, 2007). Goldratt describes data as “every string of characters that describes something, anything, about reality” (Goldratt, 1990a, p. 4). When data is processed into a form that is useful, it creates information which answers questions like who, what, when and how many (Ackoff, 1989 as cited in Rowley, 2007). Information represents that part of data, which influences people’s actions (Goldratt, 1990a). When information is transformed into a certain set of instructions or “know-how”, it becomes knowledge (Ackoff, 1989 as cited in Rowley, 2007). The last level is wisdom, where the understanding of knowledge is evaluated (Ackoff, 1989 as cited in Rowley, 2007).

Nonaka (1994), based on work done by Polanyi (Polanyi, 1962, 1967 as cited in Alavi & Leidner, 2001) described two knowledge dimensions: explicit and tacit. Explicit knowledge is expressed in the form of data and records, which can easily be shared, processed and stored (Nonaka, Toyama, & Konno, 2000). Tacit knowledge has both cognitive and technical components (Nonaka, 1994). The cognitive component includes opinions and viewpoints about reality, whereas the technical component includes abilities and “know-how” (Nonaka, 1994). Tacit knowledge is personal and subjective, which makes it hard to formalise and communicate to others (Nonaka *et al.*, 2000). The socialisation, externalisation, combination and internalisation (SECI) model describes the creation of knowledge through the interaction of explicit and tacit knowledge (Nonaka *et al.*, 2000).

### **2.2. Knowledge management**

The knowledge management concept originated in early 1990s from the business sector and has been found in various industries, including information sciences, public policy and library systems since (Bose, 2003; Kothari, Hovanec, Hastie, & Sibbald,



2011). The ability to create and use knowledge has become a major source of competitive advantage for organisations competing in environments that change rapidly (Nonaka *et al.*, 2000). Knowledge management is a planned process within organisations with the goal of improving the organisations' performance (Bose, 2003). Kothari *et al.* (2011) define knowledge management as “providing the right information, to the right person, at the right time, with the potential of attaining greater competitive advantage” (p.1). Knowledge management consists of four processes: knowledge creation, knowledge storage and retrieval, knowledge transfer and knowledge application (Alavi & Leidner, 2001).

Over the past decade, the concept and practices of knowledge management have increasingly become part of the healthcare industry (Nicolini *et al.*, 2008). Knowledge management is defined by the British Medical Association as “the systematic process of identifying, capturing, and transferring information and knowledge people can use to create, compete, and improve” (Nicolini *et al.*, 2008, p 245).

### **2.3. Research to practice gap**

Healthcare workers need to be updated continuously with the latest knowledge as their knowledge becomes outdated over time. Replacing out of date practices with advances in healthcare is critical in ensuring the delivery of highest-level healthcare (McKibbon *et al.*, 2010). When healthcare systems do not use the available research knowledge, resources are wasted, healthcare costs are increased, patient's quality of life is reduced and there is a loss of public healthcare improvements (Buchan, 2004; Chassin & Galvin, 1998; Drolet & Lorenzi, 2011; Grimshaw *et al.*, 2012; Straus *et al.*, 2011).

The know–do gap is one of the most important challenges that need to be overcome this century to ensure public health (World Health Organization, 2005a). Lee Jong Wook, director-general of the WHO, postulates this as follows: “health work teaches us with great rigour that action without knowledge is wasted effort, just as knowledge without action is a wasted resource” (World Health Organization, 2005a, p. 1). The Institute of Medicine (IOM) in the US is of the opinion that the gap between evidence-based interventions and practice is so large that it is more accurate to refer to it as “a chasm” (Glasgow & Emmons, 2007). As mentioned in the introduction, the disease burden in low and middle income countries have not changed much over time, which suggests a fundamental gap between available knowledge and clinical practice in these countries (Canadian Institutes of Health Research; 2010).

Implementing research into practice has been a slow process, which can take years (Grol, 2001; McGlynn *et al.*, 2003; Oborn, Barrett, & Racko, 2010). There are numerous examples of failure to implement evidence-based guidelines in practice, despite their acceptance by the healthcare community (Evensen, Sanson-Fisher, D'Este, & Fitzgerald, 2010). An example is doctors who under or overprescribe medication despite high-quality evidence being available (Arnold & Straus, 2005; LaRosa, He, & Vupputuri, 1999; Majumdar, McAlister, & Furberg, 2004). A study conducted in South Africa, identified poor healthcare worker knowledge of the tuberculosis (TB) guidelines as one of the main barriers to implementation of isoniazid prophylaxis (Lester *et al.*, 2010). Naidoo (2006) identified the lack of knowledge and training as one of the four main barriers preventing doctors from giving antiretroviral therapy (Naidoo, 2006). This is in keeping with a study by Van Damme, Kober, and Kegels (2008) stating that the availability of well-trained healthcare workers in Southern African countries is the biggest barrier to providing antiretroviral therapy to eligible patients. A survey of general practitioners (GPs) knowledge of primary eye care, revealed that they relied mostly on knowledge obtained during undergraduate training, with test scores of 53% on 10 basic multiple-choice questions relating to eye care (Van Zyl, Fernandes, Rogers, & Du Toit, 2011).

There is increased awareness of using active dissemination and implementation to do knowledge translation in light of the evidence that translation of research into practice has failed (Grimshaw *et al.*, 2001; Ward *et al.*, 2009a). Many factors play a role in slowing or stopping the knowledge translation process which relates to the context of factors such as political, cultural, economic and social factors (Berwick, 2003; Greenhalgh *et al.*, 2004). In addition, funders and researchers do not always prioritise the questions that are important to be answered in order to successfully close the research to practice gap (Westfall, Mold, & Fagnan, 2007).

#### **2.4. Measuring the research to practice gap**

One of the first steps in the knowledge translation process is to determine the gap between the available research evidence and clinical practice (Straus *et al.*, 2013). To determine this gap, needs must be systematically assessed with the method used depending on the goal of the assessment, the available data and resources (Straus *et al.*, 2013).

Needs can be classified as follows: (Gilliam & Murray, 1996 as cited in Kitson & Straus, 2010):

1. Felt needs: Identify needs through what people say they need. It is subjective and do not necessarily reflect real needs.
2. Expressed needs: Identify needs by observing people's actions.
3. Normative needs: Identify needs by using expert opinion to define a certain required level of performance.
4. Comparative needs: Identify needs by comparing different groups to each other in terms of resources and service levels.

Due to a constraint in available resources, it is not always possible to address every gap identified (Kitson & Straus, 2010). Other factors that need to be considered when addressing a gap include an analysis of the impact of that gap on morbidity and mortality as well as the cost to address the gap (Kitson & Straus, 2010).

## **2.5. Knowledge translation in healthcare**

There are several different terms used in the literature to describe the process of getting research evidence into practice (Grimshaw *et al.*, 2012; Straus *et al.*, 2013). One study identified more than a 100 different terms used to describe knowledge translation research (Graham *et al.*, 2006). This makes retrieving information and sharing of content in the field of knowledge translation (KT) difficult (McKibbon, Eady, & Marks, 2000). The United Kingdom (UK) and Europe use the terms “implementation science” and “research utilization” (Straus *et al.*, 2013).

The US uses the terms “dissemination”, “implementation”, “knowledge transfer and research use” (Straus *et al.*, 2013). Implementation research is defined as “the scientific study of methods to promote the systematic uptake of research findings and other evidence-based practices into routine practice, and hence, to improve the quality and effectiveness of health services” (Eccles & Mittman, 2006). In 2006, the National Institute of Health in the US made research into knowledge translation a priority by launching the Clinical and Translational Science Award (CTSA) programme in 2006 (Woolf, 2008).

In Canada the terms “knowledge translation” and “knowledge to action” are used (Straus *et al.*, 2013). The CIHR coined the term “knowledge translation” in 2000 (World Health Organization, 2005a; Graham *et al.*, 2006). The CIHR defines knowledge

translation as “a dynamic and iterative process that includes the synthesis, dissemination, exchange and ethically sound application of knowledge to improve health, provide more effective health services and products and strengthen the healthcare system” (Canadian Institutes of Health Research, n.d.).

Knowledge translation can be broken down into the three components as per the definition above:

1. Synthesis: Integration of research findings into the existing literature in the form of reviews, meta-analysis and practice guidelines (Canadian Institutes of Health Research, n.d.).
2. Dissemination: Communicating the message to knowledge users (Canadian Institutes of Health Research, n.d.).
3. Exchange: The interaction between researcher producing the knowledge and the knowledge user (Canadian Institutes of Health Research, n.d.).

The World Health Organization (WHO) has modified the CIHR’s knowledge translation definition to “the synthesis, exchange and application of knowledge by relevant stakeholders to accelerate the benefits of global and local innovation in strengthening health systems and improving people’s health” (World Health Organization, 2005a, p.2). At the 58<sup>th</sup> World Health Assembly in 2005, the WHO gave the assurance of their commitment to knowledge translation by stating their intentions as follows: “to establish or strengthen mechanisms for the translation of knowledge in support of evidence-based public health and healthcare delivery systems, and evidence-based health-related policies” (World Health Organization, 2005b, para. 5). The term “knowledge translation”, will be the term used in this research to describe efforts to reduce the evidence practice gap.

The CIHR define a knowledge user as a person who will apply the generated research knowledge in decision making regarding health policies and practices (Canadian Institutes of Health Research, n.d.). Knowledge users include healthcare practitioners, healthcare administrators, policy makers and patients (Canadian Institutes of Health Research, n.d.).

In the healthcare industry, there has been a large move towards evidence-based medicine (Kothari *et al.*, 2011). According to Sackett, Rosenberg, Gray, Haynes, and Richardson (1996), evidence-based medicine can be defined as “the conscientious, explicit, and judicious use of current best evidence in making decisions about the care

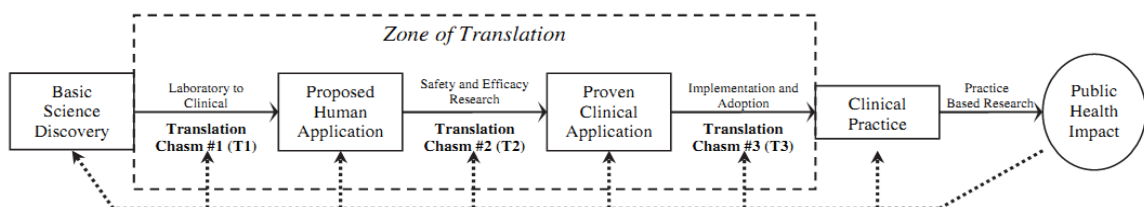
of individual patients”. Knowledge translation is the main challenge facing evidence-based medicine presently (Guyatt, Cook, & Haynes, 2004). Continuing education in healthcare should be based on approaches that are known to work well in practice and which are based on the best available knowledge (Graham *et al.*, 2006).

Whilst some progress has been made in meeting the knowledge needs of healthcare workers at a tertiary care level and in research better, little progress has been made in better meeting the knowledge needs of primary healthcare workers (Bailey & Pang, 2004; Cuellar-Montoya *et al.*, 2004; Godlee *et al.*, 2004). Factors playing a role in this observed difference relate to the use of "innovative" internet-based approaches for tertiary and research healthcare workers, whilst not looking at approaches that are more basic for healthcare workers at the primary and district level (Pakenham-Walsh & Bukachi, 2009).

## 2.6. Knowledge translation blocks

The model describing the different knowledge translation blocks was first described in 2003, stemming from work done by the Institute of Medicine (IOM) (Sung *et al.*, 2003). This model describes getting knowledge into practice as two phases, each with a translational block named T1 and T2 respectively (Sung *et al.*, 2003). This model has been expanded into three translational blocks by Westfall *et al.* (2007), and was further developed by Dougherty and Conway (2008). By building on the work of these previous authors, Drolet and Lorenzi (2011) designed the most recent model describing translational activities and calls this framework the “Biomedical Research Translation Continuum” (Figure 1).

**Figure 1: Biomedical research translation continuum**



Source: Drolet, B. C., & Lorenzi, N. M. (2011). Translational research: understanding the continuum from bench to bedside. *Translational Research*, 157(1), 1-5. Copyright © 2011. Reproduced with permission of Mosby Inc.

The model consists of four landmarks during the process of knowledge moving from research into practice (Drolet & Lorenzi, 2011). The four landmarks are the basic science discovery, suggested human application, proven clinical use and lastly clinical practice. These four landmarks are separated by the T1, T2 and T3 blocks or “chasms”:

T1: Translation from basic science discovery to application in humans.

T2: Translation from finding an application in humans to a clinical use for example, drug development.

T3: Translation from a proven clinical uses into clinical practice.

Once the knowledge is put into practice and the T1, T2 and T3 gaps is successfully overcome, the knowledge in practice leads to public health benefits (Drolet & Lorenzi, 2011). The research conducted for this study focuses on specifically the T3 knowledge translation gap.

## **2.7. Knowledge translation models**

The field of knowledge translation research is relatively new with many gaps present in literature (Straus *et al.*, 2011). Many different models and theories for translating research into practice exist in the literature (Graham *et al.*, 2006; Greenhalgh *et al.*, 2004; Ward *et al.*, 2009a). Many of these models remain untested in practice, which makes using them to plan and assess knowledge translation difficult and confusing (Straus, Tetroe, & Graham, 2009; Ward *et al.*, 2009a). In this literature review, three knowledge translation models will be described in more detail.

### **2.7.1. The knowledge to action model**

#### **2.7.1.1. Overview of the model**

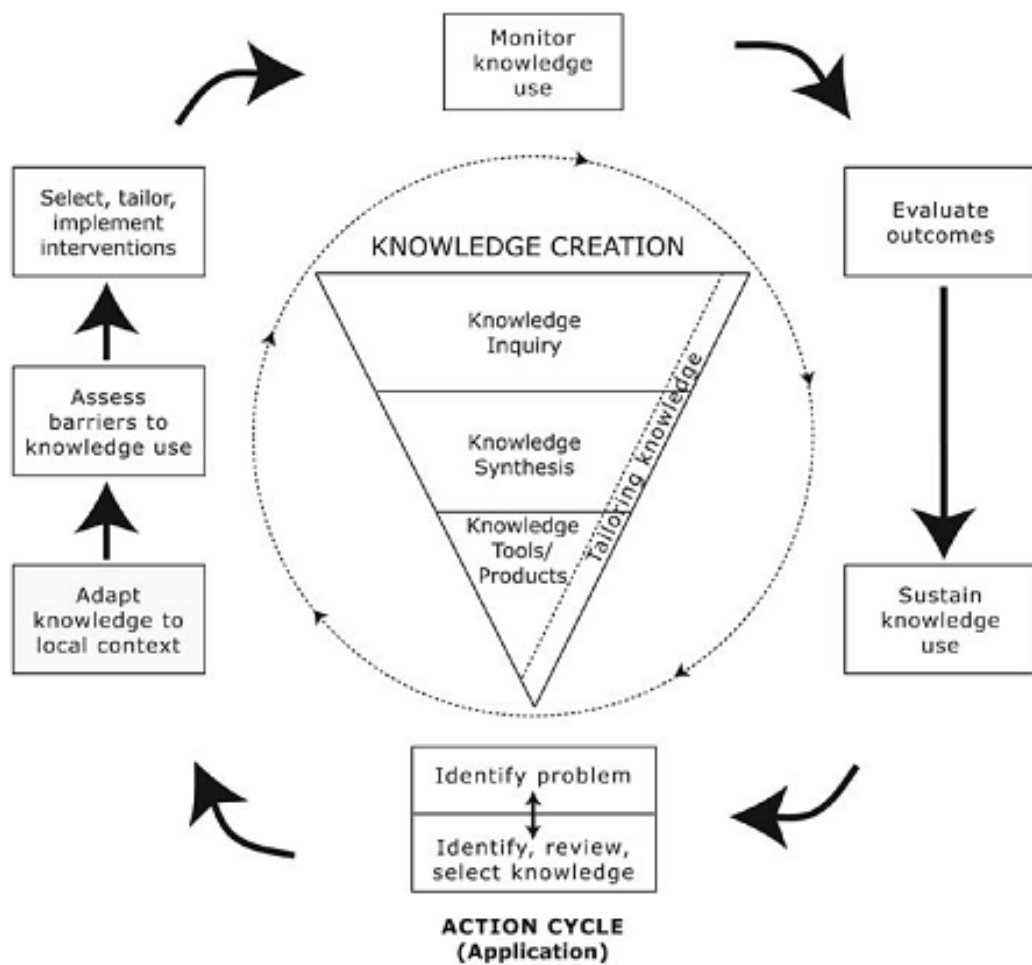
The Graham *et al.* (2006) model is one of the most commonly used knowledge translation models. The CIHR currently uses this model to guide their knowledge translation process (Straus *et al.*, 2013). This model provides a framework known as the knowledge to action cycle that provides an approach to knowledge translation (Graham *et al.*, 2006).

The common elements identified in 30 planned action theories served as a basis for the development of this model (Ward *et al.*, 2009a; Straus *et al.*, 2013). This model has however not been further developed since its initial design, and implementation in

practice and its sufficiency to describe the knowledge translation process remain unknown (Ward *et al.*, 2009a). Graham *et al.* (2006) use the term “action” in the place of practice to demonstrate the applicability of this model to a wide range of stakeholders, which includes healthcare workers, policy makers and patients.

The knowledge to action cycle model consists of two main processes, namely knowledge creation and the action cycle, which influence each other continuously and is shown in Figure 2 (Graham *et al.*, 2006).

**Figure 2: Knowledge to action cycle**



Source: Graham, I. D., Logan, J., Harrison, M. B., Straus, S. E., Tetroe, J., Caswell, W., & Robinson, N. (2006). Lost in knowledge translation: time for a map? *Journal of continuing education in the health professions*, 26(1), 13-24. Copyright © 2006. Reproduced with permission of John Wiley and Sons, Inc.

### 2.7.1.2. Knowledge creation

Knowledge creation can be visualised as a “knowledge funnel” which represents all knowledge that exists and can be applied in healthcare (Graham *et al.*, 2006). As knowledge moves through this funnel in a stepwise fashion, it becomes more practically useful to knowledge users (Table 1) (Brouwers, Stacey, & O’Connor, 2010; Graham *et al.*, 2006).

**Table 1: Phases of knowledge creation**

Phase	Knowledge	Description	Example
1. Knowledge inquiry	First generation	Unrefined knowledge	Primary research e.g. randomised trails
2. Knowledge synthesis	Second generation	Summarises primary research to answer a specific question	Systematic reviews
3. Knowledge tools and products	Third generation	User-friendly knowledge that gives specific instruction	Guidelines Decision aids Educational modules

Clinical practice guidelines are an example of third generation knowledge, which are increasingly being used, representing one way of closing the research to practice gap (Davies, 2002; Grimshaw *et al.*, 2004; Miller & Kearney, 2004). One major advantage of using guidelines is that it decreases inappropriate variations in clinical practice, which subsequently improves the quality of healthcare (Cabana *et al.*, 1999). Current strategies to successfully implement guidelines in primary healthcare remain unsystematic and variable with many questions remaining regarding the ideal approach (Grol, 2001; Westfall *et al.*, 2007).

### 2.7.1.3. Action cycle

The action part of the cycle represents the application of created knowledge, which consists of seven action steps (Graham *et al.*, 2006; Straus *et al.*, 2013). These steps can occur at the same time or in sequence and may be influenced by the knowledge creation funnel (Graham *et al.*, 2006; Straus *et al.*, 2013). This model incorporates the knowledge users and their needs as an essential element of the knowledge translation process (Straus *et al.*, 2009).



The seven steps of the action cycle's are as follows (Graham *et al.*, 2006):

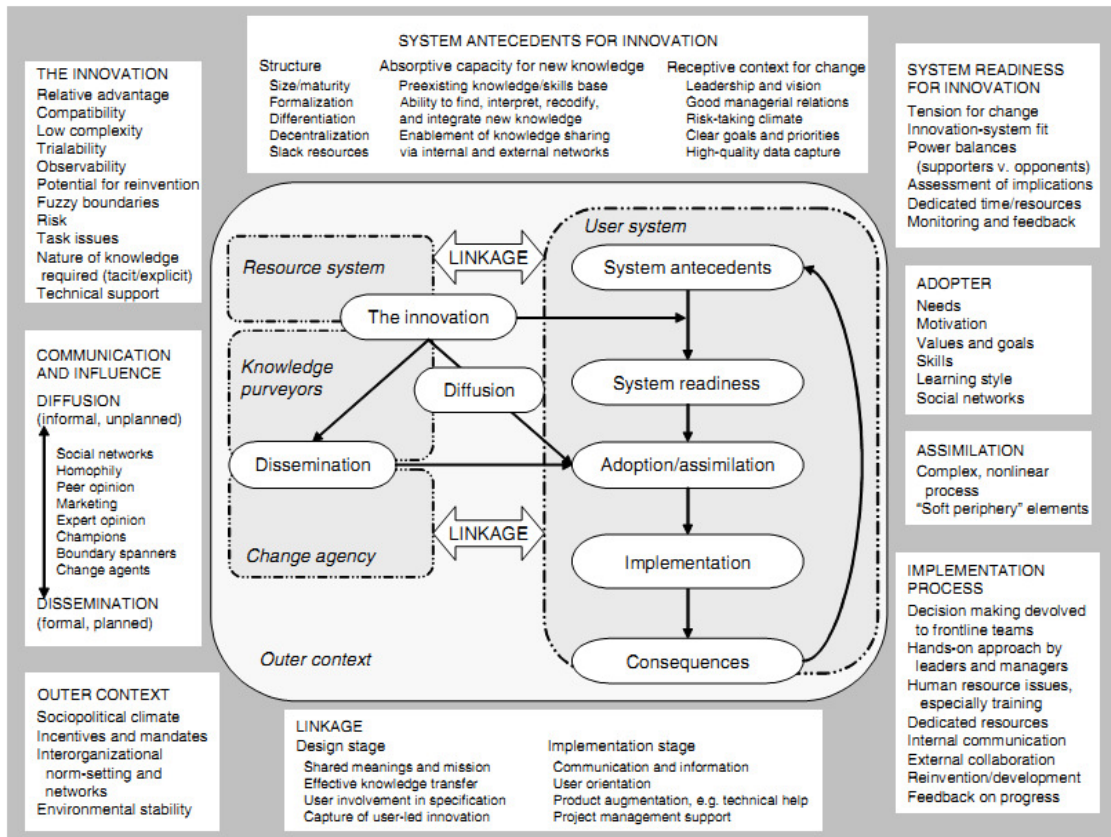
1. An individual or group identifies a problem that needs to be answered.
2. Relevant knowledge or research that can help answer the identified problem is identified and evaluated.
3. Knowledge is adapted to the local setting by determining its usefulness and suitability to the particular context where it will be used.
4. The barriers that might affect the implementation of the knowledge are evaluated in order to overcome or minimise these barriers.
5. The knowledge is implemented through various knowledge translation strategies.
6. The knowledge use is monitored by assessing if it has brought about the changes aimed for.
7. The impact of knowledge use is determined.
8. The use of knowledge is sustained by evaluating possible barriers and finding ways to overcome them.

### **2.7.2. Diffusion, dissemination and implementation of innovations**

Greenhalgh *et al.* (2004) conducted a systematic review of the literature that led to the design of a model showing how innovations can be implemented and sustained in healthcare (Figure 3). The authors defined an innovation as new behaviours or actions that are implemented using a specific plan, which leads to improved healthcare (Greenhalgh *et al.*, 2004). This systematic review used articles from 13 different research areas, which included evidence-based medicine, where diffusion of innovation was defined as “filling the knowledge gap” in targeted clinicians (Greenhalgh *et al.*, 2004).

This model illustrates that the complex interactions between the innovation, the adopter and the environment influence the successful adoption of new evidence in practice (Greenhalgh *et al.*, 2004). The environment, which is in this model referred to as the “outer context” includes the socio-political environment, stability of the environment, incentives and mandates as well as inter-organisational networks (Greenhalgh *et al.*, 2004).

**Figure 3: Determinants of diffusion, dissemination, and implementation of innovations**



Source: Greenhalgh, T., Robert, G., Macfarlane, F., Bate, P., & Kyriakidou, O. (2004). Diffusion of innovations in service organizations: systematic review and recommendations. *Milbank Quarterly*, 82(4), 581-629. Copyright © 2004. Reproduced with permission of Milbank Memorial Fund.

### 2.7.3. Five component knowledge translation model

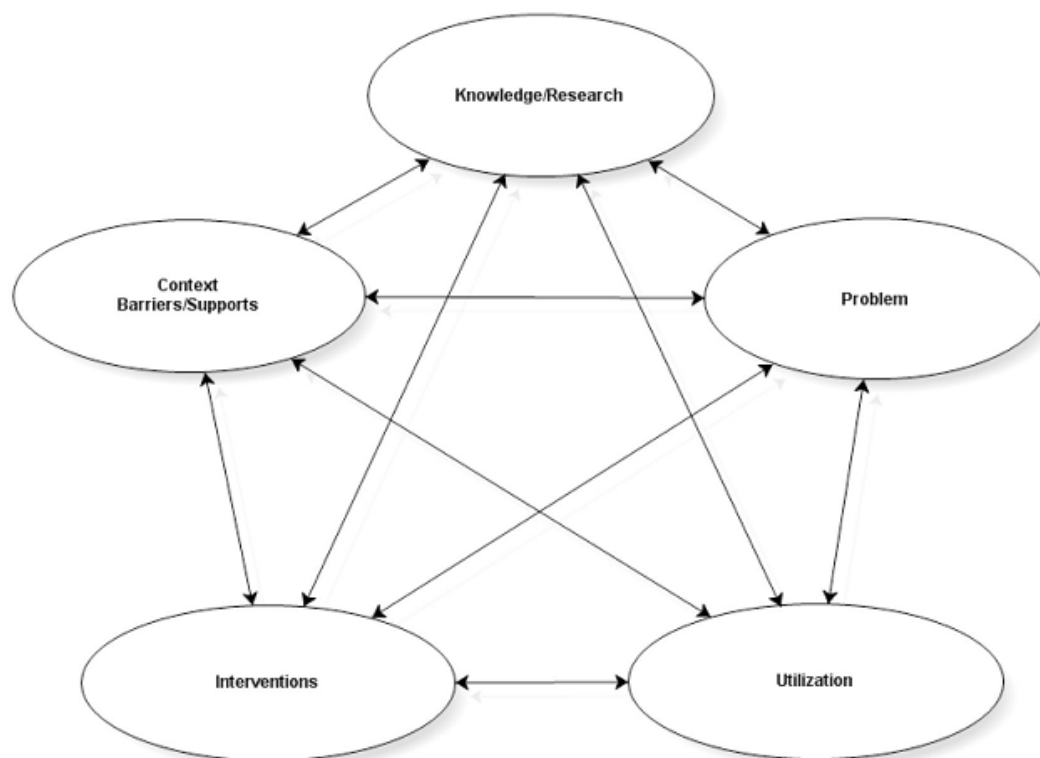
Ward *et al.* (2009a) did a thematic analysis of 28 models describing knowledge translation in order to identify components that are common to all these models. This was done with the aim of simplifying and collating the vast amount of different knowledge translation models and frameworks (Ward *et al.*, 2009a).

The five identified components are as follows:

1. Problem identification and communication
2. Knowledge development and selection
3. Context analysis
4. Knowledge transfer activities and interventions
5. Knowledge utilisation

This model serves as a framework that highlights the important components of a knowledge translation strategy in order to assist with planning and evaluating different knowledge translation activities (Ward *et al.*, 2009a). This model highlights that the five components can occur more than once, interact with each other at the same time, and may occur in no specific order when knowledge translation takes place which is shown in Figure 4 (Ward *et al.*, 2009a).

**Figure 4: Knowledge translation model**



Source: Ward, V., House, A., & Hamer, S. (2009a). Developing a framework for transferring knowledge into action: a thematic analysis of the literature. *Journal of health services research & policy*, 14(3), 156-164. Copyright © 2009. Reproduced with permission from SAGE.

### 2.8. Three phases of knowledge translation

Disseminating research findings is a vital part of in the knowledge translation process, which happens between the synthesis of knowledge and the application of knowledge (Graham, Tetroe, & Gagnon, 2013). In a recently published book by Straus *et al.* (2013), knowledge translation activities are divided into three phases, namely diffusion, dissemination and implementation as suggested originally by Lomas (1993). Each

phase's success depends on the preceding phase, with the process becoming more active and more focused as it progresses from one phase to the next (Lomas, 1993).

1. Diffusion (Lomas, 1993; Straus *et al.*, 2013):
  - a. Activity characteristics: passive information flow, which is an unintentional process, which is not controlled.
  - b. Knowledge user: must look for the answer to a self-formulated question, which requires high levels of motivation. The knowledge user must know where and how to search information and how to assess the information for quality.
  - c. Examples: traditional interventions e.g. publishing peer reviewed journal articles, conference presentations and using web-based methods.
2. Dissemination (Knowledge transfer) (Lomas, 1993; Straus *et al.*, 2013):
  - a. Activity characteristics: more active information flows with a customised message that is intended for a specific group of knowledge users.
  - b. Knowledge user: exposed to the message whether or not they want exposure.
  - c. Example: interactive small group meetings, media campaigns, reminders, opinion leaders and communities of practice.
3. Implementation (Lomas, 1993; Straus *et al.*, 2013):
  - a. Activity characteristics: involves identifying barriers that hinder knowledge use and helping with overcoming these barriers to enable the application of that knowledge by the knowledge user.

When knowledge dissemination is planned, the following five questions should be considered (Reardon , Lavis, & Gibson , 2006):

1. What (is the message)?
2. To whom (audience)?
3. By who (messenger)?
4. How (transfer method)?
5. With what expected impact (evaluation)?

According to a literature review by Gagnon (2011), there are certain important guidelines that form the basis of a knowledge dissemination strategy. Several interventions are available to increase the translation of evidence into practice (Davis & Davis, 2010). The dissemination of knowledge involves the identification of a suitable

target group to receive the knowledge, as well as finding a suitable medium to communicate the knowledge (Canadian Institutes of Health Research, n.d.).

The large amount of primary research evidence regarding the effectiveness of different implementation strategies is dispersed and not easily accessible, which complicates decision making by policy makers regarding the best quality improvement activities (Grimshaw *et al.*, 2001). It therefore becomes important to rely on systematic reviews that can summarise these findings to inform policy makers to make the best decision that can ultimately lead to the improvement of care (Grimshaw *et al.*, 2001). Prior, Guerin, and Grimmer-Somers (2008) performed a synthesis of effective guideline implementation strategies using systematic reviews done from 1987-2007, which reflect 22 512 clinicians in different healthcare settings.

A summary of the effectiveness of different guideline implementation strategies is shown next (Prior *et al.*, 2008):

#### 1. Ineffective strategy

- a) Distribution and dissemination only
- b) Organisational intervention
- c) Traditional educational: passive methods for example, conferences, websites and didactic lectures

#### 2. Uncertain / variable strategy

- a) Audit / feedback / peer review
- b) Continuing medical education
- c) Financial incentive
- d) Material incentive
- e) Local opinion leader
- f) Management support
- g) Mass media strategy

#### 3. Effective strategy

- a) Educational outreach (“academic detailing”) has been shown to have the greatest effect. It involves visits by educators, provision of promotional materials and educational reminders or follow up. Disadvantages include that it is time consuming and expensive (Prior *et al.*, 2008).

- b) Decision support systems such as, computer based reminders are effective, but increase the consultation time and clinicians' stress levels (Prior *et al.*, 2008).
- c) Educational meetings / interactive educational include practical sessions and workshops which are usually combined with some form of evaluation (Prior *et al.*, 2008).
- d) Guideline content and construction: where content is developed by a credible organisation or group, develops content, it is associated with a higher rate of compliance. Collaboration with clinicians during the construction of the guidelines also increases ownership (Prior *et al.*, 2008).

These findings are virtually identical to a review by Davis, O'Brien, Freemantle, Wolf, Mazmanian, and Taylor-Vaisey (1999), which also found that interactive educational sessions, which included a practical component, were more effective compared to didactic sessions.

## 2.9. Evaluating the use of knowledge

The impact of knowledge translation interventions should be evaluated to establish how and to what extent the knowledge was used and implemented to benefit patients (Straus *et al.*, 2010). The model by Kirkpatrick (1976) is widely used in the literature to evaluate the impact of educational interventions. This model consists of four levels: reaction, learning, behavioural and results (Salas & Cannon-Bowers, 2001; Yardley & Dornan, 2012). Kirkpatrick's model has been adapted to the healthcare industry to reflect the educational outcomes specific to the medical field (Table 2). This model grades the impact of educational interventions using hierarchical levels, with each higher level representing greater quality than the one below (Yardley & Dornan, 2012).

**Table 2: Kirkpatrick's evaluation model**

Level	Kirkpatrick level	Adapted levels	Description
1	Reaction	Participation in education	Learner's opinion of the educational content, teaching methods, materials, and quality of teaching
2	Learning	2 <sub>a</sub> : change in attitude	Change in attitude or perception after educational intervention
		2 <sub>b</sub> : change in knowledge and/or skills	Attainment of knowledge (concepts, procedures) and/or certain skills
3	Behavioural	Change in behaviour	Learner is willing to implement the new knowledge and skills

Level	Kirkpatrick level	Adapted levels	Description
4	Results	4 <sub>a</sub> :change in practice	Changes in practice with regards to patient care
		4 <sub>b</sub> : benefits the patient	Improvement of the patient's health as a result of the education

Source: Adapted from Kirkpatrick, 1976; Issenberg, McGaghie, Petrusa, Gordon, & Scalese, 2005; Steinert *et al.*, 2006, Yardley & Dornan, 2012.

## 2.10. Forces that drive healthcare workers to learn

Both external and internal forces drive healthcare workers to learn (Davis & Davis, 2010).

### 1. External forces:

- a) Requirement to obtain CPD points (Davis & Davis, 2010)
  - i. The Health Professional Council of South Africa (HPCSA) requires doctors to obtain 60 Continuing Education Units (CEU) over a two-year period, which may result in suspension in cases of non-compliance (HPCSA, 2011).
  - ii. Pharmaceutical companies use Continuing Professional Development (CPD) events to influence the behaviour of healthcare workers and the fast increase in available medical knowledge (Davis & Davis, 2010).
- b) Changes in the patient demographics (Davis & Davis, 2010).

### 2. Internal forces:

- a) Healthcare workers' sense of professionalism (Davis & Davis, 2010).
- b) Recent personal experiences (Davis & Davis, 2010).

## 2.11. Facilitators and barriers to knowledge translation

### 2.11.1. The importance of understanding facilitators and barriers

When planning a knowledge translation strategy, it is important to understand the presence of facilitators and barriers, as this makes the success of the strategy more likely (Grimshaw *et al.*, 2012). To implement clinical guidelines requires change at the different levels of the entire system (Grimshaw *et al.*, 2004). Barriers to implementation can arise at various levels, including the patient level, provider, the team or group level, organisational level and policy level (Ferlie & Shortell, 2001).

### 2.11.2. Facilitators and barriers to knowledge translation

Certain facilitators and barriers influence knowledge translation by affecting the production of knowledge (supply) and/or the use of knowledge (demand). These facilitators and barriers are summarised in Table 3 (World Health Organization, 2005a).

**Table 3: Facilitators and barriers to knowledge translation to policy and practice**

<b>Knowledge supply side (Push factors)</b>		
<b>Factor</b>	<b>Facilitators</b>	<b>Barriers</b>
1. Research knowledge	Relevant, high quality and easy to understand	Distorted or biased evidence
2. Knowledge synthesis	Timely	Slow and costly
3. Knowledge availability	Accessible and easily available	Poor or lack of access
4. Knowledge translation	Knowledge mapping is done	No common knowledge translation framework
5. Knowledge translators	Use of opinion leaders and organisations with good reputations to do KT	
6. Funders	Support knowledge translation of research findings	Research agenda is determined by the donor
<b>Knowledge demand side (Pull factors)</b>		
	<b>Facilitators</b>	<b>Barriers</b>
1. Environment	Political will to use knowledge. Understanding the socio-political environment	Political or financial reasons for not acting on the research evidence
2. Accessibility	Knowledge is accessible, user-friendly and in searchable databases	
3. Research evidence	Problem-based evidence or user-initiated questions which include social participation in decision making	Different paradigms for evidence and policy amongst different stakeholders Policymakers have a low demand for research evidence

Source: Adapted from: World Health Organization, 2005a, Box 2, p. 6.

### 2.11.3. Facilitators and barriers at healthcare worker level

A systematic review by Cabana *et al.* (1999) evaluated the barriers that lead to doctors not following the clinical practice guidelines. Before the guidelines can affect patient care, they first have to affect the doctor's knowledge, then attitude and lastly behaviour (Cabana *et al.*, 1999).

Barriers to adherence to the guidelines be divided into three groups (Cabana *et al.*, 1999)



1. Barriers affecting knowledge:
  - a) Lack of awareness: the large volume of research evidence and accessibility.
  - b) Lack of familiarity: leads to clinician not applying the guideline even if aware.
2. Barriers affecting attitude:
  - a) Lack of agreement with the guidelines.
  - b) Lack of outcome expectancy: belief that the guideline will not lead to improvement.
  - c) Lack of self-efficacy: lack of self-confidence to follow the guideline.
  - d) Lack of motivation: no motivation to change the previous way of practice.
3. Barriers affecting behaviour:
  - a) External barriers
    - a. Guideline related: difficult to use.
    - b. Patient related: patient resistance or preferences.
    - c. Environment related .e.g. resources and time.

Primary resources for information used by doctors were textbooks, colleagues and electronic databases such as reviews (Dawes & Sampson, 2003). Problems with these resources have however been identified. Textbooks go out of date quickly, information from colleagues is not always correct, and few healthcare workers use systematic reviews (Bero & Rennie, 1995; McKibbon *et al.*, 2000; Dawes & Sampson, 2003; Kiesler & Auerbach, 2006). Primary care physicians list time constraints, difficulty in formulating a question, lack of a search strategy and difficulty in interpreting the evidence as the main barriers to using electronic resources (Coumou & Meijman, 2006). Professional networking and communities of practice are preferred in the healthcare industry, making it different from other industries (Nicolini *et al.*, 2008). Healthcare workers who belong to communities of practice can share knowledge and give advice to each other on solving a particular challenge (Thomson, Schneider, & Wright, 2013). Research has found that the behaviour of healthcare workers is influenced as much by their own and colleagues' experiences, as by the available high quality medical evidence (Dopson, FitzGerald, Ferlie, Gabbay, & Locock, 2002). In an ethnographic study done in England, it was found that doctors rarely looked for or used explicit research evidence, and preferred to rely on "mindlines" (Gabbay & May, 2004). The knowledge contained in "mindlines" is predominantly tacit knowledge formed by personal as well as colleagues' experiences, opinion leaders, patients and pharmaceutical representatives, and is refined through informal interactions in communities of practice (Gabbay & May, 2004).

## **2.12. Information seeking behaviour in healthcare workers**

### **2.12.1. Overview of information seeking behaviours**

Dawes and Sampson (2003) conducted a systematic review that identified six important factors that play a role in how doctors look for knowledge and information. This includes that doctors want information sources that are convenient to access, high quality, reliable, quick to use, and which contain information that can be applied in practice (Dawes & Sampson, 2003). Doctors' habits also played a role in how they look for information (Dawes & Sampson, 2003). This review also identified five barriers experienced by doctors looking for information, which include having a lack of time, information volume perceived as too large, forgetting to look for information, a lack of urgency, and the belief that there is no answer to their question. Using these identified factors and barriers as starting point, other supporting literature was subsequently added.

### **2.12.2. Factors that play a role in information seeking**

#### **2.12.2.1. Convenience of access**

De Villiers and De Villiers (2006) did a survey in 2001 of 110 doctors in 27 district hospitals in South Africa that identified the most commonly used methods to learn as journal reading, learning from colleagues, and meetings with pharmaceutical companies, which were also the most readily available to doctors. When healthcare workers do not have access to basic information, which is more common in developing countries, they rely on the advice of colleagues as well as their own experiences to manage patients instead (Macrorie, 1997; Pakenham-Walsh & Bukachi, 2009; Pakenham-Walsh, Priestley & Smith, 1997; Sekikawa, Laporte, Satoh, & Ochi, 1997;).

#### **2.12.2.2. Habit**

A study done in Germany, found that German general practitioners preferred "classical" and "traditional" settings for learning activities, despite the use of the internet increasing (Vollmar, Rieger, Butzlaff, & Ostermann, 2009). In a review done from 1992-2005 it was found that doctors mainly relied on asking colleagues and consulting paper sources when needing answers to clinical questions (Coumou & Meijman, 2006). The countries included in this review came from developed countries, where an increase in the use of electronic resources via the internet would have been expected (Coumou & Meijman, 2006).

### **2.12.3. Barriers that play a role in information seeking**

#### **2.12.3.1. Lack of time and forgetfulness**

One of the main barriers in looking for information is a lack of time (Davies, 2007; Straus & Haynes, 2009). One study found that only 50% of questions that were identified during patient consultations were pursued by primary care doctors (Ely, Osheroff, Champbliss, Ebell, & Rosenbaum, 2005).

#### **2.12.3.2. The large volume of information**

Another barrier in looking for information is the sheer volume that is available (Straus & Haynes, 2009). Healthcare faces an “information paradox” where doctors are overloaded with information, whilst at the same time being unable to find the knowledge they need at a specific point in time (Gray, 1998). MEDLINE® adds approximately 12 000 new articles per week, which includes roughly 300 randomised controlled trials (Glasziou, 2008). When searching for information, doctors become overwhelmed by both inaccurate and irrelevant information (Davies, 2007).

Even though the internet makes information overload worse, electronic library systems provide a solution in the form of relevant, searchable information when needed by healthcare workers (Gray & de Lusignan, 1999). Electronic libraries containing guidelines, articles, and clinical protocols are increasingly seen as an important source to finding relevant information (Gray & de Lusignan, 1999).

### **2.13. The importance of context in knowledge translation**

A knowledge translation plan needs to take into account the context where the knowledge will be used, as this influences the success of the knowledge translation strategy (Kitson & Bisby, 2008; Straus *et al.*, 2013). Considering the context means adapting the knowledge to the specific audience, whilst at the same time considering the barriers and facilitators to knowledge use in that context (Straus *et al.*, 2013). Some knowledge translation models focus on evaluating the barriers to successful knowledge transfer within a specific context (Graham *et al.*, 2006; Tugwell, Robinson, Grimshaw & Santesso, 2006). Greenhalgh’s model also incorporates the evaluation of the “outer context” which includes the socio-political environment (Greenhalgh *et al.*, 2004).

## **2.14. The role of knowledge brokers**

Knowledge brokers are individuals or organisations which goal is to assist with the transfer of knowledge between research and practice (Meyer, 2010; Ward, House, & Hamer, 2009b).

Knowledge brokers fulfil three types of roles:

1. Knowledge managers: manage creation, diffusion and use of knowledge (Oldham & McLean, 1997).
2. Linkage agents: connects researchers with knowledge users (Oldham & McLean, 1997).
3. Capacity builders: improves the access of knowledge by training knowledge users (Oldham & McLean, 1997).

## **2.15. The South African healthcare context**

South African healthcare is divided into a public and private sector (Department of Health, 2011). The public sector serves approximately 84% of the SA population and is under-resourced in terms of human capital with poor healthcare service quality (Department of Health, 2011). This is in contrast to the high quality care given by the private sector, which serves only 16% of the SA population and is well resourced in terms of human capital (Department of Health, 2011).

SA faces an overall shortage of healthcare workers with only 66 doctors and 388 nurses per 100 000 of the population (World Health Organization, 2006). Even though this is higher than the required WHO level, only an estimated 30% of doctors and 60% of nurses currently work in the public sector (Health Economics and HIV & AIDS Research Division, 2009).

Healthcare can further be divided into primary, secondary and tertiary level care. Primary care represents the first contact of the patient with the healthcare system and plays a crucial role in the delivery of healthcare to a population (Dookie & Singh, 2012; Shi, 2012; World Health Organization, 1978). Healthcare workers providing primary care include general practitioners, family physicians, pharmacists, nurse practitioners, clinical associates and allied healthcare workers (Dookie & Singh, 2012; Shi, 2012). Secondary care involves specialist care with advanced interventions that primary care doctors cannot provide (Shi, 2012). Tertiary care represents highly specialised care, which is based at an institution with specialised technology (Shi, 2012).

The Department of Health (DOH) coordinates healthcare in the public sector with 96% of facilities at the primary care level (Table 4). This illustrates the importance of focusing knowledge translation activities at this level. Clinics are usually staffed with nurses only, with community health centres having a larger range of healthcare workers, which include doctors (Mash *et al.*, 2012). South Africa has a “quadruple burden of disease”, with the highest per capita health burden of middle-income country globally (Lawn & Kinney, 2009; Mayosi *et al.*, 2009).

**Table 4: Public health facilities in South Africa, 2011**

Type of facility	Level of care	Amount	%
Clinic	Primary	3203	82.6%
Community health/day centre	Primary	282	7.3%
District hospital	Primary	253	6.5%
Regional hospital	Secondary	55	1.4%
Tertiary hospital	Tertiary	10	0.3%
National central hospital	Tertiary	6	0.2%
Other specialised hospitals (e.g. Psychiatry)	Secondary/Tertiary	70	1.8%
Other (Maternal Obstetrics unit)	Secondary/Tertiary	1	0.0%
<b>Total number of facilities</b>		<b>3880</b>	<b>100%</b>

Source: Department of Health, 2012a.

South Africa has a number of organisations involved in knowledge translation activities. The researcher divided these organisations into four groups, namely university affiliated, non-governmental organisations, private organisations and government.

## 2.16. Fundamental differences: Public versus private primary care sector

The public and private healthcare sectors in South Africa are fundamentally different. As the researcher is also a healthcare worker and has tacit knowledge of the healthcare industry, a personal interpretation of the differences between the public and private sector at the primary healthcare level was constructed in combination with other sources (Table 5) (Department of Health, 2008; Department of Health 2011; Georgeu, *et al.*, 2012; Mayosi, Lawn *et al.*, 2012).

**Table 5: Public versus private primary sector**

	Public sector	Private sector
Management	Department of Health	Self-directed by clinician
Population	Majority of SA population	Minority of SA population
Facilities	Clinics, community health centres and district hospitals	Private practices
Payment	Provided by Government	Medical aids and patient out of pocket payments

	<b>Public sector</b>	<b>Private sector</b>
Healthcare worker	Nurse driven with doctor support	Doctor driven
Way of working	Team based	Independent with limited networking
Patient management	Guideline based	Doctor free to follow a patient management approach of his choice
Medication	Essential drug list : limited list of medication	Any medication available in South Africa
Measurements	District Health Information System	No quality indicators available
Training	Most training free to healthcare workers	Healthcare workers need to pay themselves

Source: Department of Health, 2008; Department of Health 2011; Georgeu, *et al.*, 2012; Mayosi, Lawn *et al.*, 2012.

## **2.17. Theory of Constraints (TOC)**

### **2.17.1. TOC: concepts and focusing steps**

The Theory of Constraints (TOC), originally developed by Eliyahu Goldratt, is a management philosophy that based on providing a focus for continuous system improvement (Goldratt & Cox, 2004; Kim *et al.*, 2008). TOC was originally developed in the 1970s as a scheduling process in manufacturing, but has since evolved into a management theory with problem-structuring and problem-solving methods applicable to any system and environment (Mabin & Balderstone, 2003). A system can be defined as a “collection of interrelated, interdependent components or processes that act in concert to turn inputs into some kind of output in pursuit of some goal” (Dettmer, 2007, p 4).

TOC consists of two main concepts, namely:

1. Every system has at least one constraint, which is defined as “anything that limits a system from achieving higher performance versus its goal” (Goldratt, 1988; Rahman 1998).
2. The presence of system constraints represents an opportunity to improve the system. The constraint determines the system’s performance, thus successfully addressing these constraints to improve the overall system’s performance (Rahman, 1998).

### **2.17.2. Types of constraints**

According to Scheinkopf (1999), three types of constraints exist namely physical, policy and paradigm. Paradigm constraints cause policy constraints, which ultimately cause physical constraints (Scheinkopf, 1999). Another way to divide constraints is into physical and non-physical constraints (Scheinkopf, 1999). Mabin and Balderstone (2000) classify constraints as either physical, policy or behavioural constraints. To summarise:

#### **1. Non-physical constraints**

- a) Paradigm constraints are assumptions or beliefs that lead to policies being developed or followed (Scheinkopf, 1999).
- b) Policy constraints are guidelines and measures that act as a hindrance to the system's ability to improve through using the five focusing steps of TOC (Scheinkopf, 1999). Dettmer (2007) describes a policy as something that "results from a decision intended to standardize behaviour from the decision point onward into the future" (p. 171). Policies can be both formal written down rules and regulations or informal, verbal codes of conduct (Dettmer, 2007). Policies usually serve a useful purpose, but may become a constraint that limits the system's performance (Dettmer, 2007).
- c) Behavioural constraints originate from implementing specific policies or performance measures and continue after these policies have been changed (Mabin & Balderstone, 2003).

#### **2. Physical constraints**

- a) An internal physical constraint is a limited resource inside of an organisation that limits the system's throughput (Scheinkopf, 1999). Examples include a lack of capacity, people or skills (Scheinkopf, 1999).
- b) An external physical constraint is located outside the organisation. Examples include a lack of market demand and raw materials (Scheinkopf, 1999).

### **2.17.3. TOC's five focusing steps**

TOC makes use of five focusing steps to direct improvement efforts to the part of the system that will lead to the largest positive effect (Davies & Mabin, 2009; Dettmer, 2007; Goldratt, 1990b as cited in Rahman, 1998):

Step 1: Identify the systems constraint

Step 2: Decide how to exploit this constraint

Step 3: Subordinate everything else

Step 4: Elevate the constraint

Step 5: If the constraint is broken, go back to step 1. Do not let inertia become the next constraint.

It was originally thought that the five focusing steps of TOC could only be applied to physical constraints, but it has recently been shown that they can also be applied to non-physical constraints (Pretorius, 2013). This can be done by determining if the constraint is physical or non-physical after the constraint has been identified in step 1 (Pretorius, 2013). If the constraint is non-physical, a new or modified policy or behaviour is first required before the process can move to Step 5 of TOC (Pretorius, 2013). A way of addressing these non-physical constraints is by using the Thinking Processes (Scheinkopf, 1999).

#### **2.17.4. The goal of For-profit versus Not-for-profit organisations**

The main goal of For-profit organisations is to make money, but this can only be achieved if customers and employees are also satisfied (Shoemaker & Reid, 2005). The impact of an action can be assessed by determining the effect on three basic measurements: inventory, operating expenses and throughput (Dettmer, 2007). Inventory is the money inside the system, which is turned into throughput by spending money called the operating expenses (Dettmer, 2007). The goal of the system is to decrease inventory and operating expenses, whilst increasing throughput, which ultimately leads to more products that generated money through sales (Dettmer, 2007).

The main goal of Not-for-profit and government organisations involve delivering a service, but this can only be achieved if the organisations are financially secure and employees are satisfied (Shoemaker & Reid, 2005). Some authors have suggested finding analogies to the concepts of inventory, operating expenses and throughput to make them more applicable to service organisations (Motwani, Klein, & Harowitz, 1996). Motwani et al. (1996), describes a healthcare clinic's inventory as the patients, and the operating expenses as resources used to see those patients. This is followed by a transformation process for example a doctor's consultation which leads to throughput in the form of medical service revenue (Motwani et al. 1996). Further more,



looking at the healthcare industry, Pauker, Zane, and Salem (2005) describe the goal of medicine as “to improve health now and in future” (p. 2907).

### **2.17.5. The Thinking Processes (TP)**

In 1994, Goldratt published the book “It’s Not Luck” which uses the Thinking Processes (TP) as a blueprint for finding solutions to complicated, unstructured problems (Watson, Blackstone, & Gardiner, 2007). The Thinking Processes comprise of a set of tools that uses logic to guide the user on how to do things differently, as well as how to do and think differently (Davies & Mabin, 2009). Dettmer (2007) describes it as a “system level problem solving tool” (p 69) which is in essence providing a roadmap to bring about change (Mabin, Forgeson, & Green, 2001). The Thinking Processes use common sense, intuitive knowledge, and analysis to produce solutions to policy constraints (Goldratt, 1994 as cited in Rahman, 1998). The TP tools can be applied to any problem or situation by people who have in-depth knowledge of that problem (Mabin & Balderstone, 2000 as cited in Kim *et al.*, 2008). The Thinking Processes guide the identification and structuring of the problem, which includes possible barriers followed by building and implementing a solution (Mabin, Forgeson, & Green, 2001). The goal of using the TP is to provide a systematic approach to implementing change that ultimately improves the system (Scheinkopf, 1999). The TP tools have been used in various industries and fields including supply chain management, manufacturing, production, sales and accounting (Kim *et al.*, 2008). The TP tools have also been applied in the healthcare field, for example, in mental healthcare and emergency medicine (Ritson & Waterfield, 2005; Taylor & Nayak, 2012).

The Thinking Processes tools use cause and effect diagrams to find the answers to three system level questions (Rahman, 1998; Dettmer, 2007). Dettmer (2007) added a fourth, preceding question. The Thinking Processes tools answer these four questions about change and help to focus system improvement efforts (Dettmer, 2007).

1. What is the desired standard of performance? This identifies the goal of the system (Dettmer, 2007).
2. What to change? This identifies the main problem (Rahman, 1998).
3. What to change to? This develops an uncomplicated, practical solution (Rahman, 1998).
4. How to cause the change? This puts the solution into action (Rahman, 1998).

Answering these questions facilitates the process of ongoing improvement of a system (Burton-Houle, 2001). Traditionally, the TP consisted of five logic diagrams and a set of logic rules (Mabin *et al.*, 2001; Kim *et al.*, 2008). Dettmer (2007) added a sixth logic diagram, the intermediate objectives (IO) map, originally Goldratt's idea, but was not fully developed and used previously (Dettmer, 2007). These logic diagrams are interconnected and use the output from one as an input to one or more of the others (Watson *et al.*, 2007).

A. Logic diagrams:

1. Intermediate objectives map (IO)
2. Current reality tree (CRT)
3. Evaporating cloud (EC)
4. Future reality tree (FRT)
5. Prerequisite tree (PRT)
6. Transition tree (TT)

B. Logic rules: categories of legitimate reservation (CLR)

### **2.17.6. Categories of legitimate reservation**

The categories of legitimate reservation form the basis of the logical Thinking Processes and serve to distinguish a person's subjective perception from reality (Dettmer, 2007). The categories of legitimate reservation consist of eight logic rules that prove the cause and effect relationships used in the logic trees (Dettmer, 2007). These eight logic rules represent the fundamental difference between the Thinking Processes tool and other problem-analysis tools, as they seek to validate the connection between the different elements (Dettmer, 2007).

The eight logic rules are as follows (Scheinkopf, 1999; Dettmer, 2007):

1. Clarity: verifies that the meaning and the context of the entity are clear.
2. Entity existence: verifies that the entity exists in reality and is a complete idea.
3. Causality existence: verifies that there is a logical connection between cause and effect.
4. Cause insufficiency: verifies if other causal factors are missing.
5. Additional cause: checks if other causes might cause the effect on its own.
6. Cause-effect reversal: checks if the stated effect isn't actually the cause.
7. Predicted effect existence: checks if the cause is something intangible.
8. Tautology: checks for circular logic.

## **2.17.7. Sufficient cause versus necessary condition thinking**

### **2.17.7.1. Sufficient cause thinking**

Sufficient cause thinking rests on the principle of effect-cause-effect (Scheinkopf, 1999). An example would be the assumption that the existence of one thing causes something else to exist (Scheinkopf, 1999).

There are three types of sufficiency (Mabin *et al.*, 2001):

1. A is sufficient to cause C.
2. If both A and B occur together, then they will be sufficient to cause C.
3. A and B (separately) both contribute to C, and between them are sufficient to cause C.

The current reality tree, future reality tree and transition tree check for “sufficient cause” by building connections between observed effects and causes using “if” and “then” statements, and are known as sufficiency based trees (Mabin *et al.*, 2001; Dettmer, 2007). To determine sufficiency the question is asked: Is “this” sufficient to cause “that”? (Dettmer, 2007). The categories of legitimate reservation mainly apply to sufficiency trees.

### **2.17.7.2. Necessary condition thinking**

Necessary condition thinking is based on certain requirements: when something must exist before something else can follow (Scheinkopf, 1999). The evaporating cloud and prerequisite tree make use of necessary condition thinking. Thus, in order to have A, we need to have B (Mabin *et al.*, 2001). These trees are read by using the format: “in order to...we must...because” (Dettmer, 2007, p. 59). The categories of legitimate reservation have only some applicability to necessity-based trees (Dettmer, 2007).

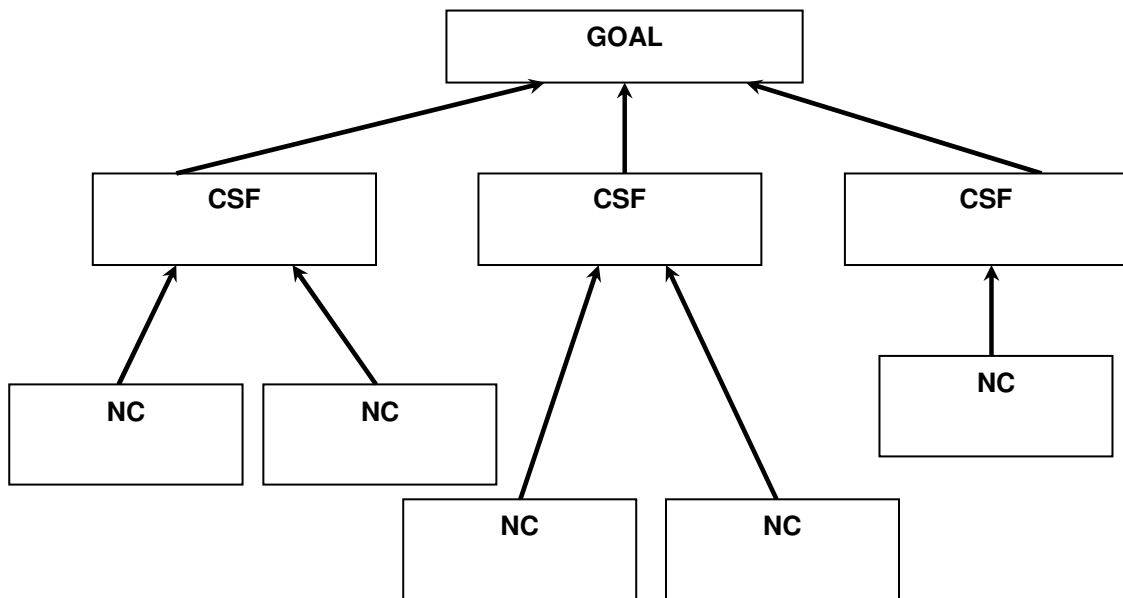
## **2.17.8. What is the desired standard?**

### **2.17.8.1. Intermediate objectives map**

The intermediate objectives (IO) map is a diagrammatic representation of a system’s goal including the critical success factors (CSF) and necessary conditions (NC) needed to achieve that goal (Dettmer, 2007). The goal of the IO map is to answer the question: What is the desired standard of performance of the system? (Dettmer, 2007) The CSF are milestones that are necessary for the goal to be achieved (Dettmer, 2007). If these milestones are not reached, the goal will also not be reached (Dettmer, 2007). CSF

are related to some functional activity in the system, with the activities needed to reach these milestones lying at the level below the CSF (Dettmer, 2007). The necessary conditions are activities or tasks that are necessary to achieve the critical success factors. An example of the different components of an IO map is shown in Figure 5.

**Figure 5: The intermediate objectives map**



GOAL=Goal of the system  
 CSF=Critical success factor  
 NC=Necessary condition

Source: Dettmer, H. W. (2007). *The logical Thinking Process: A systems approach to complex problem solving*. Milwaukee, WI: ASQ Quality Press, p. 23. Copyright © 2007. Reproduced with permission from Amer Society for Quality.

## 2.17.9. What to change?

### 2.17.9.1. Current reality tree

The current reality tree (CRT) demonstrates the current reality of a system and uses cause and effect logic to answer the question, “what to change?” (Mabin *et al.*, 2001; Cox, Blackstone, & Schleier, 2003 as cited in Kim *et al.*, 2008). A CRT a gap analysis tool that helps to identify why the current system is different from the one outlined in the intermediate objectives map (Dettmer, 2007). It helps to isolate what needs to be changed in a system by identifying shortcomings and subsequently finding their root

cause using cause and effect logic (Dettmer, 2007). The current reality tree is useful to explore complex situations, where several factors and forces affect each other (Dettmer, 2007). The CRT helps the user to identify which single change in the system will have the largest positive effect on the system overall (Dettmer, 2007).

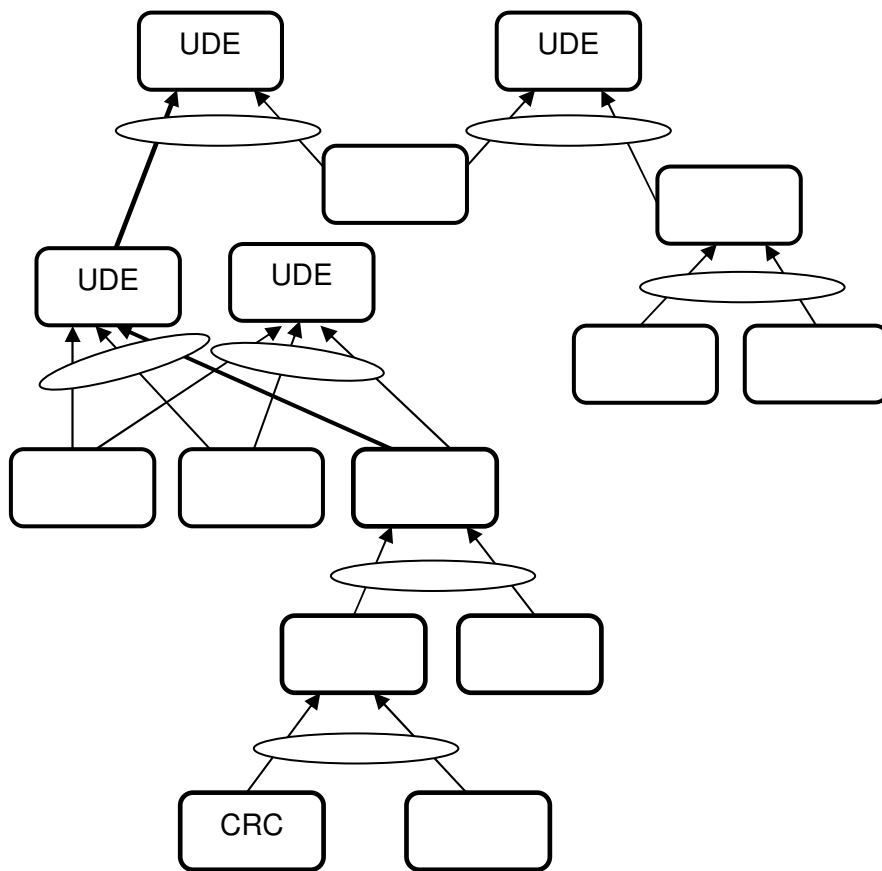
A CRT starts with the undesirable effects (UDEs) of the system and works backwards to identify the root cause (Cox *et al.*, 2003 as cited in Kim *et al.*, 2008; Dettmer, 2007; Watson *et al.*, 2007). An UDE is defined as “something that exists in reality that is negative, and has penalties for its continued existence” (Burton-Houle, 2001). Complex systems usually have more than one UDE (Dettmer, 2007). A UDE is the starting point to finding the true underlying problem in the system, as it is the most visible outcome of complex interactions within the system (Dettmer, 2007).

There are two ways to develop a CRT: the traditional approach and the 3-UDE cloud approach (Dettmer, 2007). The traditional approach consists of 10 steps that focus on finding causes for the UDEs (Kim *et al.*, 2008). The three cloud approach consists of creating three evaporating clouds, which leads to the construction of the core conflict cloud (CCC) by looking for common elements in the different clouds (Watson *et al.*, 2007). The CCC makes the building of the CRT simpler as it provides insight into the underlying conflict in the system (Watson *et al.*, 2007).

Supporters of the three cloud approach feel that the traditional approach may be too complicated, time consuming, and not always successful in convincing managers that an actual problem exists (Button, 2000 cited in Kim *et al.*, 2008; Cox *et al.*, 2003 cited in Kim *et al.*, 2008). Dettmer (2007) argues that the traditional approach follows the scientific method of problem identification, solution development, testing different solutions and ultimately choosing the best one. Dettmer (2007) reasons that the 3-UDE cloud approach is “fatally flawed” due to the use of inductive reasoning for analysis rather than verified, deductive reasoning (p. 366).

The researcher tends to agree with Dettmer (2007) and will for the purpose of this research use the traditional approach to develop the CRT. An example of the different components of a CRT is shown in Figure 6.

**Figure 6: Current Reality Tree**



UDE=Undesirable effect  
CRC=Critical root cause

Source: Dettmer, H. W. (2007). *The logical Thinking Process: A systems approach to complex problem solving*. Milwaukee, WI: ASQ Quality Press, p. 24. Copyright © 2007. Reproduced with permission from Amer Society for Quality.

## 2.17.10. What to change to?

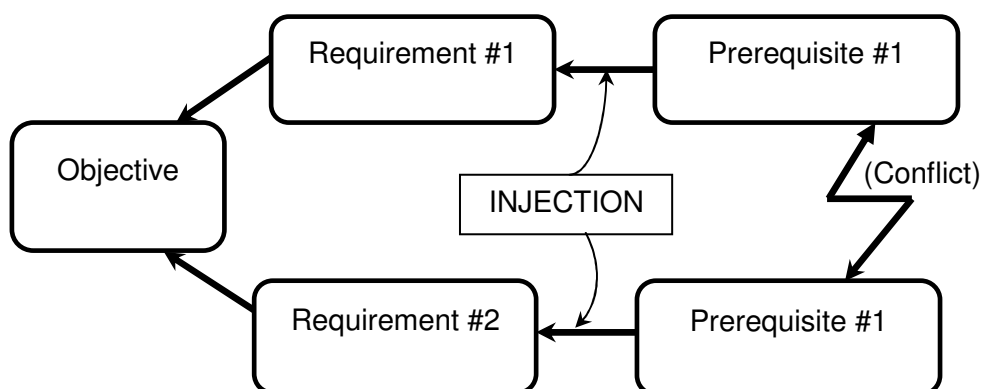
### 2.17.10.1. Evaporating cloud

Once the CRT identified “what to change?”, the next step is to use the evaporating cloud and future reality tree to find a possible solution to the core problem (Mabin *et al.*, 2001). An evaporating cloud exposes a conflict in the system, and resolves it in a way that everybody can benefit (Dettmer, 2007). There are two types on conflicts: opposite conditions and different alternatives (Dettmer, 2007). Opposite conditions are two forces that are the complete opposite one another (Dettmer, 2007). Different

alternatives are two alternatives where a choice between the two has to be made (Dettmer, 2007).

The evaporating cloud is useful to identify and resolve hidden conflicts surrounding the root causes of undesirable effects identified in the CRT (Dettmer, 2007). An evaporating cloud consists of a common objective, two necessary requirements and two prerequisites (Dettmer, 2007). The two prerequisites are in conflict with each other, and exists because of underlying assumptions (Dettmer, 2007). These underlying assumptions can be at any of the five arrows that connect these five elements (Dettmer, 2007). When these assumptions are surfaced, they can be invalidated by using an “injection”, which is represents solution to the conflict. An injection is “a new condition or action that does not exist in the current reality” to bring about the desired effect (Dettmer, 2007, p 214).

**Figure 7: The Evaporating cloud (conflict resolution diagram)**



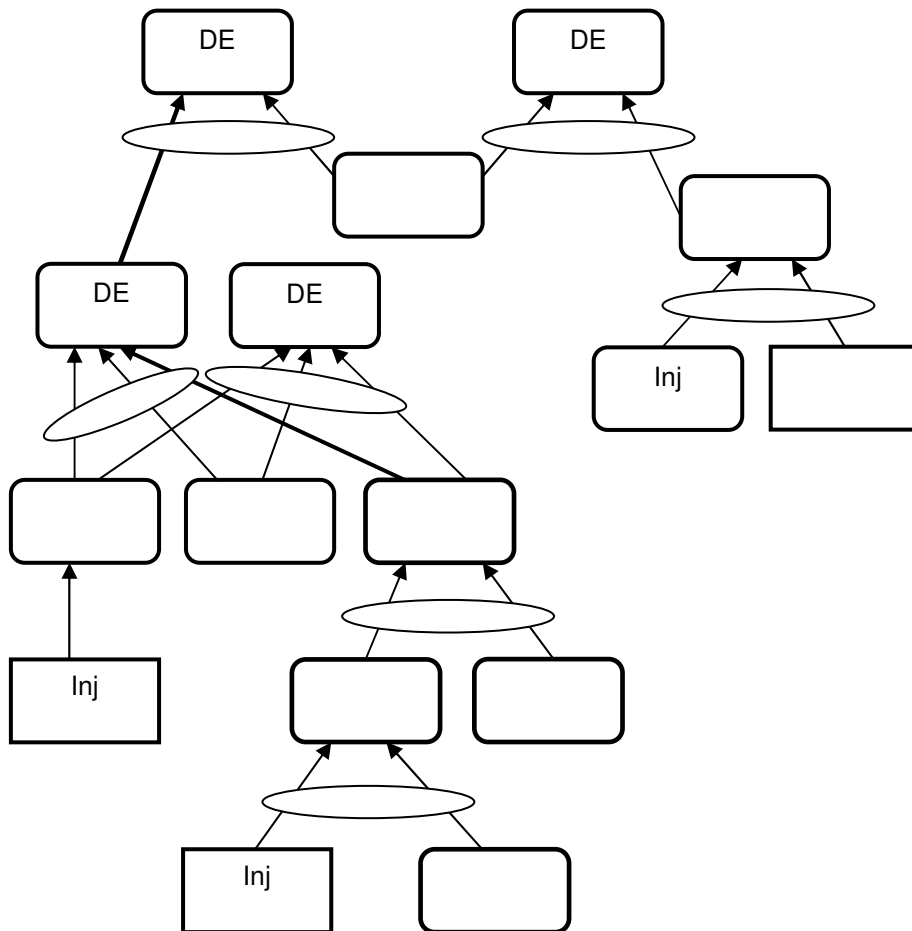
Source: Dettmer, H. W. (2007). The logical Thinking Process: A systems approach to complex problem solving. Milwaukee, WI: ASQ Quality Press, p. 25. Copyright © 2007. Reproduced with permission from Amer Society for Quality.

### 2.17.10.2. Future reality tree

The future reality tree uses sufficient cause thinking to predict if the suggested changes will have the desired effect or unintended effects (Scheinkopf, 1999; Dettmer, 2007). The future reality trees make use of “injections” (represented by the square boxes), which can be ideas that come from the current reality tree, evaporating cloud, or simply using logic and brainstorming that lead produce the desired effects (Figure 8) (Dettmer, 2007). The future reality tree can assist with exposing negative branches, which are

hidden undesirable effects (Dettmer, 2007). It can also help to identify positive reinforcing loops, where a desired effect is routed back to reinforce the new reality (Dettmer, 2007).

**Figure 8: Future reality tree**



DE=Desired effect

Inj=Injection

Source: Dettmer, H. W. (2007). *The Logical Thinking Process: A systems approach to complex problem solving*. Milwaukee, WI: ASQ Quality Press, p. 26. Copyright © 2007. Reproduced with permission from Amer Society for Quality.



## **2.17.11. How to cause the change**

### **2.17.11.1. Prerequisite tree**

A prerequisite tree helps answer the first part of the question “how to cause the change?” (Dettmer, 2007). It determines which tasks should be completed to reach a specific goal and identifies possible obstacles and ways to overcome them (Dettmer, 2007).

### **2.17.11.2. Transition tree**

A transition tree answers the second part of the question “how to cause the change?” (Dettmer, 2007). It provides stepwise instruction as to how to implement the specific actions to reach the specified goal (Dettmer, 2007).

## **2.17.12. Summary**

A summary of the relationship between the four questions, logic trees, thinking used and their goal is shown in Table 6.

**Table 6: Summary of the logic trees**

<b>Four questions</b>	<b>Logic tree</b>	<b>Thinking used</b>	<b>Goal</b>
What is the desired standard?	IO	Not applicable	Identify the goal and CSF and NC to reach it
What to change?	CRT	Sufficient cause	Identify main problems
What to change to?	EC	Necessary condition	Develop simple practical answers
	FRT	Sufficient cause	
How to cause the change?	PRT	Necessary condition	Execute answers
	TT	Sufficient cause	

Source: Adapted from Dettmer, 2007, p 29; Rahman, 1998.

## **2.17.13. TOC as applied to knowledge management and translation**

Articles in the literature on the application of TOC and TP in the field of knowledge management are limited. Ronen and Spiegler (1991) suggested a new way in which information in an organisation could be viewed and managed, by treating it as inventory (Ronen & Spiegler, 1991). One article by Morey (2001) states that if organisations do not use operations theory in their knowledge management approaches, they will not achieve the results on the bottom-line they are aiming for. He argues that organisations wrongly assume that all knowledge management interventions are equally beneficial, which results in money being spent on all of them, instead of focusing on the ones that

will directly produce results (Morey, 2001). He proposes that organisational learning takes place at the key constraints in the organisation, which might be an input constraint, capacity constraint or market constraint (Morey, 2001). No articles or publications concerning the use of TOC or TP in the field of knowledge translation could be identified.

## **CHAPTER 3: RESEARCH QUESTIONS**

The literature review identifies several factors that are important when attempting to translate knowledge into practice effectively. There is a lack of research regarding the different knowledge translation strategies used by organisations in the South African context at primary healthcare level. The literature also indicates that it is important to understand knowledge users' needs and preferences when planning a knowledge translation approach (Straus *et al.*, 2009). Finally, the Thinking Processes of Theory of Constraints represents a useful way of examining a system with the goal of optimisation (Dettmer, 2007). The TP have however not been applied to the field of knowledge translation in prior research studies.

The research questions were formulated as follows:

### **Research question 1**

What knowledge translation strategy is used by organisations involved in translating knowledge to primary healthcare workers in South Africa?

### **Research question 2**

How are primary healthcare workers keeping their knowledge up to date and how do they prefer to keep their knowledge up to date?

### **Research question 3**

What intervention will possibly improve knowledge translation in primary healthcare in the public sector?

## CHAPTER 4: RESEARCH METHODOLOGY

### 4.1. Research design

Zikmund, Babin, Carr, and Griffin (2009) define a research design as a “master plan” which serves as a framework for the researcher’s methods in gathering and evaluating information to answer the research questions. Three types of research design exist: exploratory, descriptive and explanatory (Saunders & Lewis, 2012). This research consisted of both an exploratory and descriptive research design using mixed methods.

Explorative research aims to find new ways of looking at a topic, gain new insights, and answer questions not clearly understood by the researcher (Saunders & Lewis, 2012). Exploratory research can form the basis for conducting research that is more detailed at a later stage (Sreejesh, Mohapatra, & Anusree, 2014). Qualitative research explores and develops a better understanding of an area where there is limited existing information and where the results might depend on context (Zikmund *et al.*, 2009). The qualitative research component focused on evaluating the different strategies of organisations involved in knowledge translation to primary healthcare workers in South Africa. It explores the perceived facilitators and barriers to knowledge translation in the South African context, and describes how the impact of these different strategies are measured.

Descriptive research is useful to describe the characteristics of an organisation, people or setting (Zikmund *et al.*, 2009). Descriptive research usually follows the understanding obtained from exploratory research (Zikmund *et al.*, 2009). Performing a survey is one type of research method that can be used to conduct descriptive research (Zikmund *et al.*, 2009). The quantitative component of this research describes how primary healthcare workers look for information and knowledge, as well as how they prefer to look for information and knowledge.

Mixed methods research uses both qualitative and quantitative research approaches in order to obtain an in-depth understanding of the data collected (Johnson, Onwuegbuzie, & Turner, 2007). According to Greene, Caracelli, & Graham (1989) there are five main reasons to use a mixed methods approach namely triangulation, complementarity, development, initiation and expansion. This work was expanded to a list of 16 items by Bryman (2006) namely: triangulation, offset, completeness, process, different research questions, explanation, unexpected results, instrument development, sampling, credibility, context, illustration, utility, confirm and discover, diversity of views,

and enhancement of findings. The main reasons the researcher chose mixed methods for this research was for triangulation, completeness and to be able to answer the different research questions.

Three different subtypes of mixed method research exist (Johnson *et al.*, 2007):

1. Qualitative dominant which consists of mostly qualitative data with a smaller amount of quantitative data.
2. Equal status which consists of equal amounts of qualitative and quantitative data.
3. Quantitative dominant which consists of mostly quantitative data with a smaller amount of qualitative data.

This research used a qualitative dominant approach, with a smaller quantitative component to add to the qualitative data.

This mixed methods research specifically made use of a convergent parallel design where both the qualitative and quantitative arms of this study were executed at the same time (Creswell & Clark, 2007). This approach keeps the qualitative and quantitative data collection and analysis separate, and combines it at the interpretation stage (Creswell & Clark, 2007). This design is useful to obtain a more complete understanding of the research topic (Creswell & Clark, 2007).

## **4.2. Ethics**

Permission to do this research was granted by the Gordon Institute of Business Science Research Ethics Committee. As this research involves healthcare workers, it also has written approval from the University of Pretoria, Faculty of Health Sciences Research Ethics Committee, protocol number 264/2013.

## **4.3. Research process**

### **4.3.1. Qualitative research**

#### **4.3.1.1. Description of the process followed**

Semi-structured, in-depth interviews were done with individuals heading training programmes in the selected organisations. According to DiCicco-Bloom and Crabtree (2006), semi-structured interviews consist of a set of open-ended questions determined before the interview, with more questions arising from the interaction between the researcher and the participant during the interview. The advantage of doing semi-

structured interviews is that certain specific topics can be focused on (Zikmund *et al.*, 2009). Data obtained from the semi-interviews is also easier to interpret compared to other qualitative approaches (Zikmund *et al.*, 2009). Semi-structured interviews give the researcher flexibility in terms of the order in which questions are asked, as well as having the opportunity to omit or add additional questions as appropriate (Saunders & Lewis, 2012 ). Secondary data obtained from the organisation's websites in the public domain was used for triangulation with the interview data, where needed.

#### **4.3.1.2. Universe and sampling**

The universe for this part of the study was all organisations involved in translating knowledge to primary healthcare workers in South Africa. This included academic institutions, non-profit organisations, government, as well as private businesses. The researcher used judgement (purposive) sampling to identify the organisations. Judgment sampling is a non-probability sampling method where the sample is selected by the researcher to accomplish a specific goal (Zikmund *et al.*, 2009). Organisations were identified by conducting internet searches as well as from the researcher's own knowledge regarding such organisations.

The primary sampling unit consisted of nine organisations selected from the defined population. The secondary sampling unit consisted of the heads or organisers of training activities of the organisations in the sample. Twelve people in nine organisations were interviewed which included three NGOs, three university affiliated organisations, one government organisation and one private organisation (Refer to section 5.2.1 Table 9). The aim was to understand which knowledge translation strategies are used, why they are used, and how effective they are.

#### **4.3.1.3. The unit of analysis**

The primary unit of analysis was the knowledge translation organisation. The secondary unit of analysis was the knowledge translation process itself, which looks at the interaction between the knowledge translation organisations and primary healthcare workers.

#### **4.3.1.4. Data collection and preparation**

The semi-structured interviews were conducted with the participants either face-to-face or telephonically, and lasted between 30 minutes and an hour each. Telephonic interviews were conducted with organisations located outside of Gauteng, where the

researcher is based. A semi-structured interview guide was sent to the participants prior to the interview (Appendix 1). Informed consent was obtained from all the study participants prior to conducting the interview. All interviews were recorded and subsequently transcribed verbatim. The data was subsequently checked for accuracy and other errors by listening to the recorded interviews and comparing it to the transcripts, whilst making corrections as necessary. AtlasTi software (ATLAS.ti. Version 7, 2012) was used to perform coding of the transcribed interviews. To maintain the anonymity of participating organisations and participants, a number was assigned to each organisation from one to nine. The symbols A and B were used to distinguish two different participants from the same organisation where relevant. The guaranteed anonymity for the participants made open, in-depth discussions possible.

#### **4.3.1.5. Data analysis approach**

##### **4.3.1.5.1. Content analysis**

Various approaches for analysing qualitative data exist, which include grounded theory, ethnography, phenomenology, content analysis, and narrative analysis (Elo & Kyngäs, 2008; Hsieh & Shannon, 2005; Priest, Roberts, & Woods, 2001).

To answer research question 1, a direct content analysis approach was used. Content analysis can be inductive or deductive using either qualitative or quantitative data (Elo & Kyngäs, 2008). Content analysis can be done using one of three approaches: conventional, direct or summative (Hsieh & Shannon, 2005).

1. Conventional content analysis: The research starts with observation with the codes defined and derived from the research data analysis itself.
2. Direct content analysis: The research starts with existing theory with codes defined and derived before and during using both the theory and research data.
3. Summative content analysis: The research starts with keywords, with keywords identified from the data, review of the literature, and interest of the researchers.

Direct content analysis uses the obtained research data to confirm and further develop existing theories and frameworks (Hsieh & Shannon, 2005). This represents a deductive approach to analysing the data. Key concepts and variables are identified as initial coding categories using existing research (Potter & Levine-Donnerstein, 1999). Any text that cannot be coded using the original coding scheme is assigned a new code (Hsieh & Shannon, 2005).

A deductive approach was used with coding categories identified from the literature review to answer research questions 1. The results from the interviews were triangulated to information available in the public domain on the organisations' websites where applicable. The information contained on these websites was scrutinised in terms of training courses, as well checking for the availability of online training material.

#### **4.3.1.5.2. Thematic analysis**

Any remaining data was analysed according to themes. Braun and Clarke (2006) define thematic analysis as "a method for identifying, analysing, and reporting patterns (themes) within data" (p.6). A thematic analysis looks for patterns of meaning that recur over the entire set of interviews (Braun & Clarke, 2006).

#### **4.3.1.6. Analysis to answer research question 1**

The first part of research question 1 seeks to find out more about the knowledge translation approach organisations are using. The action cycle used by Graham *et al.* (2006) was used as a framework to guide the researcher, but was not limited to it. The evaluation of the organisation's strategies was divided into knowledge creation and action phases.

The knowledge creation phase examined the organisation's design and use of their in-house materials. This also relates to adapting the knowledge to the local context, which is a component of the action cycle.

The action phase examined dissemination and implementation of knowledge, measurement and evaluation of knowledge and sustaining of knowledge use.

1. With regard to dissemination and implementation of knowledge, Prior *et al.*'s (2008) review concerned with guideline implementation strategies was used as an additional framework to classify the strategies as ineffective, uncertain to variable, and effective. The organisation's strategies in the public and private sector could subsequently be compared.
2. To evaluate how organisations measured and evaluated the effectiveness of their knowledge translation approach, Kirkpatrick's adapted model was used as an additional framework (Issenberg *et al.*, 2005; Steinert *et al.*, 2006). The organisation's strategies could subsequently be compared with one another. Special attention was given to any mention of facilitators and barriers to



knowledge translation. To assess these barriers, the model suggested by Cabana *et al.* (1999) that focuses on barriers affecting knowledge, attitudes, and behaviour, was used. The researcher argues that the presence of both facilitators and barriers would influence which knowledge translation strategy an organisation would use.

3. To evaluate how organisations sustain knowledge use, suggestions for future knowledge translation strategies were grouped together.

#### **4.3.1.7. Presentation of the findings**

Due to the differences between the public and private sector in South Africa, the analysis of the two sectors was done either combined or separately, as deemed appropriate by the researcher. This is because of the fundamental differences between the two sectors, which makes a combined analysis not always possible or appropriate.

#### **4.3.1.8. Evaluation of the qualitative rigour of this study**

To ensure the trustworthiness of the findings of a qualitative study, the following four components must be evaluated: credibility, transferability, dependability and confirmability (Lincoln & Guba, 1985 as cited in Thomas & Magilvy, 2011).

Dependability, which is comparable to the reliability in quantitative research, takes place when the methods used by one researcher are clear enough for another researcher to follow (Thomas & Magilvy, 2011). This ensures dependability and in this study the researcher gave a detailed, step-wise description of the research method followed as suggested by Thomas and Magilvy (2011).

Transferability, which is comparable to the external validity in quantitative research, refers to the question whether the research findings can be applied to other contexts (Thomas & Magilvy, 2011). As this research made use of non-probability sampling, the limitation would be that the results are not necessarily transferable.

Confirmability, which is comparable to the objectivity in quantitative research, refers to control of the researcher bias when presenting the data (Thomas & Magilvy, 2011).

Credibility, which is comparable to the internal validity in quantitative research, reflects confidence in the findings of the research (Thomas & Magilvy, 2011). Triangulation using the websites of the organisations represents one way in which the credibility of

qualitative research can be increased (Bowen, 2005; Shenton, 2004). Using random sampling also contributes to credibility (Shenton, 2004). Thus, the use of non-probability sampling in this study represents a threat to the credibility.

#### **4.3.1.9. Limitations**

1. Judgement sampling was used to identify organisations, which is a non-probability sampling method. This means that the results cannot be projected beyond the sample to the population (Zikmund *et al.*, 2009).
2. Qualitative data analysis is subjective (Zikmund *et al.*, 2009). The researcher's personal biases could have influenced the interpretation of the data, especially because the researcher works in the healthcare field.
3. Face to face interviews give the researcher extra information in terms of body language and social cues, which telephonic interviews do not do (Opdenakker, 2006). This may influence the interpretation of the data by the researcher.

#### **4.3.2. Quantitative research**

##### **4.3.2.1. Description of the process followed**

This survey collected quantitative data from primary healthcare workers using an anonymous online questionnaire.

##### **4.3.2.2. Universe and sampling**

The universe for this part of the study included all primary healthcare workers in South Africa. Primary healthcare workers working in both the public and private sector were included. Primary healthcare workers included nurses, doctors (e.g. general practitioners, medical officers), family physicians, dentists, and clinical associates working in primary care. A combination of convenience and snowball sampling was used to identify respondents. Convenience sampling uses non-probability sampling of respondents who are conveniently available to the researcher (Zikmund *et al.*, 2009). This convenience sample was subsequently used for snowball sampling.

Strictly speaking, snowball sampling is a method that selects the initial respondents using probability sampling and finds additional respondents through using information supplied by the initial respondents (Zikmund *et al.*, 2009). The initial process is in other words a random process, where all members of the population have the same chance of being selected (Zikmund *et al.*, 2009).

The researcher in other words used snowballing sample, with the difference that the initial sample was selected using non-probability sampling instead of probability sampling. The survey was initially sent to healthcare workers known by the researcher. These healthcare workers were asked to complete the survey if they fitted the inclusion criteria, and/or to forward the survey to other healthcare workers who fitted the inclusion criteria.

#### **4.3.2.3. The unit of analysis**

The unit of analysis for the survey was the primary healthcare worker.

#### **4.3.2.4. Questionnaire design**

Quantitative, descriptive research was used for the survey. The questionnaire consisted of fixed alternative questions. Fixed alternative questions consist of a limited number of specified responses, where the respondent has to choose the response closest to his/her viewpoint (Zikmund *et al.*, 2009). From the researcher's point of view, fixed alternative responses require less survey design skill and is more straightforward to analyse and interpret (Zikmund *et al.*, 2009). From a respondent's point of view, fixed alternative responses take less time to complete and are simpler to answer (Zikmund *et al.*, 2009). The questionnaire consisted of 18 questions in total (Appendix 2). The first 12 questions collected demographic and work related information. The remaining six questions focused on how healthcare workers obtain information and how they prefer to obtain information. Each of the six questions has a set of related subquestions, which used a Likert rating scale. A Likert scale is an attitudinal scale that measures the respondent's degree of agreement or disagreement towards a statement or concept (Sreejesh *et al.*, 2014).

The survey was designed using ideas from published journal articles that investigated knowledge preferences in primary healthcare workers (Dawes & Sampson, 2003; Vollmar *et al.*, 2009). The last question in the survey also contained questions around the new South African HIV guidelines that were released in April 2013. This was to serve as a reference point for the knowledge translation gap. The HIV guideline was chosen because of the high HIV disease burden in South Africa.

Pretesting of the questionnaire was done to obtain feedback regarding the clarity of the questions, to identify potential misunderstandings, as well as the presence of leading

questions. A group of four medical doctors was used for this purpose. Two of the respondents struggled with question 15, which was subsequently revised until both respondents were satisfied. All four respondents felt that the remaining questions were clear, not leading, and easy to understand and answer. The respondents were also satisfied with the overall length of the questionnaire and the time it took to complete.

#### **4.3.2.5. Data collection and management**

The survey was distributed online using the survey tool SurveyMonkey® to primary healthcare workers in both the public and private sector (SurveyMonkey Inc.). The reason for choosing an online survey tool relates to the ease of distribution to a wide audience covering the whole of South Africa. As mentioned, snowball sampling was used to reach healthcare workers by sending the link to healthcare workers known by the researcher and asked to forward the survey link to the target population. The survey was secured by a password to protect the integrity of the data. Data for the survey was collected from 30 August 2013 until 15 September 2013.

#### **4.3.2.6. Data analysis**

##### **4.3.2.6.1. Sample clean up**

The data gathered was extracted from the SurveyMonkey® website into a Microsoft Office Excel 2010 spreadsheet. There were 92 questionnaires completed in total as shown in Table 7.

**Table 7: Characteristics of the respondents**

<b>Job title</b>	<b>Number of responses</b>
Doctor (GP)	65
Family physician	17
Dentist	5
Nurse	3
Other	2
<b>Total</b>	<b>92</b>

Due to the small number of responses from both nurses and dentists, these groups were excluded from the statistical analysis, as meaningful analyses and comparisons would not be possible. In the group marked “other” there were two responses that did not fit the inclusion criteria of this study and these were subsequently excluded. The remaining 82 responses were all from doctors working in primary care, which was subsequently used for the statistical analysis.

#### **4.3.2.6.2. Overview of analysis method**

##### **4.3.2.6.2.1. Aim of the analysis**

The goal was to rank the subquestions contained in each question from most preferred to least, and to attempt to distinguish between responses that varied significantly from what could be expected under a random process of selection.

Question 17 and 18 were simple 'Yes/No' questions, while question 18 was only answered by respondents who had answered 'Yes' to question 17.

##### **4.3.2.6.2.2. Ranking: Weighted Average Score**

To rank the statements, a weighted average score was calculated for each statement with a score of 1 assigned to the most negative and 5 to the most affirmative response. The scores were subsequently weighted by using the number of votes they received.

After the weighted average score was calculated, all of the relevant subquestions were sorted from most affirmative (highest score) to least affirmative (lowest score).

##### **4.3.2.6.2.3. Identifying significance**

In order to attempt to distinguish between significant and insignificant responses to subquestions, a two-tiered approach was employed. Firstly, each individual response was tested for significance (A), and secondly the total affirmative – and total negative responses were tested for significance excluding neutral responses (B). The idea behind the latter was to distinguish between substatements that were answered in a significantly affirmative or negative fashion.

To determine significance, the average expected number of responses ( $X$ ) was subtracted from the actual response count ( $x_i$ ) and divided by the estimated standard deviation(s). Significance was seen as a standardised ( $z_i$ ) value greater than 3.

$$z_i = (x_i - X)/s$$

#### 4.3.2.6.3. Analysis of question 13 to 16

##### 4.3.2.6.3.1. Identifying significant individual responses

###### Average

The sample size (n) is 82 and there are five possible responses from the Likert scale. Under a random process one would expect on average  $82/5 = 16.4$  selections (20%) for each possible response.

###### Standard deviation

If one assumes a binomial distribution with a probability (p) of 20% for a success (a specific response is chosen) and 80% for a failure, the standard deviation for each response is:

$$\sqrt{np(1-p)} = \sqrt{82 \cdot .2(1-.2)} = 3.62$$

or 4.4% of the responses.

The number of responses in each category ( $x_i$ ) was standardised as

$$z_i = (x_i - 16.4)/3.62$$

##### 4.3.2.6.3.2. Identifying significant affirmative and negative substatements

###### Average

From the five possible responses from the Likert scale, there are two choices that are affirmative and two choices that are negative. The expected average responses under a random process are therefore two times the individual response average or  $16.4 \cdot 2 = 32.8$  observations (Table 8).

**Table 8: Calculating average responses**

	Never	Rarely	Sometimes	Often	Always
Individual responses	16.4	16.4	16.4	16.4	16.4
	Negative		Neutral	Affirmative	
Affirmative and Negative	$16.4 \times 2 = 32.8$		16.4	$16.4 \times 2 = 32.8$	

###### Standard deviation

If one assumes a binomial distribution with a probability (p) of 40% for a success (either of the two affirmative or negative statements are chosen) and 60% for a failure, the standard deviation for each response is:

$$\sqrt{np(1-p)} = \sqrt{82 \cdot .4(1-.4)} = 4.44$$

or 5.4% of the responses.

The total affirmative and negative responses for each substatement ( $x_i$ ) was standardized as

$$z_i = (x_i - 32.8)/4.44$$

### **Combined ranking**

Questions 13, 14 and 16 were constructed in such a way that it was possible to do a combined ranking that facilitates a two-dimensional understanding of the results. The combined ranking is simply the average of the individual weighted average rankings of each substatement.

#### **4.3.2.6.4. Analysis of Question 18**

##### **4.3.2.6.4.1. Identifying significant responses**

###### **Average**

The sample size ( $n$ ) is 58 (number of respondents who answered 'Yes' to question 17) and there were two possible responses. Under a random process one would expect  $58/2 = 29$  observations for each possible response.

###### **Standard deviation**

If one assumes a binomial distribution with a probability ( $p$ ) of 50% for a success and 50% for a failure, the standard deviation for each response is:

$$\sqrt{np(1-p)} = \sqrt{58 \cdot .5(1-.5)} = 3.8$$

or 6.5% of the responses.

The number of responses in each category( $x_i$ ) was standardised as

$$z_i = (x_i - 29)/3.8$$

##### **4.3.2.6.5. Comparison of the quantitative findings to the qualitative findings**

The survey results were compared to the qualitative data where applicable. This was done to identify any similarities or differences between responses obtained from knowledge users and the knowledge translation organisations.

#### **4.3.2.7. Limitations**

1. The sample is not representative of the population. A convenience sample, which is a non-probability sampling method, was used to select the initial respondents, which means that the results from this survey cannot be projected to the rest of the population (Zikmund *et al.*, 2009).
2. The sample was collected using an online survey tool, which has two inherent problems:
  - a.) Undercoverage, which is an underrepresentation of certain respondents in the population because the survey method does not allow for the selection of those respondents (Bethlehem, 2010). In this case, respondents who did not have internet access would be automatically excluded from this research.
  - b.) Self-selection bias, which means respondents, could decide if they wanted to participate in the study (Bethlehem, 2010). People who feel strongly about a topic are more likely to participate in a survey (Zikmund *et al.*, 2009). In this research, self-selection bias cannot be ruled out as it is possible that the primary healthcare workers who responded to the survey are the same ones who try to keep their medical knowledge up to date and see it as important.
3. Due to the sampling method, the non-response rate cannot be determined. Non-response due to respondents not having the technical capability to navigate the internet effectively, has also been described (Bethlehem, 2010).

#### **4.3.3. Application of the TOC Thinking Processes**

##### **4.3.3.1. Focus area of the application of the TOC Thinking Processes**

The Thinking Processes of TOC were applied to the knowledge translation process in the public sector. The DOH is ultimately responsible for getting research and policies into practice in the public sector with the assistance of the knowledge translation organisations. As the public sector serves the majority of the South African population it can be argued that optimisation of knowledge translation within the DOH, will have the biggest impact of the South African Health system.

In contrast to the public sector, the private sector consists of many independent practitioners, and does not form a cohesive group or system. Thus, the researcher argues that it is not possible to apply the Thinking Processes to the private sector as there is not overarching mechanism of control.



#### **4.3.3.2. Applying the Thinking Processes**

The Thinking Processes used the qualitative data obtained from knowledge translation organisations that focus on observed undesirable effects (UDE's) in the public sector specifically. Knowledge translation within the DOH was defined as all activities that relate to getting knowledge from research into practice, which includes the design, dissemination, implementation and evaluation of DOH guidelines in practice.

An intermediate objectives map, current reality tree, evaporating cloud and future reality tree was built. This was done to find the answer to the first two TP questions namely: "what to change?" and "what to change to". Each tree was constructed using the instructions outlined in Dettmer's book "the Logical Thinking Process" (Dettmer, 2007). The ultimate goal was to optimising the process of knowledge translation in the Department of Health and hence the public sector system. The undesirable effects used in the CRT were identified by evaluating the barriers to knowledge, attitude and behaviour as observed by the KT organisations. Solutions for the root causes of the UDE was identified by using the evaporating cloud, qualitative data as well as logical thinking. A future reality tree was lastly constructed to show how these proposed solutions lead to the desired effect in the system.

#### **4.3.3.3. Limitations**

1. As the undesirable effects were identified from the interviewed organisations, it gives an only and indirect opinion of knowledge translation challenges within the DOH system.
2. The fact that the researcher is a healthcare worker may lead to bias when constructing solutions to optimise knowledge translation.

## **CHAPTER 5: RESULTS**

### **5.1. Introduction**

This study used a mixed methods approach, which included both qualitative and quantitative data. A qualitative dominant mixed methods approach was used with the majority of the data being qualitative with a smaller amount of quantitative data.

Qualitative data was collected by conducting semi-structured interviews with organisations involved in knowledge translation to primary healthcare workers in South Africa and analysed using AtlasTi software.

Quantitative data was collected by an online survey targeting primary healthcare workers in South Africa to assess their knowledge needs and preferences and the data was statistically analysed using Microsoft Office Excel 2010.

Lastly, the Thinking Processes of TOC were applied to the qualitative data from the public sector to identify ways in which the knowledge translation process can be optimised.

### **5.2. Research question 1: qualitative data**

#### **5.2.1. Description of the research sample**

Nine organisations involved in knowledge translation to primary healthcare workers in South Africa were interviewed. The sample consisted of three non-governmental organisations (NGOs), three university affiliated organisations, one government municipality and one membership organisation.

Twelve interviews in total were done. One person was interviewed in Organisation 1, 3, 5, 6 and 8. Two people were interviewed in Organisation 2, 4, and 9. Interviewing a second person was in all cases suggested by the organisation itself, as the organisation felt this person could shed more light on a specific aspect of their training programme. A summary of the type of organisation, the number of people interviewed per organisation, and the interview method is shown in Table 9.

**Table 9: Organisations interviewed**

Org	Type of organisation	Face-to-face	Telephonically
1	Non-governmental organisation	Person A	
2	Membership organisation		Person A Person B
3	Government municipality	Person A	
4	Non-governmental organisation	Person A Person B	
5	Private	Person A	
6	University affiliated		Person A
7	University affiliated		Person A
8	Non-governmental organisation	Person A	
9	University affiliated	Person A Person B	

### 5.2.2. The sector and scope of the organisations

Organisations indicated by the use of percentages, the amount of knowledge translation activities they do in the public and private sector respectively. Organisations' scope of training was divided into either narrow or wide. A narrow scope was defined as knowledge translation focused on a limited number of disease conditions. A wide scope was defined as knowledge translation focused on a wide range of disease conditions. A summary of the findings is shown in Table 10.

**Table 10: Sector and scope of organisations interviewed**

Org	Sector		Scope
	Public	Private	
1	95%	5%	Narrow: HIV
2	80%	20%	Narrow: HIV
3	100%	0%	Wide: all diseases
4	60%	40%	Wide: all diseases
5	100%	0%	Narrow: HIV
6	60%	40%	Wide: all diseases
7	100%	0%	Wide: all diseases
8	90%	10%	Narrow: HIV
9	90%	10%	Narrow: HIV

Most organisations focus solely to predominantly on the public sector in terms of knowledge translation. Organisation 3, 5 and 7 were active in the public sector only. Organisation 4 and 6 had the highest level of involvement in the private sector, followed in decreasing order of involvement by Organisation 2, 8, 9 and 1.

Organisations 3, 4, 6 and 7 have a wide scope, focusing on both communicable and non-communicable disease conditions. Organisation 1, 2, 5, 8 and 9 focused mainly on HIV and conditions surrounding HIV. Organisation 7 stood out as they conducted

primary research to identify the most common reasons why patients visit primary healthcare facilities, and are focusing on knowledge translation pertaining to these diseases. Organisation 8 indicated that they are currently in the process of widening their scope, which addresses the concern Organisation 7 has with regard to the HIV focused KT approach.

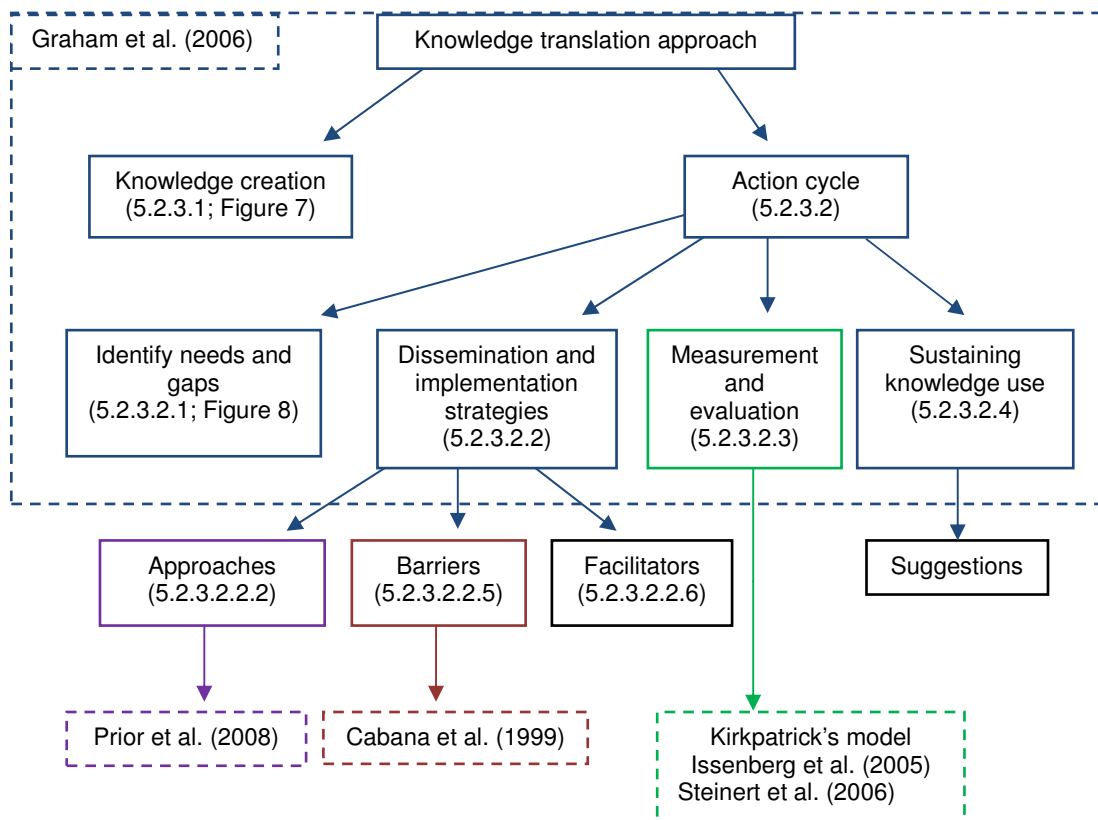
*"We are concerned by the level of fragmentation the whole HIV programme has brought in. These people are now surviving on HAART. They have a much higher risk of non-communicable diseases and mental health conditions. Those are not going to be addressed, you know, if we don't broaden that focus"* [Organisation 7]

*"I think anybody delivering healthcare should be a holistic, head to toe practitioner"* [Organisation 8]

### 5.2.3. Research question 1: analysis outline

In order to answer Research question 1, the data was analysed using the outline in Figure 9, which serves as a roadmap along which the results are tied together. This outline is based on Graham *et al.*'s model (2006) with several other additional models incorporated to analyse specific knowledge translation steps.

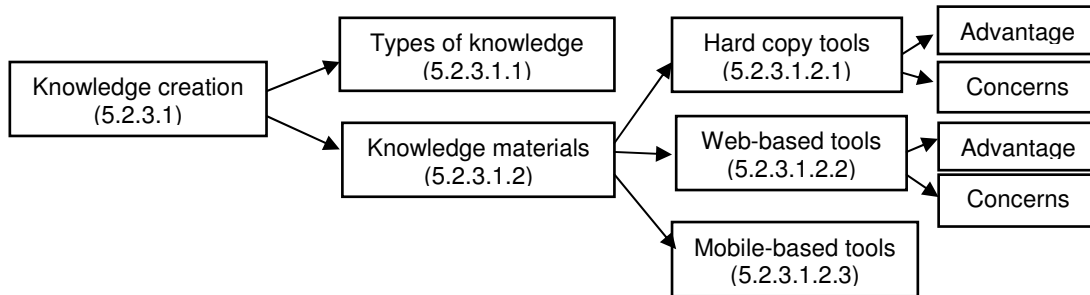
**Figure 9: Analysis outline**



### 5.2.3.1. Knowledge creation

An outline of the analysis of the knowledge creation step is shown in Figure 10.

**Figure 10: Knowledge creation: analysis outline**



#### 5.2.3.1.1. Type of knowledge

The knowledge created by each of the organisations was divided into first, second and third generation knowledge using the Graham *et al.* (2006) knowledge creation model (Table 11).

**Table 11: Types of knowledge**

Knowledge	Example
1. First generation	Organisation 1, 4, 7, 8 and 9 conduct their own primary research to generate first generation knowledge, which is published in scientific journals.
2. Second generation	Organisation 2 and 6 make use of disease experts to write articles, which collates information from various sources on a specific topic.
3. Third generation	Organisation 2 publishes guidelines written by HIV experts.
	Organisation 5 designs posters to show healthcare workers how to collect specimens for HIV testing.
	Organisation 7 uses existing guidelines combined with other sources to design user-friendly decision-making tools containing both algorithms and checklists. <i>"We have spent quite a lot of time looking at the <b>evidence synthesis component</b> [emphasis added] of knowledge translation and how guidelines are packaged"</i> [Organisation 7]
4. Repackaging third generation	Existing guidelines are put into a user-friendly form, in essence repackaging existing third generation knowledge. <i>"We developed materials starting last year to simplify the existing guidelines, not to run anything parallel to them, actually using the DOH guideline"</i> [Organisation 1]
	<i>"You can get the same information anywhere, all the guidelines are guidelines and you can decipher it from the guideline into your own material, it's not really your own knowledge"</i> [Organisation 8]

### 5.2.3.1.2. Knowledge materials

Knowledge materials were divided into hard copy, web-based and mobile-based tools. Hard copy tools were defined as booklets, books, posters and other material that are distributed to healthcare workers for references purposes. Web-based tools were defined as any knowledge and information that is available on the organisation's website. Mobile-based tools were defined as knowledge translation involving mobile phones.

Organisations that present courses develop content for these courses in the form of presentations and course materials, which are distributed to course attendees. There was however, a paucity of data from the interviews on this aspect and it was thus excluded from this analysis.

Eight organisations develop their own materials to disseminate information (Table 12). Organisation 3, the only governmental organisation, does not design its own materials, but distributes existing DOH guidelines and protocols to healthcare workers. Three organisations use both hard copy and web-based tools, two use hard copy tools only and three use web-based tools only.

Six out of the nine organisations use hard copy tools, which form an integral part of the organisation's knowledge translation approach. The tools are used in both the public and private sector depending on where the activities of the organisation are focused. Six of the nine organisations use web-based tools, of which the majority is open source. Only Organisation 2 uses mobile-based tools in the form of sending text messages to paying members on a weekly basis.

**Table 12: Tools, focus and sector of interviewed organisations**

Org	Hard copy tools		Web-based tools	
	Examples	Availability	Examples	Availability
1	Guideline book Pocket book Desk calendar	Freely available on request	All hard copy tools	Open source and can be downloaded
2	Journal with articles	Paying members	Journal articles and other content e.g. guidelines, past CPD presentations	Open source and can be downloaded
4			Online courses	Only available if registered for that course
5	Booklet	Freely available on		

Org	Hard copy tools		Web-based tools	
	Examples	Availability	Examples	Availability
	Poster DVD	request and distributed to all training sites		
6	Book	Paying members	Articles	Requires user registration but content is free
7	Guideline book	Available at training sites		
8			Presentations from conferences and training courses	Open source and can be downloaded
9			Research publications	Open source and can be downloaded

### 5.2.3.1.2.1. Hard copy tools

#### 5.2.3.1.2.1.1. Advantages of hard copy tools

The advantages of using hard copy training tools are shown in Table 13.

**Table 13: Advantages of hard copy tools**

Advantage	Example
1. User-friendly	<i>"We identified how difficult it is to look at guidelines that people don't know. When they do know, they do not know how to look at them and how to read them. So we developed materials starting last year <b>to simplify</b> [emphasis added] the existing guidelines" and "We try to make it colourful and <b>simple</b> [emphasis added] for them to understand and use every day and we don't just dump them there we take them through them [Organisation 1]</i>
	<i>"It is very visual and <b>very simple</b> [emphasis added] to understand, it has been divided into different steps" [Organisation 5]</i>
	<i>"We try to be very strict about limiting one construct to one page, so that the entire clinical decision making process is captured with <b>one view</b> [emphasis added]. It is really important that it looks attractive and be very <b>clearly laid out</b> [emphasis added]. It is as important as the content" [Organisation 7]</i>
2. Meets a need	<i>"Our magazine is very clinical, because we have those nurses that are studying and it helps them. Even those that aren't studying, it still helps them, especially those working with HIV and TB patients, because our articles are mostly related to that" [Organisation 2B]</i>
	<i>"Because a lot of the rural doctors don't like to work on computers, so we developed a book, and every year we bring out a book" [Organisation 6]</i>
3. Updates knowledge	<i>"Some of the nurses did say, we're very thankful for the TB tool, it helped me this morning, the patient came in with such and such drug that I did not recognise, but because of this book, I saw in this book it is the new MDR [Multidrug resistant] treatment" [Organisation 2B referring to Organisation 1's TB tool]</i>

4. Consolidates different sources	<p><i>"I would go through the guidelines and <b>consolidate them</b> [emphasis added] and make them easy to understand" [Organisation 2B]</i></p>
	<p><i>"We will also <b>collate all the source materials</b> [emphasis added] nationally, for that will have a bearing on those guidelines. So all the national guidelines come together and review all that content, see if they have left anything out" [Organisation 7]</i></p>
5. Continuity in the absence of training	<p><i>"The tools are some kind of continuity in the process so even if someone else comes in then they will be able to pick up the book, it's that simple, and look at the poster and look at how you do it" [Organisation 5]</i></p>

#### 5.2.3.1.2.1.2. Concerns regarding hard copy tools

Organisation 9B identified two concerns regarding hard copy tools which are shown in Table 14. No other organisation mentioned any specific concerns.

**Table 14: Concerns regarding hard copy tools**

Concern	Example
1. Confusion	<p><i>"Provinces that do new tweaks to the guidelines and do it slightly differently again because <b>it causes confusion</b> [emphasis added] because the patient goes one place and goes to another place and get told different things and fight with the nurse about it" [Organisation 9B]</i></p>
2. Cost	<p><i>"We got the national training now, that theoretically everybody is supposed to be training on, but I suspect people have made their own training materials, and that is a <b>waste of resources actually</b> [emphasis added]" [Organisation 9B]</i></p>

#### 5.2.3.1.2.2. Web-based tools

##### 5.2.3.1.2.2.1. Advantages of web-based tools

Organisations identified two advantages of using web-based tools which are show in Table 15.

**Table 15: Advantages of web-based tools**

Advantages	Example
1. Freely available	<p><i>"It's not feasible to say you can only get this information if you are a member" [Organisation 2A]</i></p>
2. Wide variety of topics covered	<p><i>"The website is very easy because there are nearly 900 articles on the website, and I think it's <b>more of a variety</b> [emphasis added] on the website" [Organisation 6]</i></p>



### 5.2.3.1.2.2. Concerns regarding web-based tools

Underutilisation of online content was the major concern raised by organisations. Several possible reasons for this underutilisation could be identified. A summary of these findings is shown in Table 16.

**Table 16: Concerns regarding web-based tools**

Concern	Example
1. Underutilisation	<i>"We got fifteen courses online the didactic courses that we have, but then they are now online so then they would be able to go to the website and access them. <b>Statistically we are not really doing that well</b> [emphasis added], we have less than two hundred and fifty people currently" [Organisation 4A regarding their online platform]</i>
Reasons	Examples
1. Computer literacy	<i>"Even in Joburg [Johannesburg], nurses, most of them are technologically challenged. In the clinics, we are just so sceptical about the internet, it scares us, but I am not talking for all of the nurses" [Organisation 2]</i>
2. User preferences	<i>"They [older doctors] don't like to work on the computer they prefer to order the book" [Organisation 6]</i> <i>"A lot of rural doctors don't like to work on computers" [Organisation 6]</i>
3. Lack of awareness	<i>"We <b>need to market</b> [emphasis added] our courses, and especially our website as well is very underused and it's a very good website" [emphasis added] [Organisation 6])</i>
4. No internet access	<i>"<b>If they had an access to internet</b> [emphasis added], they could just go to the Department of Health website and download those [the guidelines]" [Organisation 2 B referring to rural areas]</i> Also refer to Table 37, Infrastructure in rural areas.

### 5.2.3.1.2.3. Mobile-based tools

The main advantage of mobile-based tools is that it made knowledge accessible in areas with limited infrastructure. No concerns were raised regarding this method.

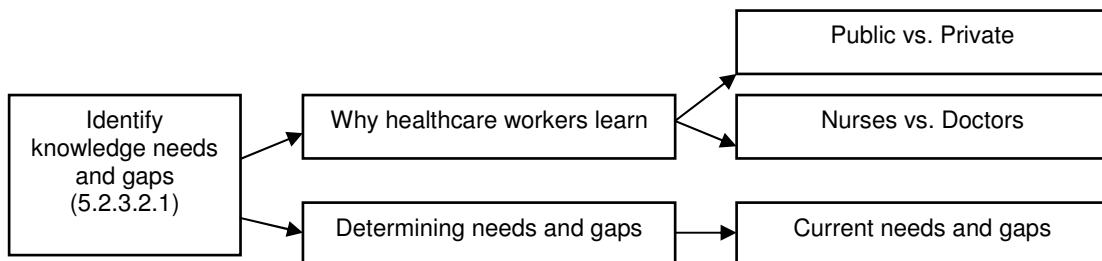
<i>"Most nurses don't have email addresses because we deal with nurses in rural areas as well. So the best is SMS with the tip" and "About 99% have cell phones, so at least they get the information through SMS tips [Organisation 2B]</i>
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### 5.2.3.2. Action cycle

#### 5.2.3.2.1. Identifying knowledge needs or gaps

An outline of the knowledge needs and gaps analysis is shown in Figure 11.

**Figure 11: Knowledge needs and gaps**



#### 5.2.3.2.1.1. Why healthcare workers learn

In the public sector, the Department of Health implements guidelines that must be followed by healthcare workers. In the private sector, CPD points seemed to be a major driver amongst doctors (Table 17 and 18).

**Table 17: Public vs. Private sector**

Public sector	Private sector
<i>"Here they are forced to go through the guideline, <b>they don't have a choice</b> [emphasis added] because nobody wants to be seen as not performing" [Organisation 3]</i>	<i>"Particularly in the private sector there is a lot of anxiety about CPD" [Organisation 9A]</i>
<i>"They don't go out and get information, <b>they get prescribed</b> [emphasis added] that you need to do x, y and z" [Organisation 8]</i>	<i>"For the private guys they do need it, the CPD points, especially if there are ethic points" [Organisation 9B]</i>
<i>"Public sector, I think people get a lot of teaching" [Organisation 9A]</i>	<i>"There is a lot of buy-in from the GPs in that area who want to know, who have come out and who have requested training" [Organisation 8]</i>

**Table 18: Nurses vs. doctors**

Nurses	Doctors
<i>"For nurses we are starting in August with CPD points" [Organisation 3]</i>	<i>"It is an incentive but I find they come for the knowledge as well, not just for the points" [Organisation 1]</i>
<i>"Apparently they are starting the nurses CPD points" [Organisation 8]</i>	<i>"Yes, that [CPD points] is definitely an incentive, doctors can get audited and they do at any time" [Organisation 2B]</i>
	<i>"Ethics is a big drive, if you have something about ethics everybody wants to be there"</i>

Nurses	Doctors
	[Organisation 8]
	<i>“Yes, particular private sector there is a lot of anxiety about CPD”</i> [Organisation 9A]
	<i>“Doctors, I a lot of them will attend regardless but it is something [CPD points] that they need”</i> [Organisation 9B]

### 5.2.3.2.1.2. Determining knowledge needs and gaps

Organisations use different methods to determine knowledge needs and gaps, which is shown in Table 19.

**Table 19: Determining knowledge and gaps**

Method	Example
1. Course evaluation forms	<i>“With each course we have an <b>evaluation form</b> [emphasis added], and there’s a needs analysis on the evaluation form. So we do that according to the needs analysis out of the evaluation”</i> [Organisation 6])
2. Personal interaction	<i>“With the tool I encourage the direct supervisors to sit with the subordinates to see either <b>one on one</b> [emphasis added] or in a group and determine training needs”</i> [Organisation 3] <i>“People <b>meet the mentor</b> [emphasis added] and they establish what their needs are because people have different experience in different things”</i> [Organisation 4B]
3. Measurement and evaluation process	Doing file audits and using DHIS data. (Refer 5.2.3.2.3: Measurement and evaluation)

### 5.2.3.2.1.3. Current knowledge translation gaps

Organisations identified various knowledge translation gaps. Some of these gaps were related to the knowledge itself, whilst others related more to the knowledge translation process (Table 20).

**Table 20: Current knowledge translation gaps**

Gap	Example
<b>Knowledge</b>	
1. Pre-service training	<i>“this nursing sister said to me that the training of nurses currently, it is almost like pushing numbers, so people [nurses] <b>don’t get to go through the basics</b> [emphasis added] and the fundamentals of being a nurse” ; “we found that whatever the nursing colleges have been doing, it’s so outdated”</i> [Organisation 5]

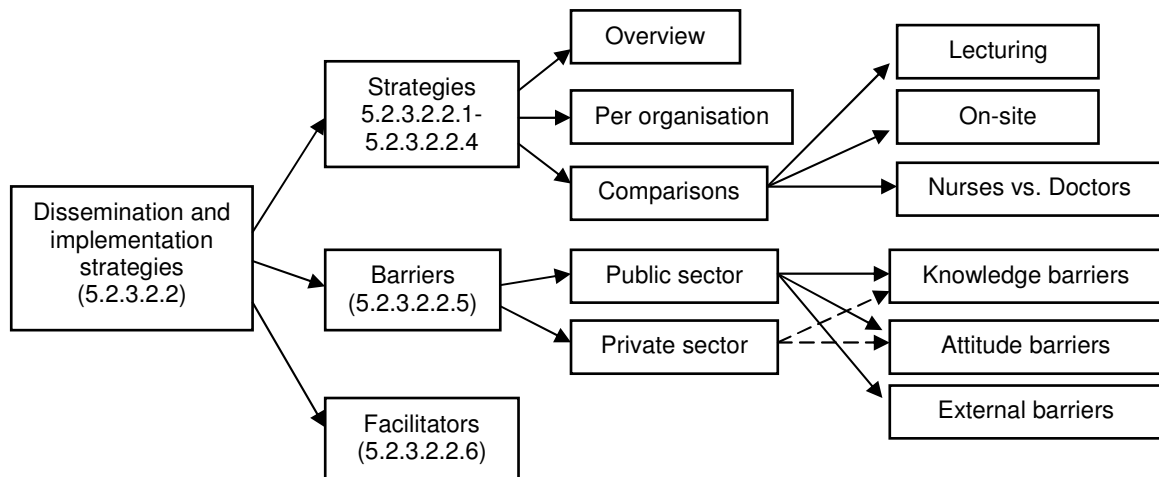
Gap	Example
<b>Knowledge</b>	
	<p><i>“The <b>biggest gap currently is pre-service</b> [emphasis added], so before they even leave varsity [university], we feel that they should already have been trained in all these [NIMART, PALS A Plus, IMCI] because you are going to a community service” [Organisation 8]</i></p> <p><i>“common colds and other run of the mill problems that would be seen routinely and that would be routine HIV now, you wouldn’t see in those environments [academic hospitals]” [Organisation 9B referring to the training doctors receive]</i></p>
2. Primary care level	<p><i>“doctors who haven’t got involved in it [antiretroviral management] got left behind and have lost out and nurses are almost more competent than doctors in terms of ARV’s [Organisation 4B]</i></p> <p><i>“now you have to have one nurse offering all services so they only know what they have been doing [a specialised area for example, immunisations], and that is the gap” and “The doctors are supposed to evaluate X-rays. They don’t have enough expertise to do that, so hopefully your radiologist gives you a nice report” [Organisation 8]</i></p> <p><i>“we shifted it to primary healthcare nurse initiation and nurse management and we left out the private sector and also to a large extent left out the doctors” [Organisation 9B]</i></p>
<b>KT process</b>	
1. Not enough peer review	<i>“with doctors, our clinical notes are so sacrosanct that I think in some ways we are a little bit protective but there is not enough peer review” [Organisation 9A]</i>
2. Not enough knowledge translation expertise	<i>“So it is this balancing the clinical agenda, with the public health agenda. And it requires specific knowledge translation expertise to do that, and there isn’t enough of that, in the national department [DOH]” [Organisation 7]</i>

### 5.2.3.2.2. Dissemination and implementation strategies

#### 5.2.3.2.2.1. Analysis outline

An outline of the dissemination and implementation strategies is shown in Figure 12.

**Figure 12: Dissemination and implementation strategies**



**5.2.3.2.2.2. Overview of all organisations**

The strategies used in the public and private sector are shown separately due to the inherent differences between the two sectors. It is important to keep in mind that the tools mentioned in section 5.2.3.1 form an integral part of the organisation's dissemination and implementation strategy. An overview of the different dissemination and implementation strategies is shown in Table 21.

The summary of the dissemination and implementation strategy of each organisation is shown in Table 21. This is followed by the results of each organisation individually.

**Table 21: Knowledge dissemination and implementation strategies**

Org	Sector	Ineffective	Variable	Effective
1	Public	<b>Traditional educational</b> • Short courses • Seminars • Website	Audit and feedback	<b>Educational outreach</b> • NIMART, PALSA Plus
	Private	<b>Traditional educational</b> • Short courses • Seminars • Website		
2	Public	<b>Traditional educational</b> • Journal • CME meetings • Conference • Mobile text messages • Website		<b>Interactive educational</b> • Online case studies with questions • Skills workshops • Clinical workshops (Nurse programme)
	Private	<b>Traditional educational</b> • Journal		<b>Interactive educational</b> • Online case studies with

Org	Sector	Ineffective	Variable	Effective
		<ul style="list-style-type: none"> <li>• CPD meetings</li> <li>• Conference</li> <li>• Mobile text messages</li> <li>• Website</li> </ul>		<ul style="list-style-type: none"> <li>• questions</li> <li>• Skills workshops</li> </ul>
3	Public	<b>Dissemination only</b> <ul style="list-style-type: none"> <li>• Email/fax/post DOH guidelines*</li> </ul>	Audit and feedback	<b>Interactive educational</b> <ul style="list-style-type: none"> <li>• Morning lectures with afternoon practical</li> <li>• Clinical discussion forum</li> </ul> <b>Educational outreach</b> <ul style="list-style-type: none"> <li>• NIMART</li> </ul>
4	Public	<b>Traditional educations</b> <ul style="list-style-type: none"> <li>• Distance education</li> </ul>	Audit and feedback	<b>Interactive educational</b> <ul style="list-style-type: none"> <li>• Workshops with role play or case discussion</li> </ul> <b>Educational outreach</b> <ul style="list-style-type: none"> <li>• NIMART</li> </ul>
	Private	<b>Traditional educations</b> <ul style="list-style-type: none"> <li>• Distance education</li> </ul>		<b>Interactive educational</b> <ul style="list-style-type: none"> <li>• Workshops with role play or case discussion</li> </ul>
5	Public			<b>Interactive educational</b> <ul style="list-style-type: none"> <li>• Lectures with practical</li> </ul>
6	Public	<b>Traditional educational</b> <ul style="list-style-type: none"> <li>• Short courses</li> <li>• Website</li> </ul>		<b>Interactive educational</b> <ul style="list-style-type: none"> <li>• Short course with practical</li> </ul>
	Private	<b>Traditional educational</b> <ul style="list-style-type: none"> <li>• Short courses</li> <li>• Website</li> </ul>		<b>Interactive educational</b> <ul style="list-style-type: none"> <li>• Short course with practical</li> </ul>
7	Public			<b>Educational outreach</b> <ul style="list-style-type: none"> <li>• Primary care including NIMART, PALSA PLUS</li> </ul>
8	Public	<b>Traditional educational</b> <ul style="list-style-type: none"> <li>• Lectures</li> </ul>		<b>Interactive/outreach</b> <ul style="list-style-type: none"> <li>• NIMART, PALSA PLUS</li> </ul>
	Private	<b>Traditional educational</b> <ul style="list-style-type: none"> <li>• Lectures</li> </ul>		
9	Public	<b>Traditional educational</b> <ul style="list-style-type: none"> <li>• Lectures</li> <li>• Conferences</li> </ul>		<b>Educational outreach</b> <ul style="list-style-type: none"> <li>• NIMART</li> </ul> <b>Interactive educational</b> <ul style="list-style-type: none"> <li>• Workshops</li> </ul>
	Private	<b>Traditional educational</b> <ul style="list-style-type: none"> <li>• Lectures</li> <li>• Conferences</li> </ul>		<b>Interactive educational</b> <ul style="list-style-type: none"> <li>• Workshops</li> </ul>

### 5.2.3.2.2.3. Dissemination and implementation strategy per organisation

#### 5.2.3.2.2.3.1.1. Organisation 1

The dissemination and implementation strategy of Organisation 1 is shown in Table 22. Organisation 1 does 70% of their training in rural areas and 30% in urban areas.

**Table 22: Organisation 1 dissemination and implementation**

Method	HCW	Notes
1. Short courses	Doctors	ART in adults and children
	Nurses	Basic HIV courses If not ready for NIMART
2. Seminars	Doctors Nurses	Feedback from information from conferences
3. Audit and feedback	Nurses	Quality improvement as part of NIMART
4. NIMART	Nurses	ART: theory followed by mentoring on-site
5. Website	Not applicable	All hardcopy tools are open source and can be downloaded

**5.2.3.2.2.3.1.2. Organisation 2**

The dissemination and implementation strategy of Organisation 2 is shown in Table 23. The reason for using their current overall KT approach relates to making the best use of the organisation's limited human resources.

**Table 23: Organisation 2 dissemination and implementation**

Method	HCW	Notes
1. Journal	Doctors Nurses	Distributed quarterly to members only via post or email. Left over hardcopies are distributed at workshops and CPD meetings free of charge.
2. CPD meeting	Doctors Nurses	Monthly meetings at 16 different sites, 50% being in urban areas and 50% in rural areas.
3. Conference	Doctors Nurses	Every 2 years
4. Mobile text messaging (clinical tips)	Nurses	Weekly tips to members only (fees)
5. Online case studies	Mostly doctors	CPD points to members only (fees)
6. Website	Not applicable	Journal, past CPD presentations, various guidelines are freely available online
7. Skills workshop	Doctors Nurses	At other HIV and TB conferences Usually 1-2 hours long on something practical
8. Clinical workshop "nurse programme"	NIMART nurses	Half-day workshop with case discussions in groups with facilitator

**5.2.3.2.2.3.1.3. Organisation 3**

The dissemination and implementation strategy of Organisation 3 is shown in Table 24. As Organisation 3 is part of a municipality, it is responsible for internal training of its own staff. Organisation 3 collaborates with other organisations for external training programmes for courses that they cannot give themselves. The fact that is an urban

area meant that infrastructure, for example, telephones and internet was not a barrier to knowledge transfer.

**Table 24: Organisation 3 dissemination and implementation**

Method	HCW	Notes
1. Dissemination	Doctors Nurses	Guidelines via email or fax
2. Audit and feedback	Doctors Nurses	Certificate of competence given if the audit is in order Checks healthcare worker compliance with the guidelines and protocols
3. Morning lectures with afternoon practical	Doctors Nurses	Certificate of attendance is given
4. Clinical discussion forums	Doctors Nurses	Monthly compulsory meeting for all clinics in this municipality Discussion of problem cases

#### 5.2.3.2.2.3.1.4. Organisation 4

The dissemination and implementation strategy of Organisation 4 is shown in Table 25.

**Table 25: Organisation 4 dissemination and implementation**

Method	HCW	Notes
1. Distance learning courses ± an interactive workshop component	Doctors Nurses	Various topics
2. Interactive workshops	Doctors Nurses	Various topics
3. NIMART	Nurses	5-day workshop on ART initiation followed by mentoring
4. Audit and feedback	Nurses	Part of NIMART programme

#### 5.2.3.2.2.3.1.5. Organisation 5

Organisation 5 focuses on training healthcare workers on taking specimens correctly for one of the diagnostic tests they have designed, which is being used in public sector laboratories. Their training is comprehensive, as it does not only focus on specimen collection, but also on collecting data to put in the DHIS register and the follow up of the patient in future. The dissemination and implementation strategy of Organisation 5 is shown in Table 26.



**Table 26: Organisation 5 dissemination and implementation**

Method	HCW	Notes
1. Lectures and practical	Nurses	HIV-related laboratory tests

**5.2.3.2.2.3.1.6. Organisation 6**

Organisation 6 focuses mostly on small towns in more rural areas. As this organisation is university affiliated, the content of the courses is strictly controlled. Courses range from a couple of hours to a couple of days. The majority of courses have a practical component accompanied by a test of the theory and practical by a competency certificate. The dissemination and implementation strategy of Organisation 6 is shown in Table 27.

**Table 27: Organisation 6 dissemination and implementation**

Method	HCW	Notes
1. Short courses (lectures)	Doctors Nurses	Various topics
2. Short courses with practical	Doctors Nurses	Various topics
3. Book	Doctors Nurses	Journal articles with CPD points available
4. Website	Doctors Nurses	Journal articles with CPD points available Needs to register with HPCSA number

**5.2.3.2.2.3.1.7. Organisation 7**

The dissemination and implementation strategy of Organisation 7 is shown in Table 28. Organisation 7 follows an educational outreach model, which consists of short one to two-hour sessions conducted on-site. Organisation 7 trains nurse middle managers in the public sector as trainers, who then travel to the facilities and deliver the on-site training.

**Table 28: Organisation 7 dissemination and implementation**

Method	HCW	Notes
1. On-site training	Nurses	NIMART, PALSA Plus, Primary care course

*"We have done a series of pragmatic randomized control trials, looking at the effectiveness of this approach . . . those trials have shown that, we are able to show that our programme yields modest improvements in quality of care indicators, but multiple improvements at the same time. So there is strength in one component of care, it actually strengthens multiple components of care, at the same time. But the improvements are modest. And they are in the range of 5 to 15% effect sizes which is really what is consistent with what all the international literature has shown, for changing professional practice trials"*

*“the model that we didn’t want to pursue, was the model that had been used by IMCI for many years, which is where they take sort of one person out of a clinic, train them away from their colleagues, away from their patients for two weeks, and then they return to the clinic, and automatically assume that they disseminate the information at the clinic, ok, and that doesn’t happen, because they have not been equipped to do that”*

#### 5.2.3.2.2.3.1.8. Organisation 8

The dissemination and implementation strategy of Organisation 8 is shown in Table 29.

**Table 29: Organisation 8 dissemination and implementation**

Method	HCW	Notes
1. Lectures/Workshops	Doctors	HIV resistance workshop
2. On-site training	Nurses	NIMART, PALSA Plus, Primary care course

#### 5.2.3.2.2.3.1.9. Organisation 9

Organisation 9 has both external and internal training programmes. External training programmes focus on niche training as opposed to other organisations that do mass training. The dissemination and implementation strategy of Organisation 9 is shown in Table 30.

**Table 30: Organisation 9 dissemination and implementation**

Method	HCW	Notes
1. Lectures (courses)	Doctors Nurses	Advanced HIV management
2. Conferences	Doctors Nurses	
3. On-site training	Nurses	NIMART
4. Workshops	Doctors Nurses	

#### 5.2.3.2.2.4. Comparisons between organisations

##### 5.2.3.2.2.4.1.1. Lecturing

Organisation 1, 3, 4, 7 and 9A all mentioned the preference to use practical sessions, both on or off-site, instead of didactic lecturing which is shown in Table 31.

**Table 31: Opinion on lecturing vs. practical sessions**

Org	Opinion on lecturing vs. practical sessions
1	<i>“We still do have lectures, because they also ask for lectures it is something that <b>we really don’t want to do</b> [emphasis added]”</i>
3	<i>“our nurses, they do have the theoretical knowledge, they don’t have the practical know-how, they don’t have the skills to do the job so that is why we</i>

Org	Opinion on lecturing vs. practical sessions
	<i>went for that [practical] approach”</i>
6	<i>“It’s easy to sit in a class and just listen, but you don’t always take everything in. . .if you do a practical side of the course, I think you learn much more, and we decided that’s the best way to go”.</i>
7	<i>“there is fairly a strong evidence base that suggests that sort of passive didactic means are not as effective”</i>
9A	<i>“I am quite critical of didactic training. . .I believe that clinical bedside teaching is by far the most effective, but it is also the most expensive”</i>

#### 5.2.3.2.2.4.1.2. On-site training

On-site training includes one-on-one mentoring or group-training sessions conducted in the facility. Organisation 1, 3, 4, 7, 8, and 9 were all involved in NIMART training courses, which involved mentoring on-site.

*“Our definition within the organisation is mentoring is one-on-one and mentoring has to be at least 30 minutes and you have to sit with that person to actually see what they are doing” [Organisation 8]*

NIMART focuses on nurses in the public sector and only consists of a theory component done either on or off-site followed by mentoring on-site. A trained mentor nurse is responsible to do this mentoring. Support formed an integral part of the NIMART programme where nurses could contact their mentor in a variety of ways when a problem case was encountered.

*“Mentoring, it’s quite a formal process the government has developed a manual which sets the whole thing out how it happens” and “we are convinced the mentorship works” [Organisation 4B]*

A summary of the advantages and disadvantages of on-site training is shown in Table 32.

**Table 32: Advantages and disadvantages of on-site training**

Advantages	Examples
1. Less impact on service delivery	<i>“The reasons are that we are <b>taking people away from the facilities</b> [emphasis added] from service delivery it is mainly that” and “We have found that <b>the clinics got their own way</b> because they will tell you Wednesday afternoons we are quiet” [Organisation 1]</i> <i>“I suppose key among these was the fact that <b>we didn’t have to relieve people from the services</b> for training” [Organisation 7]</i>
2. Immediate application of knowledge	<i>“essentially, a nurse walks out of a training session and <b>straight into a consultation</b> [emphasis added] and there is an immediate opportunity to apply the learning in practice</i>

<b>Advantages</b>	<b>Examples</b>
	<i>now</i> [Organisation 7]
3. Immediate focus on challenges	<i>“if the mentor arrives at the facility and picks up this is a problem and they agree with the facility staff they would do <b>training there and then</b> [emphasis added]”</i> [Organisation 1] <i>“we have found that to be very helpful, because essentially a nurse walks out of a training session and straight into a consultation and there is an <b>immediate opportunity, to apply the learning</b> [emphasis added] in practice now</i> [Organisation 7]
4. Builds confidence	<i>“we would like support maybe while the patient is sitting there. It makes them <b>more comfortable or confident</b> [emphasis added] to do what they are doing”</i> [Organisation 1]
5. Nurses taught to work efficiently	<i>“we need to do things differently working smart, teaching them to <b>work smart</b>”</i> [Organisation 1]
6. Ongoing measurement	<i>“at a later stage probably visit the clinic once a month to see if they are <b>still doing what they are supposed to be doing</b> [emphasis added]”</i> [Organisation 4A]
7. Team based	<i>“So the group training is really around recognizing, we are <b>not training an individual, we are training a team</b> [emphasis added]”</i> [Organisation 7]
<b>Disadvantages</b>	<b>Examples</b>
1. Labour intensive and time consuming	<i>“It is time consuming and it is labour intensive to do it that way, I think we resigned ourselves to the fact that we want to do it the way that is going to suit the facilities more”</i> [Organisation 1]
2. Rural challenges	<i>“We are struggling to get the very mentors to support those people”</i> [in rural areas] [Organisation 1]

#### 5.2.3.2.2.4.1.3. Nurses and doctors: combined vs. separate training

Organisation 3 combined training programmes for doctors and nurses, which was in contrast to Organisation 2B which preferred having doctors and nurses separate. Organisation 7 highlighted the inherent differences between the two groups.

<i>“Doctors, they overshadow nurses, nurses would be scared to ask a question thinking that maybe they will say it is a stupid question. Doctors know more, so they will be the ones taking over and nurses will be lagging behind”</i> [Organisation 2B]
<i>“Different attitudes towards knowledge translation from nurses versus doctors, or guideline implementation for example, nurses and doctors are totally different, so interventions have to be differently crafted”</i> [Organisation 7]

### 5.2.3.2.2.5. Barriers to knowledge translation

#### 5.2.3.2.2.5.1. Barriers to knowledge translation in the public sector

The interviewed organisations identified both internal and external barriers that influenced knowledge translation.

##### 5.2.3.2.2.5.1.1. Barriers that affect knowledge

Organisations identified two barriers affecting knowledge, which are shown in Table 33.

**Table 33: Barriers that affect knowledge**

Barrier	Examples
1. Not familiar with the guideline	<i>“Even if they do give them guidelines you will find that there is a copy lying somewhere but <b>it was never explained</b> [emphasis added] to them, they don’t know the guidelines that they have” [Organisation 1]</i>
2. Teaching not tailored to the individual	<i>“I think there are not enough options for them to engage with. I think some people just learn in different ways” [Organisation 9A]</i>

##### 5.2.3.2.2.5.1.2. Barriers: attitude

The attitudinal barriers that were identified is shown in Table 34.

**Table 34: Attitudinal barriers**

Barrier	Examples
1. Resistance to change	<i>“You find others saying that, this is new and this is <b>more work for us</b> [emphasis added]. This is the minority” [Organisation 1]</i>
	<i>“in new areas you have <b>people that are negative</b> [emphasis added] and they don’t want to study ARVs” [Organisation 4A]</i>
	<i>“there have been other areas where <b>people have been resistant</b> [emphasis added] because of personal preference or because they feel too busy” [Organisation 4B]</i>
	<i>“Why are you here, are you going to report us” [Organisation 5]</i>
	<i><b>there is a lot of resistance</b> [emphasis added], everybody resists change” “ if we train them on the methodology, like PALSAs plus and they had a PALSAs plus in front of them, they [doctors] would be fine, it’s knowing that <b>it’s a nurse programme that we are using for a doctor, sometimes that become problems</b> [emphasis added]” [Organisation 8]</i>
	<i>“when you come to the inner city urban environment, <b>there is a lot of frustration when you try and introduce new learning</b> [emphasis added], they feel saturated or they feel they know it all” [Organisation 9B]</i>
2. Lack of motivation	<i>“if someone is not passionate it is very difficult to convince them” [Organisation 4A]</i>

	<p>“There is a sense of fatigue, a lot of <b>HIV fatigue</b> [emphasis added], it has overshadowed a lot of other patient care” and “They are <b>probably overworked</b> . . . a lot of them end up just becoming very inefficient in what they do. So you know you are going to go there and train but it is just paying lip service to training” [Organisation 5]</p> <p>“the <b>demands that are placed on them</b> [emphasis added], you know, it’s for this programme and that programme, strengthen this and fix this” [Organisation 7]</p>
3. Attending for the wrong reasons	<p>“we always find that there is a handful of strugglers who are there just <b>because they are out of office</b> [emphasis added] and they don’t have to do anything and see patients, it is a culture, it is an attitude” [Organisation 5]</p> <p>“[healthcare workers] come with CVs with loads of extra courses, <b>never used and never implemented</b>, [emphasis added] so people do that, they go on all these things because they can or it was for free” [Organisation 8]</p> <p>“so people go into this thing like it is a holiday, <b>I get a day off work</b> [emphasis added]” [Organisation 9A]</p>
4. Lack of self-confidence	<p>“if you are working in sparsely habited area where you see very few cases and therefore your confidence or your ability to learn is severely challenge compared to urban environment where you have more opportunities” [Organisation 9B]</p>

### 5.2.3.2.2.5.1.3. External and environmental barriers

Many of the knowledge translation barriers that were identified resided at an environmental or policy level.

#### 5.2.3.2.2.5.1.3.1. Barriers related to the guidelines

The barriers related to the guidelines are shown in Table 35.

**Table 35: Barriers related to the guidelines**

Barrier	Examples
1. Not available	<p>“When there are guidelines they are not disseminated to the people” [Organisation 1]</p> <p>“I still get calls from our members who say, can you kindly fax us the guidelines, we don’t have guidelines” [Organisation 2B]</p> <p>“We [the nurses in the clinic] don’t have guidelines on ABC, someone stole them, some gave it to their friends” [Organisation 3]</p>
2. Too complex	<p>“They [the national guidelines] are <b>too complex</b> [emphasis added] they are too text heavy” [Organisation 7]</p>
3. Contradictory	<p>“One of the major problems that we have come across is that there are many <b>conflicting recommendations</b> [emphasis added] between guidelines. So even if you read one of the national guidelines, like the new ART guidelines, you will see that on different pages there are different recommendations, for the same thing. And that results in non action, completely” [Organisation 7]</p>

Barrier	Examples
	<i>"You are also contradicting yourself [emphasis added], you are saying it is fine to use efavirenz as long as it is beyond the first trimester then the next day, don't touch a pregnancy at all and now the newest guideline is efavirenz is the drug of choice in pregnancy regardless"</i> [Organisation 9B]
4. Several draft versions	<p><i>"I am waiting for the TB guidelines but I don't know for how many years, <b>we just get updates instead of a proper guideline</b> [emphasis added]"</i> [Organisation 1]</p> <p><i>"The <b>re-work of draft guidelines is it a complete nightmare</b> [emphasis added], and these draft guidelines, I mean, the list of queries we have had, were close to 100 – 120 queries on the TB guideline"</i> [Organisation 7]</p> <p><i>"I don't remember the nuances to the new guidelines, because I can't remember where we were at. What has been accepted, what has been rejected"</i> [Organisation 9B]</p>
5. Not updated enough	<p><i>"You know our current TB guideline, that's approved on the web at the moment, doesn't cover GeneXpert"</i> and</p> <p><i>"The EDL [the essential drug list] gets updated 5 yearly, that is just useless. When you are working in a high infectious disease burden setting. You need to have updates every year"</i> [Organisation 7]</p>

#### 5.2.3.2.2.5.1.3.2. Barriers related to the staff

Organisations mentioned several knowledge translation barriers related to the staff, which are shown in Table 36.

**Table 36: Barriers related to staff**

Barrier	Examples
1. Staff shortages	<p><i>"Non attendance, due to <b>staff shortages</b> [emphasis added]"</i> [Organisation 3]</p> <p><i>"They [healthcare workers] feel too busy and they don't want to sit and be mentored, <b>they want to push the queue</b> [emphasis added] so that is a challenge"</i> [Organisation 4B]</p> <p><i>"We can only do this meeting [CPD meeting] during the week, our rural sites, the doctors and the nurses, there is <b>no way that they can get time off</b> [emphasis added] to come to these meetings, it is just impossible"</i> [Organisation 2A]</p>
2. Too many staff rotations resulting in skills being lost	<p><i>"They come to a NIMART course and then they get put on night duty or they got put on maternity there is limited scope for that and then <b>you lose your skill, you lose your confidence</b> [emphasis added] and then you don't carry on"</i> [Organisation 4B]</p> <p><i>"They get moved around and work in a different department which has been a huge challenge . . . because now <b>they lose the skill</b> [emphasis added] they can't continue practicing"</i> [Organisation 4A]</p> <p><i>"The people that she trains are generalists, <b>so we end up losing that skill</b> [emphasis added] because they are busy training a number of other things and this is one small piece of</i></p>

Barrier	Examples
	<i>everything they do so they don't do it effectively</i> [Organisation 5]
3. Staff turnover	<i>"The turnover is a massive problem, it is a huge problem, and knowledge and initiative need to take that into account. Because <b>you can't do training once</b> [emphasis added], and think you have solved the issue"</i> [Organisation 7]
4. Wrong staff sent for training	<i>"They often send the same people over and over again so you have no sense of who the appropriate person is actually attending"</i> [Organisation 9A]
	<i>"I think one of the challenges is often training the incorrect people so often you find the managers get trained not the clinicians on the ground"</i> [Organisation 9B]
5. Promotion of staff to management	<i>"When they've got a certain set of skills they get promoted to admin or some other managerial position where they don't deal with patients and then you <b>lost that skill</b> [emphasis added]"</i> [Organisation 5]

### 5.2.3.2.5.1.3.3. Barriers in rural areas

Rural primary healthcare clinics' lack of infrastructure causes knowledge translation to be difficult and slow.

*"Those in the deep deep rural areas are the worst affected. They get information months later"* [Organisation 2B]

A summary of the barriers that relates to rural areas is shown in Table 37.

**Table 37: Infrastructure in rural areas**

Barrier	Examples
1. Roads and transport	<i>"We do have meetings in rural sites, we find that we will have eighty people RSVP but only forty people will come because there is a <b>transport issue</b> [emphasis added] for example"</i> [Organisation 2A]
	<i>"Transport for staff to get tot training is crazy, there is <b>no taxi service</b> [emphasis added] in a rural area"</i> [Organisation 8]
	<i>"Bushbuck Ridge is so rural, potholes, bad roads, we have driven there, you need a 4 X 4"</i> [Organisation 8]
2. No telephone and internet	<i>"The rural sites are the problem areas, we have <b>limited access emails</b> [emphasis added]"</i> [Organisation 2A]
	<i>"I think in the rural areas they are still lagging behind, because of <b>not having access to the internet</b> [emphasis added]"</i> [Organisation 2B]
	<i>"When you go up to the deep rural areas where you got <b>difficulty accessing the internet</b> [emphasis added], it is quite difficult to get the whole process functioning" [Organisation 4B regarding problems with data collection for DHIS]</i>
	<i>"So you think this is not even so rural I can see cell phones but <b>they don't have a landline</b> [emphasis added] and that is what they would use to contact anyone to say we've run out of something"</i> [Organisation 5]



Barrier	Examples
	"One facility told me there is an computer but we don't have a extension cord for it" [Organisation 1]
3. General lack of resources	"They are very compromised even nurses they will tell you that <b>we have posts but nobody to fill them</b> "[emphasis added] [Organisation 1] "So you find out that even if they want to try and follow the guidelines they can't, because of the <b>scarcity</b> [emphasis added] of the laboratory, the material, they don't get drugs on time, they don't have transport to go fetch the drugs" [Organisation 2B]

#### 5.2.3.2.2.5.1.3.4. Barriers involving the Department of Health

Organisations identified several knowledge translation barriers that involve the DOH, which are summarised in Table 38.

**Table 38: Barriers involving the Department of Health**

Barrier	Examples
1. Lack of coordination	"It is <b>short notice</b> [emphasis added] because sometimes National gives us short notice. They give us guidelines on the 29 <sup>th</sup> and they say by the 1 <sup>st</sup> we must have implemented, we call them [clinic representative] urgently and then give them that information and they go back to the clinic and cascade it down and then you can start training them slowly" [emphasis added] [Organisation 3] "The <b>lack of coordination</b> [emphasis added] of training, you know having these pocketed initiatives that are disease focused, and having <b>so many priorities</b> [emphasis added] imposed upon them [healthcare workers]" [emphasis added] [Organisation 7] "there is <b>no system</b> [emphasis added] at the moment for understanding how to distribute new material" [Organisation 7] "all these roll outs that happen, <b>it is always at the 24<sup>th</sup> hour</b> [emphasis added] and you know that it s not necessary, you can do that only so many times before you lose people, people can only cope with so many crises and then no more" [emphasis added] [Organisation 7] "We send them on these courses, so the same nurses that are here, need to be there, so I think at the top there is <b>too much happening and not enough communication</b> [emphasis added]" " I don't even know how many people we trained, I think there we 600 to 700 in a <b>short space of time</b> [emphasis added], we were given 2 weeks to train up staff before the 1 <sup>st</sup> of April, we were still in meetings, and the stuff hadn't even gone to print" [Organisation 8]
2. Layers of management	"If they [the clinic] <b>haven't received maybe a certain circular</b> [emphasis added] that says this is what you should be doing it is becoming a problem" [Organisation 1] "Partners often <b>get information before the DOH, that doesn't work well</b> [emphasis added] because if we take a circular to a site and it hasn't gone through the manager for the province, then through the district, the municipal, the local government, the head of the clinic, then the staff so it's got to filter down" [Organisation 8]

Barrier	Examples
	<i>"If the NGO invites the clinics to a training session somewhere they will not respond, they know the protocol and policy. The invitation has to come from us to the clinics, so <b>if it comes directly from a provider to them, they just ignore it</b> [emphasis added] "</i> [Organisation 3]
3. Not prioritised	<i>"You have to have an ADSL line, and the government doesn't prioritize that stuff, they always prioritize 8 000 printers, but they don't prioritize the stuff that really would make a difference"</i> [Organisation 9A]
4. Unable to get the necessary information	<i>"I'm still <b>trying to get that list that will give me all the names of PHC clinics</b> [primary healthcare clinics] [emphasis added], so that we can then send them the magazine" (Organisation 2 B)</i> <i>"The <b>district coordinator did not know where all the clinics were</b> [emphasis added], so I had to go with a security guard from that clinic because he lived in the community to take me to all the clinics" [Organisation 5]</i>
5. Resistance amongst leadership	<i>"It depends on leadership [at clinic level and higher], sometimes leadership has influenced what happens on the ground, that nothing is going to happen . . . Now in particular, one or two of our areas, now leadership is being told you will move, now 3 years later. So <b>we are 3 years behind in this are</b>" [emphasis added] [Organisation 8]</i>
6. Lack of certain key skills	<i>"He [minister of health] has got this very can do attitude. But it is not necessary backed up by the capacity at levels beneath him, to get it done. So that is a barrier" [Organisation 7]</i>

#### 5.2.3.2.5.2. Barriers in the private sector

Organisations identified three knowledge barriers and two attitude barriers in the private sector, which are shown in Table 39.

**Table 39: Barriers that affect knowledge**

Barrier	Example
<b>Barriers that affect knowledge</b>	
1. Pharmaceutical companies influence content	<i>"I think it is still very dictated by the pharmaceutical industry and not by the academics" [Organisation 9A]</i>
2. Lack of time	<i>"it is not that they don't want to learn, I think they haven't got the time to learn" [Organisation 6])</i>
3. Less opportunity to network	<i>"I know how hard they work so the ability to learn and to network with your colleague is much lower than in the public sector" [Organisation 9A]</i>
<b>Barriers: attitude</b>	
1. Reluctance to learn about HIV	<i>"There is a large group of people that just don't want to hear about HIV, they just wish it should go away, especially amongst the older doctors" [Organisation 9A]</i>
2. Cost	<i>"it's a money thing, if you come out for 5 days you lose and then you have to get a locum so then you have to pay locum, so it is costly" [Organisation 8]</i>

### 5.2.3.2.6. Current facilitators of knowledge translation

The knowledge translation facilitators identified by organisations are shown in Table 40.

**Table 40: Current facilitators of knowledge translation**

Facilitator	Examples
1. Providing support	<p><i>"We would like support maybe while the patient is sitting there. It makes them more comfortable or confident to do what they are doing but if a patient is there and there is a problem they should know that I can phone somebody now"</i> [Organisation 1]</p> <p><i>"The person that they [the mentors] are mentoring will often call them and will give them advice by cell phone so a lot of mentors are doing that and that is how they support the clinics when they are not physically there"</i> [Organisation 4B]</p> <p><i>"So we say to them phone us on our cell phone do whatever you need to do, send me a please call me we're your primary contact and if there is a crisis we will get back to you"</i> [Organisation 5]</p>
2. Communication and buy-in upfront	<p><i>"As long as we know that we are not superior to government and we approach the correct people and say this is what I am going to do or come with me to get buy in at the facilities"</i> [Organisation 1]</p> <p><i>"So you sell the idea to them to say look this is national mandate, it's going to help our patients" and "the approach of including everybody works wonders"</i> [Organisation 4A]</p>
3. Small, regular pieces of information on-site that can be applied immediately	<p><i>"I suppose the model is we don't go for the intensive all the information you need now, to a few people, but rather pieces of information. It is pieces of information that change practice"</i> [Organisation 7]</p>
4. Political will	<p><i>"It is actually about the HIV reforms, and look we have a new health minister that's helped, hasn't it?"</i> [Organisation 7]</p>
5. Feedback	<p><i>"We are convinced that giving people feedback on what they do helps them to get enthusiastic"</i> [Organisation 4B]</p>
6. Individual attitude to training	<p><i>"You get others who just work sometimes we work into the night"</i> [Organisation 5]</p> <p><i>"They are much more appreciative in the rural areas. . . I did this lecture on Friday night, it was packed like a 150 doctors and the next morning there were a hundred and fifty nurses, counsellors, doctors and dieticians that came, hundred and fifty on a Saturday morning, try that in Joburg"</i> [Organisation 9A]</p> <p><i>"You will find your training are well attended [in the rural areas] and a lot of enthusiasm, often running an hour or hour and a half later because of the"</i></p>

Facilitator	Examples
	<i>questions that just don't stop</i> [Organisation 9B]
7. Value for money in the private sector	<i>"Companies now want to know what is the impact? What can I expect out of this training?" "it is expensive to train the wrong people or you train them badly, you actually wasted a lot of money"</i> [Organisation 4B]

### 5.2.3.2.3. Measurement and evaluation: dissemination and implementation

#### 5.2.3.2.3.1. Summary of measurement and evaluation

A summary of the different measurement strategies combined with the researcher interpretation of the Kirkpatrick level is shown in Table 41.

**Table 41: Summary of approach to measurement and evaluation of training**

Org	Method	Level	Reason
1	NIMART: self-assessment before course, in the middle of mentoring, after mentoring	Level 3	54 competencies must be fulfilled before certificate of competence is given
	DHIS indicators before and after training	Level 4	Evaluate results of training
2	Surveys and feedback forms of CPD meetings	Level 1	Evaluate experiences and perception of learners
3	Audits on both individual and clinic level on key performance indicators done annually (DHIS)	Level 4	Identify gaps and critical skills needed for future training
4	Pre- and post-course assessment	Level 2	
	DHIS indicators	Level 4	
5	No formal process in place	N/A	Largely informal or indirect feedback from laboratories testing specimens
6	Evaluation form (feedback)	Level 1	Use this form to evaluate needs for future courses
	Assessment after course	Level 2	Both theory and practical components are evaluated before a competency certificate is given.
7	Randomised controlled trails (RCT) on clinics trained using quality indicators as measurement	Level 4	Randomised controlled trial is the best form of evidence.
8	Completion of workbook and looking at patient registers	Level 4	
9	Pre- and post-course assessment	Level 2	Doctors
	How many patients initiated on ART, file audits	Level 4	Nurses

Organisations realised the importance of proper measurements, both for the organisation itself and for government. Some examples of these indicators include the

ART initiation rate in children and the number of positive HIV PCR in infants at 6 weeks of age.

### 5.2.3.2.3.2. Drivers for measurements and evaluation

The drivers for measurements and evaluation are shown in Table 42.

**Table 42: Drivers for measurement and evaluation**

Drivers	Examples
1. The organisation	<i>"We got to make a difference and we want to measure that difference"</i> [Organisation 4B]
2. Government	<i>"We are looking at the indicators and government is now saying we want to see results"</i> [Organisation 4B]

### 5.2.3.2.3.3. District health information system

Organisations use the district health information system (DHIS) data to look at key health indicators to evaluate how clinics are performing prior to and after training. Organisation 1 explains that their evaluation of these indicators is shared with the facilities as it helps to identify training needs and set targets for the facility in terms of what they would like to achieve in the future.

<i>"We look at the data before we start and see how the clinic is doing and then you measure as you go on and you see the upswing in the data"</i> [Organisation 1]
<i>"Even the audits they understand it is not a policing exercise it is a support exercise more about giving support to be able to do the work".</i> [Organisation 3]
<i>"I mean it is amazing to see the change if you look at the indicators like under five mortality rate which has gone down, life expectancy which has gone up, that is very encouraging and that is directly related to HIV"</i> [Organisation 4B]

The DHIS data is used as part of the DOH quality improvement initiatives, and the analysis of this data is shared with clinics to identify training gaps.

<i>"We look at DHIS because <b>we do a lot of quality improvement</b> [emphasis added] and we try and align everything that we do to quality improvement we look at DHIS and what the problems are in the specific area without telling them what to do, we share with them, we have learning sessions with them"</i> [Organisation 1]
<i>"with the quality improvement work what we often do is we go into the facilities as well and where we see gaps we will train and we will mentor them as well"</i> [Organisation 9B]

#### 5.2.3.2.3.4. Concerns regarding measurement and evaluation

Any concerns organisations had regarding measurement and evaluation are shown in Table 43.

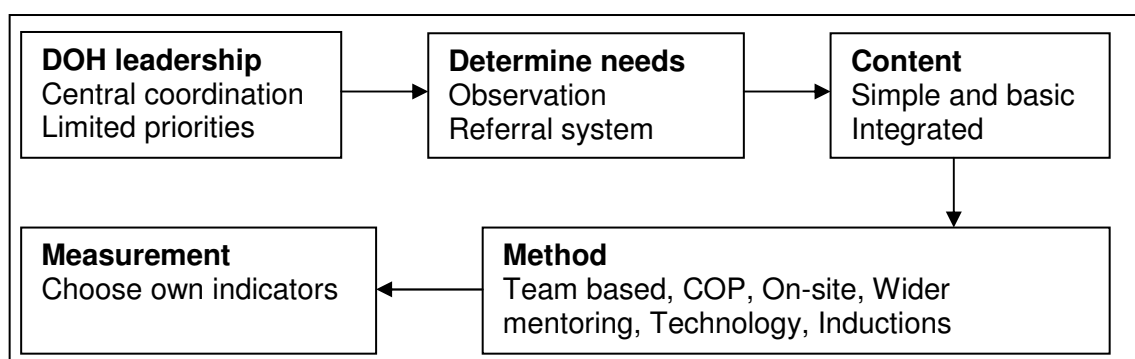
**Table 43: Concerns regarding measurement and evaluation**

Concerns	Examples
1. Organisation	<i>“Our M and E [measurement and evaluation] is something we definitely need to work on. We can only hope that the information does have benefits and it is beneficial to the people receiving it but it is tough to measure it”</i> [Organisation 2]
2. DHIS	<p><i>“We see that they don’t spend more than five or ten minutes with each patient and now they have to spend an hour with this mom taking down all the key indications which they should be putting into this register and so it doesn’t happen”</i> [Organisation 5]</p> <p><i>“I must be honest, even completion of registers, it’s very difficult to measure knowledge, to know what you are doing when I am not around, when people come and visit the clinic, the clinic sparkles, so it’s very difficult to know if it’s reliable” and “I think we have a gap in how we measure”</i> [Organisation 8]</p> <p><i>“Training [of healthcare workers] is required around understanding indicators, how to collect indicators, implementing systems so that your systems are improved”</i> [Organisation 9B]</p>

#### 5.2.3.2.4. Sustaining knowledge use in future

Organisations were asked for suggestions to improve the process of getting knowledge into practice, which are shown in Figure 13 and Table 44. Organisations also identified barriers to some of these suggestions, which are shown in Table 45.

**Figure 13: Suggestions for sustaining knowledge use in future**



**Table 44: Suggestions on how to improve knowledge translation in future**

DOH	Examples
1. Central coordination with common messaging	<i>“What we really need is <b>central coordination and common messaging</b> [emphasis added] it doesn’t matter who does the training as long as they train what is on the</i>

	<p><i>guidelines</i>" [Organisation 9B]</p> <p><i>"I think it would be really good if we could work towards a system for updating, that is available at clinic level, where you know, early in the new financial year, each year, we have new material that goes out, and a structured approach to, this is what is new for this year, and then <b>everyone knows that this is coming</b> [emphasis added]" [Organisation 7]</i></p>
2. Limited priorities	<i>"I think you have to have a limited set of priorities. Because there is too much to fix, is not possible to fix all of it simultaneously"</i> [Organisation 7]
<b>Determining needs</b>	<b>Examples</b>
1. Using observation	<i>"I don't think you need to monitor what they say their needs are I don't think people understand their own training needs at all, I think that is a misconception... they need to be monitored better and they need to, you know <b>somebody with an external eye</b> [emphasis added] that can say, listen you are obviously a bit confused let's get you into a programme"</i> [Organisation 9A]
2. Using the referral system	<i>"If that [the up referral system] was more consistent we could identify the training needs. That is what the trainer should be doing, what's going up and what's going down, that is what a training programme should be doing is <b>watching the referral systems</b> [emphasis added]" [Organisation 9A]</i>
<b>Content</b>	<b>Examples</b>
1. Simple and basic	<p><i>"I think the doctor training is <b>pitched too high</b> [emphasis added]. . . I think that a lot of the times the doctors that are sitting on the course are lost"</i> [Organisation 8]</p> <p><i>"I think people [healthcare workers] appreciate not being spoken down to, but also <b>not being over educated</b> [emphasis added] with stuff that is actually irrelevant"</i> [Organisation 9A]</p> <p><i>"I think it will be good if the ways of delivering the information in a very <b>understandable</b> [emphasis added] package and not to confuse our nurses"</i> [Organisation 9B]</p>
2. Integrated	<p><i>"I do think there is a place for integrated care approaches, like the ones we've worked on. Because I mean they do, the trials have shown that they deliver small improvements in care, fair enough, but across a range of conditions, at the same time. And that is really what you are wanting, that is really what I feel helps the system strengthening as well. It is about improving the whole, pulling up the whole health service, not just the one programme"</i> [Organisation 7]</p> <p><i>"I think anybody delivering healthcare should be a holistic, head-to-toe practitioner"</i> [Organisation 8]</p>
<b>Method</b>	<b>Examples</b>
1. Team-based training	<i>"Group training is about realising we are not training an individual we are training a team"</i> [Organisation 7]
2. Community of practice (CoP)	<i>"Maybe every Friday for an hour all the clinic nurses can get together and discuss whatever problem, teach each other,</i>

	<p>so through the magazine they can also do that” [Organisation 2B]</p> <p>“If they had the rural doctors, Monday afternoon show me your difficult X-rays and difficult cases and they have three specialists sitting at the University and say from 3-4 . . . that would be useful” [Organisation 9A]</p>
3. On-site training	<p>“I would say <b>no more training outside the clinic</b> [emphasis added], no more lunches, no more breakfasts and things and these trainers that they have, must go out and train on the spot they must train in the clinic” [Organisation 9A]</p> <p>“I think facility training where you actually go to the facilities, <b>train them in their facilities</b> [emphasis added] so that quality improvement works. Where you sit with them, help them to get the confidence and once they started going, do some quality improvement work with them and also provide within the system when you have problems you can phone” [Organisation 9B]</p>
4. Widen the mentoring scope	<p>“What we aim to do is actually make them mentors as well, maybe each and every clinic should have a mentor or two, that is something that we are working towards” [Organisation 1]</p> <p>“We have doctors mentoring doctors too, more in the paediatric field so they take them through it step by step, I think that is better” [Organisation 8]</p>
5. Use technology	<p>“We are still in the very early stages of talking about having them all mobile in terms of using cell phones as a way of communicating as opposed to email and the internet. It is a very important area to tap into because that is going to reach our rural site or people in rural areas much more effectively. You know 90% of South Africa owns a cell phone” [Organisation 2A]</p> <p>“I think there should be Skype, make sure the internet works, I think that is what we should focus on” and “the whole telemedicine hasn’t materialized in any meaningful way and I think that there hasn’t been enough focus on that” [Organisation 9A]</p>
6. Do inductions of new staff	<p>“What we need is proper inductions when people go to clinics and they start working . . . before they start they should be called in and shown where the blood forms and shown where the guidelines are and just orientated around the very basics and have that available to them for a period” [Organisation 9B]</p>
<b>Measurement and evaluation</b>	<b>Examples</b>
1. Facilities must choose their own indicators	<p>“We are wanting to have that led by the facility, as opposed to by you know, by the Province or by these lists, and lists of endless indicators, that people collect data for, and then that data is not interpreted, you know. So we are wanting to look at methods for doing that at a micro level, at the facility, where people actually choose their own indicators, on what they need to focus on, and track themselves” [Organisation 7]</p>



**Table 45: Obstacles to the suggestions**

<b>Obstacles</b>	<b>Examples</b>
1. Central coordination	<p><i>"I think what happened is that the government policy in Manto Tshabalala and Mbeki's time, NGOs took control of HIV, and now obviously the Department of Health has taken the trouble, they have got this <b>really strong NGOs</b> [emphasis added]" [Organisation 9B]</i></p> <p><i>"We had to train the people as well and way back then, there were no guidelines from government so we used what was available in the US and adopted some things to suit the South African situation" [Organisation 1]</i></p>
2. Technology	<p><i>"I am reluctant to identify e-health and the internet as a facilitator" "it is about gadgets and quirky things not about the content being delivered. It is the content that changes practice not the gadget" [Organisation 7]</i></p>

## 5.2.4. Additional findings

### 5.2.4.1. Knowledge translation organisations

#### 5.2.4.1.1. Funding for knowledge translation activities

A summary of the different sources of capital for the nine organisations is shown in Table 46.

**Table 46: Sources of capital**

<b>Org</b>	<b>Source of funding</b>
1	PEPFAR
2	Membership fees and other donor funding e.g. trusts
3	Municipality
4	PEPFAR Commercial course fees
5	Self-funded by organisation
6	Course fees
7	International donors and grants DOH funding (limited)
8	PEPFAR
9	PEPFAR

It was assumed that the funding sources mentioned in the interviews represented the most important sources, although it is evident from the organisations' websites that there are multiple sources of funding. Most organisations rely on donor funding, membership fees or money generated from training courses. Organisation 3 receives money from the respective municipality. Organisation 5 funds their own training internally, and provides it as a free service to the public sector.

Organisation 1, 4, 8 and 9 make use of the President's Emergency Plan For AIDS Relief (PEPFAR) funding from the US, which dictates a focus on HIV and conditions surrounding HIV. This funding makes it possible for the majority of HIV training to be provided free of charge to the public sector. There are however concerns regarding PEPFAR funding coming to an end in the near future. Organisations are looking at other sources to fund their KT activities. For example, Organisation 4 is focusing on building a commercial side to their organisation where training courses are given to public or private healthcare workers at a fee and focuses on a wider range of conditions.

<i>"We are mandated to work with and support government instead of doing it now on our own"</i> [Organisation 1]
<i>"We are also training nationally so you have that mandate to train nationally even if we have the five districts that we are supporting in addition to that we are also training the whole nine provinces"</i> [Organisation 4A]
<i>"We don't have any courses like diabetes on PEPFAR so they [Department of Health] are in the position to request those courses from the commercial side"</i> [Organisation 4A]
<i>"So in terms of training it's got to be within our mandate from PEPFAR that we mainly focus on HIV, TB and so on"</i> [Organisation 4B]

Organisation 5 was the only organisation that mentioned that they explain to healthcare workers the cost involved in developing materials. This was done to increase accountability.

Organisation 5 gave an opinion regarding why organisations develop their own tools *"most of the organisations prefer to do their work in house generally, because they have funding to do that, so they wouldn't take on another tool which they could have developed themselves"*.

#### 5.2.4.1.2. Knowledge translation organisations' philosophies

Some of the organisations pertinently mentioned their knowledge translation philosophies, which is shown in Table 47.

**Table 47: KT organisations' philosophies**

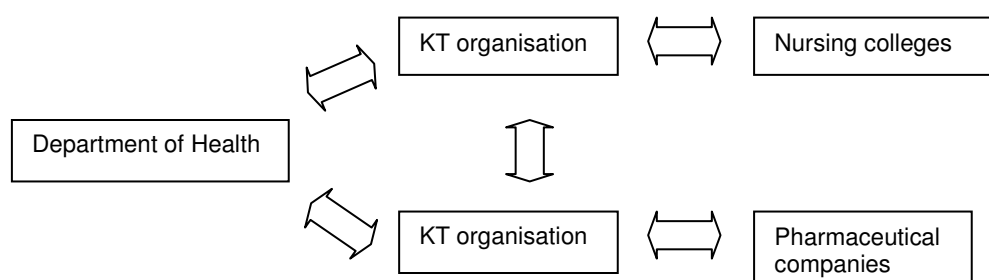
<b>Org</b>	<b>Examples</b>
1	<i>"We need to <b>leave sustainability behind</b> [emphasis added] because the funding won't be there forever"</i>
2	<i>"We never wanted to be an elitist organisation I mean we do rely on membership fees but it's not feasible to say you can <b>only</b> get this information if</i>

Org	Examples
	<i>you are a member that just really defeats the object of what we doing” [2A]</i>
4	<i>“We got to make a difference and we want to measure that difference, we want to see that it is working we want to support government so when the PEPFAR funding eventually ends in five years’ time we are <b>leaving government with a functioning health service</b> [emphasis added]” [4B]</i>
5	<i>“I am saying this it is not like it is a philanthropic thing we are not getting anything out of it obviously there is a business element to it however it is not just giving them test to the lab, it is also all of these pieces and the things that we’ve done additionally in the past two years”</i>
6	<i>“We tried to do a service as well, it’s not all about the money”</i>
7	<i>“We have a very clear vision, for our unit, we would like to revolutionize primary care, materials and training, for resource constraints settings globally”</i>

### 5.2.4.1.3. Collaboration

Several of the organisations mentioned involvement in collaborative relationships. Four types of collaboration were identified: with other knowledge translation organisations, with the DOH, with nursing colleges and with pharmaceutical companies (Figure 14 and Table 48).

**Figure 14: Collaborative relationships**



**Table 48: Collaborative relationships**

Collaboration	Examples
1. Between KT organisations	<i>“We go to an AIDS conference and TB conference every year and partner up with another organisation and we host the skills building workshops” [Organisation 2A]</i>
	<i>“We normally work with other non-governmental organisations, when they get new tools, like we had this new TB tool, and they would give us copies that we would send to our members. So through collaboration we are saving funds. We are learning mostly from other organisation and we get more bargains for our members because they end up with lots and lots of information that other nurses don’t have” [Organisation 2B]</i>
	<i>“Whatever we produced is open source, so we say to them [other organisations] you can take it and modify how it suits you” [Organisation 5]</i>

	<i>"So we work together, so we provide them with our materials, they provide us" and "our director doesn't believe in ownership, you must share everything" [Organisation 8]</i>
2. With stakeholders in the DOH	<p><i>"We liaise with them [the districts] extensively, they have their own district plans which they present to us. . .we pick what is health and what we can do and then we do those" [Organisation 1]</i></p> <p><i>"We work closely with one NGO in Gauteng for courses and Gauteng Health as well, although not much joy there, but we do work with them" [Organisation 2B]</i></p> <p><i>"They [regional training centres] would say to us, this is our plan for the following year and then we are in a position to know how many courses are they looking for and what kind of training do they want for the following year" [Organisation 4A]</i></p> <p><i>"We work within the structures of the National Department of Health, they have regional training centres" [Organisation 5]</i></p> <p><i>"We are guided by the Department of Health because now we don't have our staff anymore so we are really training their staff so we work a lot through the regional training centres" "the outlook of all the partners who support the Department of Health is that we are there to provide technical assistance, so technical assistance in terms of knowledge and expertise" [Organisation 8]</i></p>
3. With nursing colleges	<i>"So we started working with 1 or 2 of the colleges. . . so we are trying to capacitate them before they go out, they go out with the PALS Plus, the IMCI, then we just have to mentor" [Organisation 8]</i>
4. With pharmaceutical companies	<p><i>"We also work with pharmaceutical companies that is where we get the market again" [Organisation 4A]</i></p> <p><i>"What we do also is to try to and get sponsors from pharmaceutical companies, to sponsor our hand-outs, because that's quite expensive, because we give hand outs for every single course, and sometimes we do the courses at a wine farm as the venue, and then we get sponsors for that. Just to help us to sustain ourselves" [Organisation 6]</i></p>

#### 5.2.4.1.4. Barriers within training organisations themselves

Many of the organisations felt that they could do more training if they were not constrained by certain barriers, which is shown in Table 49.

**Table 49: Barriers for the training organisations themselves**

Barrier	Example
1. Resources	<p><i>"There is so many rural sites that we need to reach so put it this way, at the moment we are <b>reaching as many as we can</b> [emphasis added], as our capacity will allow" (Organisation 2 A)</i></p> <p><i>"<b>Budget constraints</b> [emphasis added] our budget is very small" [Organisation 3]</i></p> <p><i>"We have actually been <b>constrained by resources</b> [emphasis added], because obviously over the last four years it has been, you know with the global climate, it is very difficult to get soft money and we are entirely self-funded" [Organisation 7]</i></p>

Barrier	Example
	<i>“The heart of the training is the mentorship and we are <b>battling to do the mentorship because of capacity</b> [emphasis added]” [Organisation 9B]</i>
2. Area allocations	<i>“We have been allocated to areas, so it is very difficult, when we get someone from Limpopo calling. Then we say can you start with your partner and if your partner is unable to assist then you need to come back to us” [Organisation 8]</i>

#### 5.2.4.1.5. Important changes that influence KT organisations

Several changes have taken place that has influenced KT organisations which are shown in Table 50.

**Table 50: Important changes that influenced KT organisations**

Change	Example
1. Changing scope	<i>“There is a clear mandate from Government that we first of all have to integrate HIV and TB into everything else” (Organisation 4B)</i>
2. Task shifting	<i>“It is amazing watching that change in nurses in the clinics from being averse to doing anything with this [giving antiretroviral medication] to actually thinking and working as a clinician it is really amazing, <b>it is one of the most dramatic changes in primary care that I have seen in my career</b> [emphasis added] because even with the other conditions there is always this they would handle the minor things and refer all the other problems to the doctor, now these nurses are extremely knowledgeable and their whole thinking has changed and it has done something for them personally” [Organisation 4B]</i> <i>“There is a lot more responsibility on them there is this task shifting happening in South Africa and elsewhere”</i>
3. KT organisations changing from service delivery to technical assistance	<i>“I think one must see it in the <b>change in context</b> [emphasis added] initially when PEPFAR got involved it was really an emergency response and it was then putting in doctors, nurses who could manage ARVs, and then when the shift from service delivery to technical assistance, <b>technical assistance models are now trying to train government staff</b> [emphasis added] to take over for instance then is the NIMART programmes” [Organisation 4B]</i>

Change	Example
	<p><i>“The initial response was our organisation and other partners like our organisation came in and handed out goodies. We supplied them with staff, we supplied them with computers, we supplied them with containers for the ARV so our organisation spelt Father Christmas and that change has now taken place over the last year, and there are still people who think what is the organisation going to give us. <b>That has been a painful transition</b> [emphasis added] but now the realisation is that there are no more free goodies and the whole thing must go into the budget” [Organisation 4B]</i></p> <p><i>“So now we have shifted, we no longer provide warm bodies as such, they now had to be absorbed by the Department of Health into their budget, and now we just provide <b>technical assistance</b> [emphasis added]” [Organisation 8]</i></p>

#### 5.2.4.2. Specific contexts

##### 5.2.4.2.1. Urban vs. rural

Organisations mentioned that training in the urban and rural areas was very different which is shown in Table 51.

**Table 51: Urban vs. rural differences in terms of knowledge translation**

Identified differences	Examples
1. Ability to learn	<i>“If you are working in sparsely habited area where you see very few cases and therefore your confidence or your ability to learn is severely challenge compared to urban environment where you have more opportunities” [Organisation 9B]</i>
2. Enthusiasm	<i>“When you come to the government sector, inner city urban environment there are a lot of opportunities for them to go and learn in courses and there are often a lot of frustration when you try and introduce new learning they feel saturated or they feel they know it all, whereas we go to the rural environments they are just so happy to go there” [Organisation 9B]</i>
3. Amount of expertise	<i>“They [rural healthcare workers] have very limited people to train them, so it is often just teach yourself or avoid the problems” [Organisation 9B]</i>

##### 5.2.4.2.2. Private sector

Additional findings that related to the private sector are summarised in Table 52. This mostly related to the perceived knowledge level of private primary healthcare as well as the lack of coordination between the public and private sector.

**Table 52: Emerging private sector themes**

<b>Private sector</b>	<b>Examples</b>
1. Knowledge level	<i>"I think the private primary care in this country is quite poor actually"</i> [Organisation 7] <i>"Our GPs don't know anything that much"</i> [Organisation 8]
2. Lack of coordination with public sector	<i>"A lot of patients prefer to attend private practice and then come into the public healthcare to deliver and it is very important that we streamline and ensure that we are doing the same thing, because the standard of care in terms of HIV is probably better in the public sector"</i> [Organisation 9B]

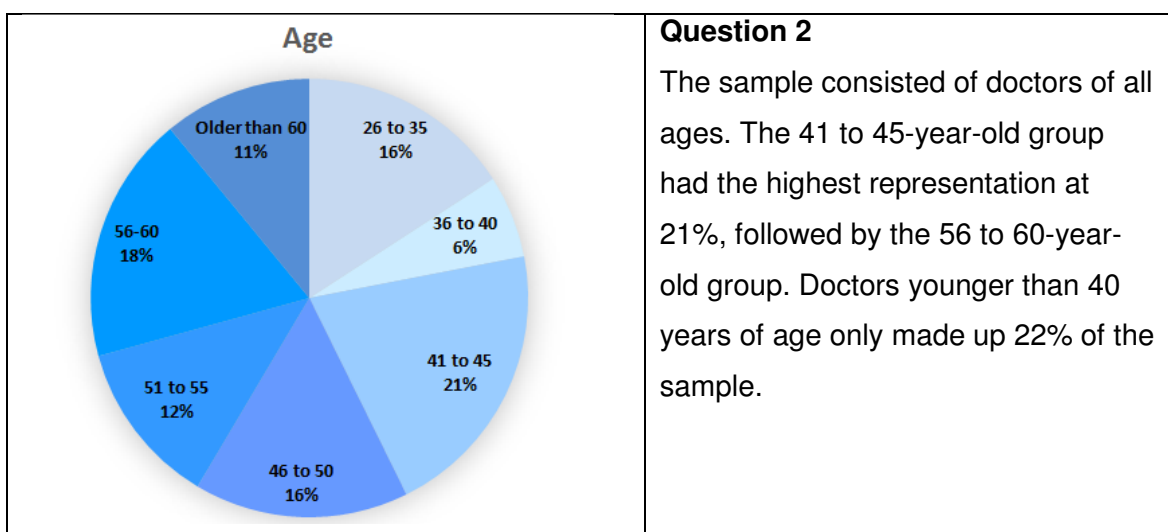
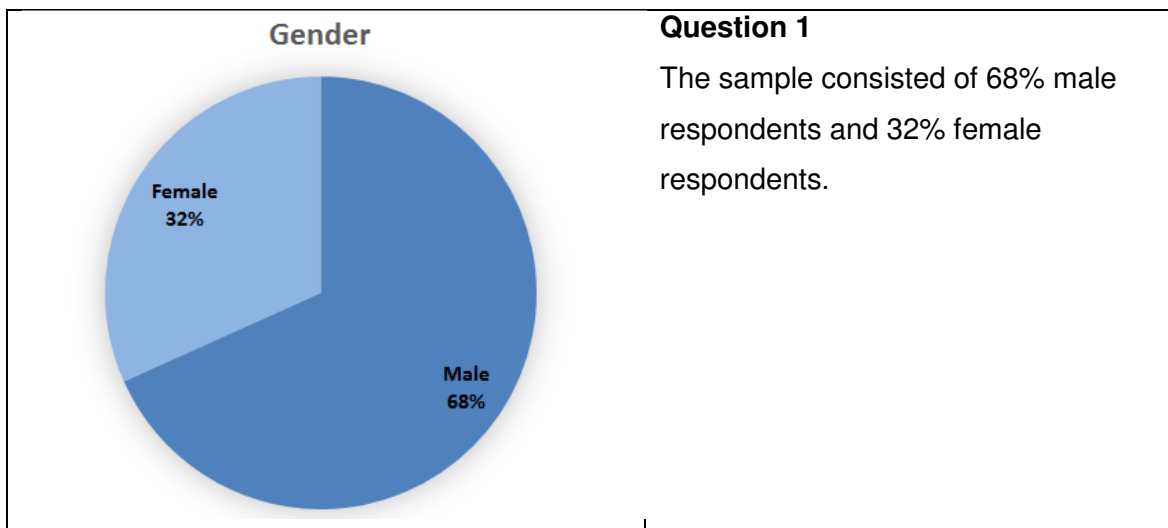
### 5.3. Research question 2: quantitative data

#### 5.3.1. Overview

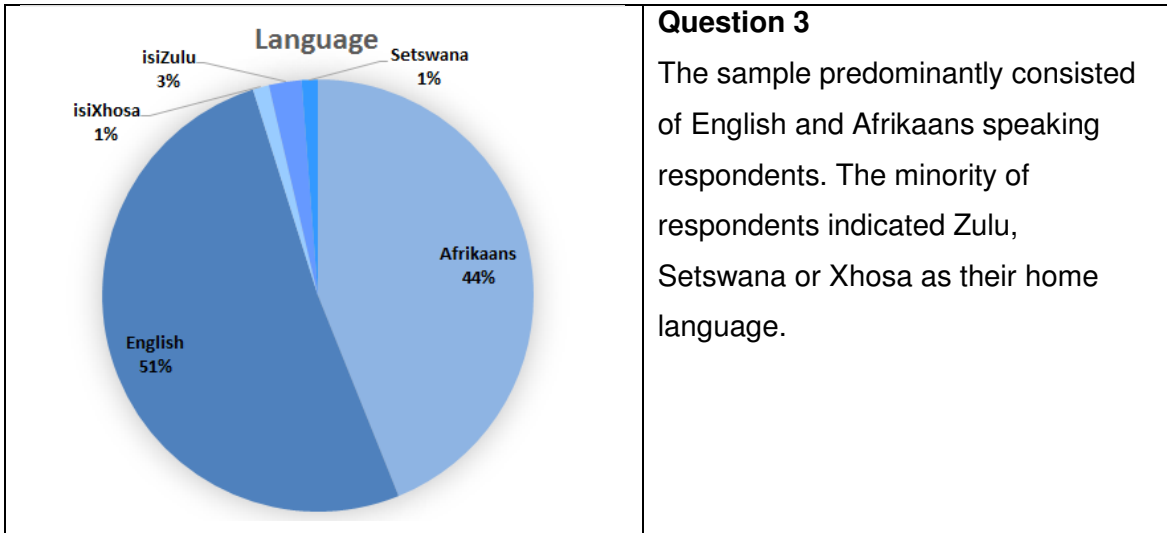
The quantitative data was collected using an anonymous online questionnaire targeting primary healthcare workers. A total of 92 responses were collected, of which 82 responses could be included in the statistical analysis.

#### 5.3.2. Sample demographics

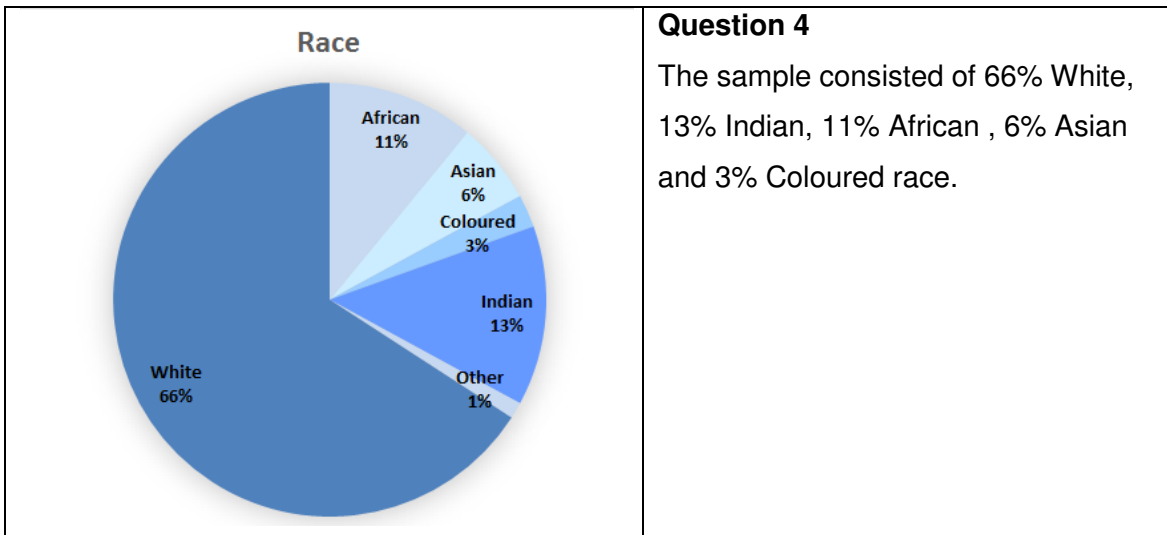
Question 1 to 6 collected data on the demographics of the respondents. The sample predominantly represented white, male English and Afrikaans speaking doctors. The majority had more than 20 years of healthcare experience and practise in an urban private practise. A more complete description of the sample is given below with accompanying graphical representations.



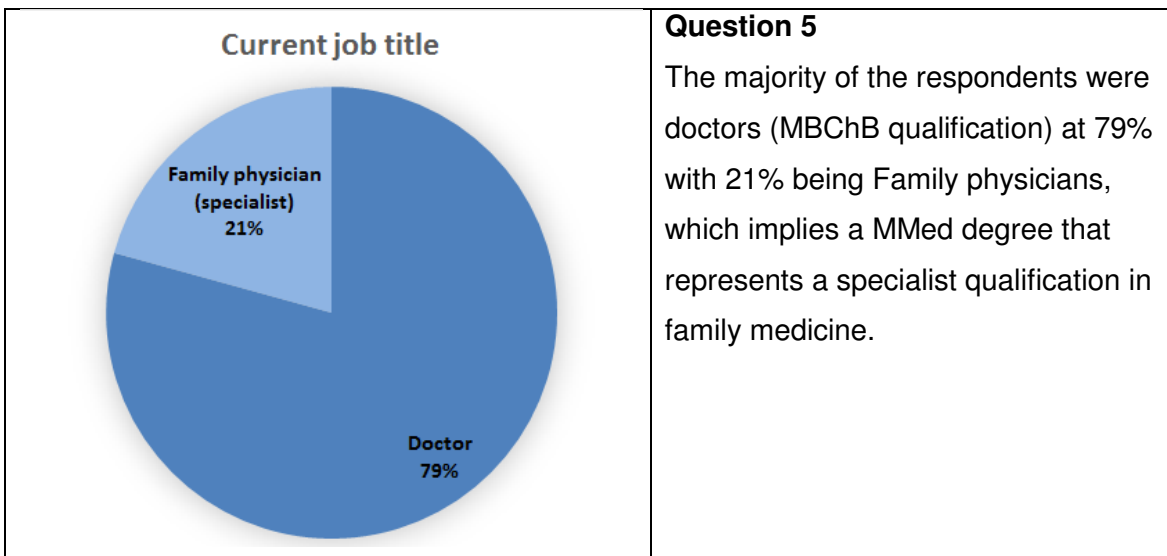




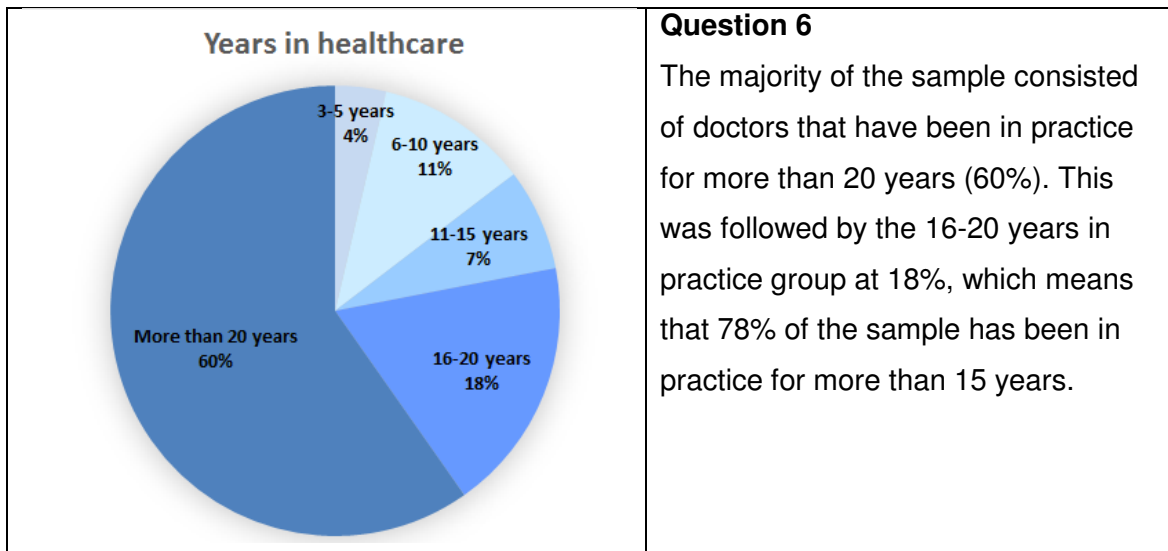
**Question 3**  
 The sample predominantly consisted of English and Afrikaans speaking respondents. The minority of respondents indicated Zulu, Setswana or Xhosa as their home language.



**Question 4**  
 The sample consisted of 66% White, 13% Indian, 11% African, 6% Asian and 3% Coloured race.

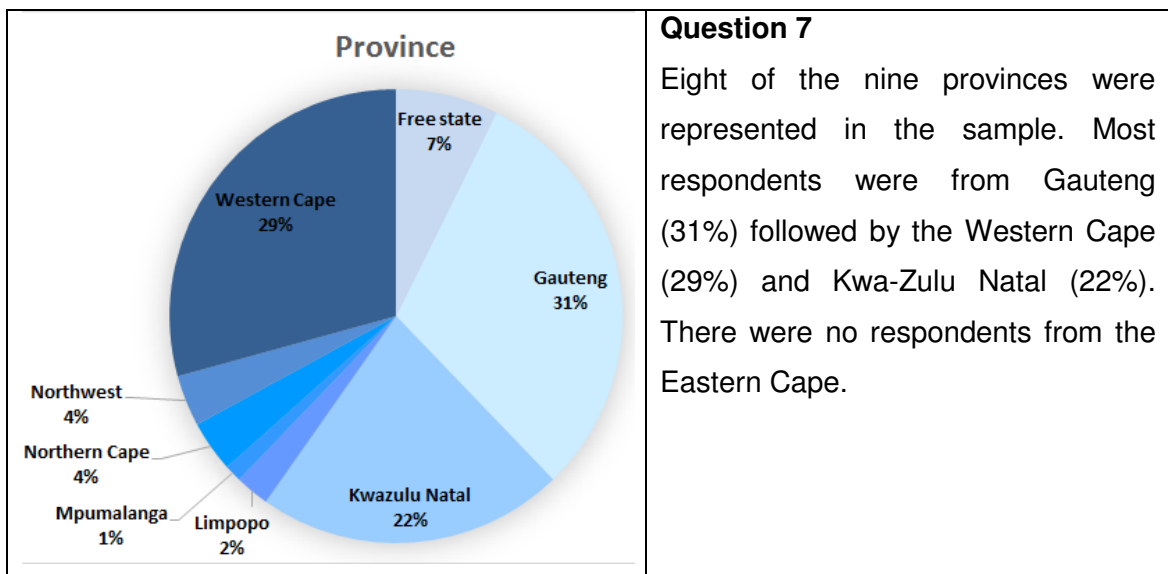


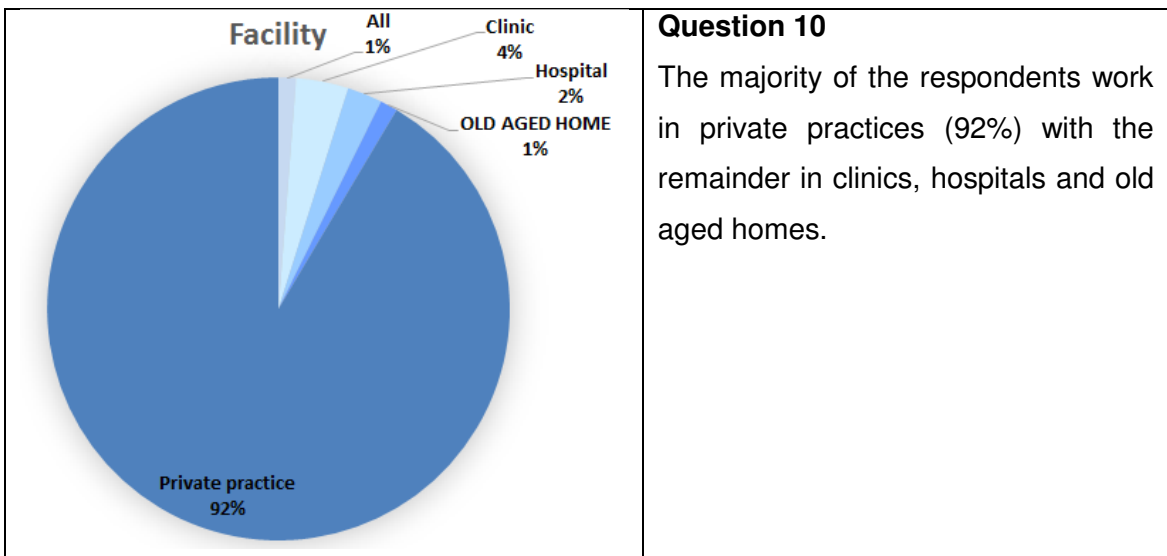
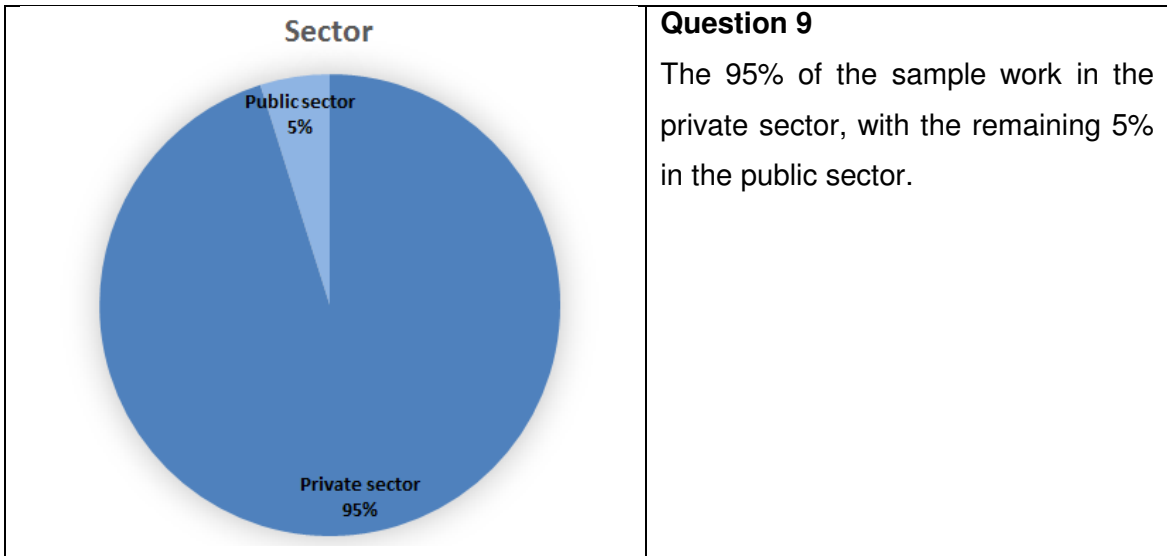
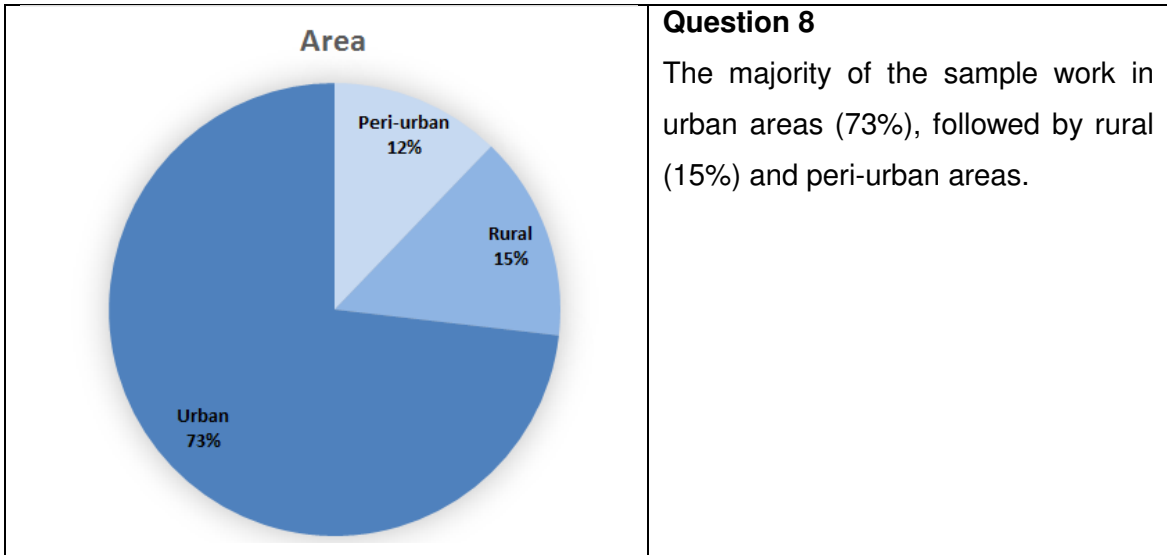
**Question 5**  
 The majority of the respondents were doctors (MBChB qualification) at 79% with 21% being Family physicians, which implies a MMed degree that represents a specialist qualification in family medicine.



**5.3.3. Work related information**

Question 7-12 collected data on work related information of the respondents. Most of the respondents practise in an urban private practise. Most respondents had fixed and mobile internet access at both work and home.

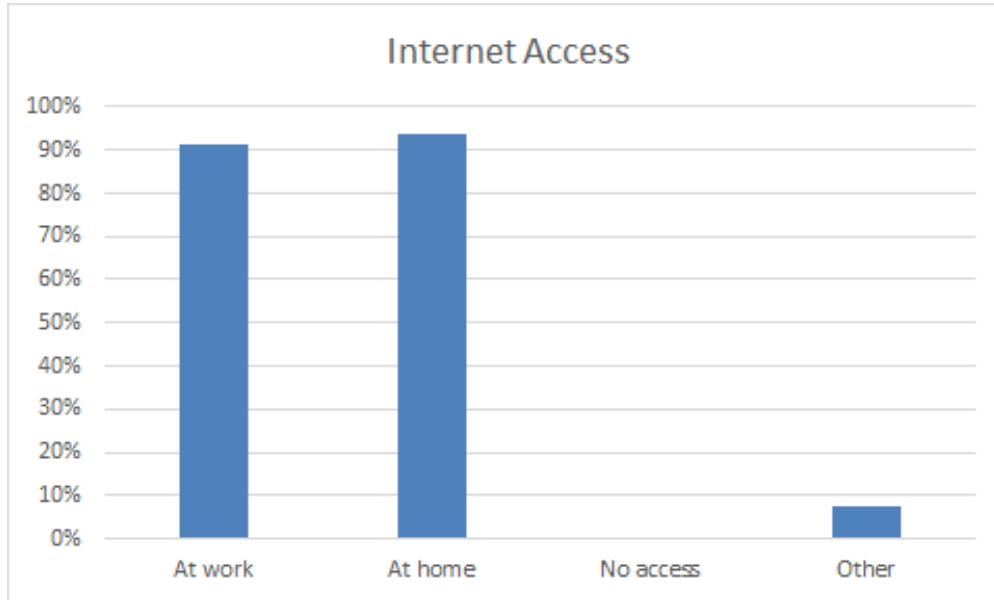




### Question 11

All respondents had internet access. More than 90% of respondents had internet access both at home and at work (Figure 15).

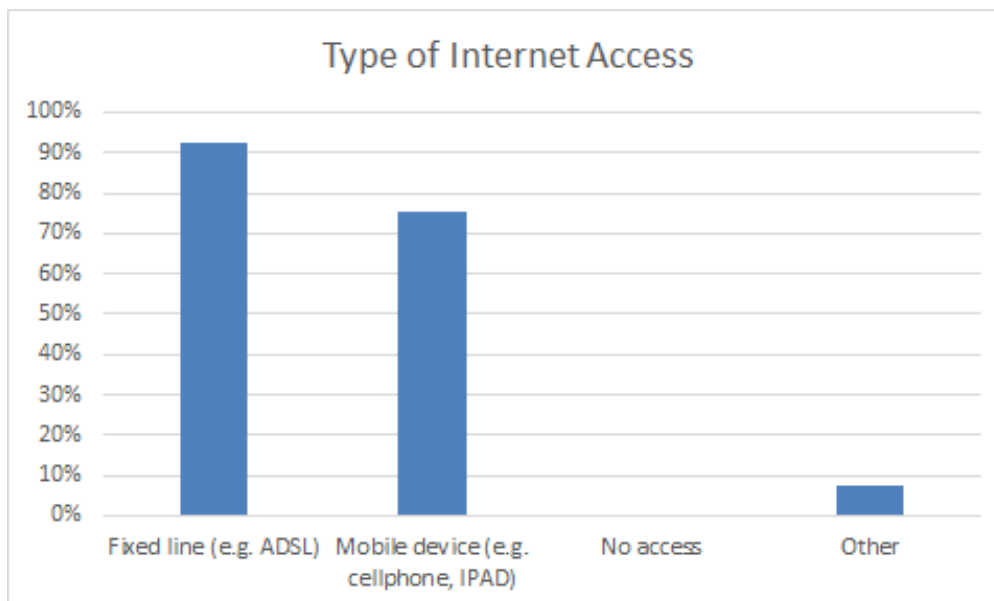
**Figure 15: Internet access**



### Question 12

More than 90% of respondents had a fixed line for internet access, with more than 70% indicating that they had access via their mobile devices. Other relates to the use of 3G modems (Figure 16).

**Figure 16: Type of internet access**



#### **5.3.4. Analysis of results for questions 13-16**

The results of questions 13 to 16 are presented in table format. The substatements are ranked by the average column shown on the far right. Individual responses that were found to be significant are highlighted in blue, affirmative significance for a substatement is highlighted in green and negative significance is highlighted in orange.

The results for question 13 (Table 53) shows that the respondents rated scientific journal articles, internet searches, academic lectures and pharmaceutical representatives as the most important sources to keep their medical knowledge up to date. Reading posters and class notes were considered not important.

The results for question 14 (Table 54) shows that respondents considered most of the factors listed as important, with the highest ratings ascribed to reliable, high quality sources.

The results of question 15 (Table 55) shows that most of the barriers listed were not considered barriers at all, with most respondents indicating that access to knowledge was not a barrier, and that they had the necessary resources to stay up to date.

The results of question 16 (Table 56) shows a strong tendency towards using the internet to stay up to date. Three of the six significant responses relates to the internet, which includes using the internet to do searches, reading journals online and getting email notifications. Getting journals through the mail, meeting with pharmaceutical representatives and attending lectures were the other highly rated preferences.

**Table 53: Question 13 Which of the following sources do you use to keep your medical knowledge up to date with the latest research or guidelines?**

	Never	Rarely	Sometimes	Often	Always	Avg
Reading scientific journal articles (hard or electronic copy)	2%	5%	15%	46%	32%	4.00
Using the internet to do searches on topics you are interested in e.g. using Google search	1%	7%	26%	39%	27%	3.83
Attending academic lectures	2%	12%	20%	49%	17%	3.66
Meeting with pharmaceutical representatives	11%	6%	21%	51%	11%	3.45
Attending conferences	4%	13%	37%	30%	16%	3.41
Using the internet to visit specific websites for information e.g. HIV Clinicians society	6%	18%	28%	33%	15%	3.32
Reading guidelines that are available where you work	6%	16%	38%	30%	10%	3.22
Attending training courses	2%	20%	38%	33%	7%	3.23
Consulting an expert in the field in person, telephonically, or via email	4%	18%	48%	26%	5%	3.10
Reading text books	5%	24%	38%	28%	5%	3.04
Using the internet to access databases that have summaries like Cochrane library or Up to date	13%	24%	28%	21%	13%	2.96
Spur of the moment discussions with colleagues you work with	9%	33%	33%	21%	5%	2.80
Using the media e.g. reading newspapers, magazines or listening to the radio	24%	27%	22%	22%	5%	2.56
Regular scheduled discussions with colleagues at meetings e.g. ward rounds	30%	24%	26%	17%	2%	2.37
Reading posters put up where you work	34%	27%	24%	12%	2%	2.22
Reading your class notes from when you were still studying	63%	27%	5%	4%	1%	1.52

**Table 54: Question 14 How important are the following factors to you when looking for knowledge to keep you up to date with the latest research or guidelines?**

	Not important	Slightly important	Neutral	Moderately important	Extremely important	Avg
The knowledge/information must be from a reliable source	0%	0%	0%	11%	89%	4.89
The knowledge/information must be of a high quality	0%	0%	0%	17%	83%	4.83
The knowledge/information must be to the point	0%	0%	2%	28%	70%	4.67
The knowledge/information must be easy to access	1%	0%	1%	32%	66%	4.61
The knowledge/information must be easy to understand	0%	1%	5%	39%	55%	4.48
The knowledge/information must be relevant to my duties	0%	1%	6%	29%	63%	4.55
I must be able to get the knowledge/information fast	0%	2%	5%	23%	70%	4.60
The knowledge/information must be in a place that I usually use to find information	2%	0%	21%	44%	33%	4.05
The knowledge/information must be free	4%	4%	21%	33%	39%	4.00
The knowledge/information must be research or guidelines from South Africa	7%	6%	30%	46%	10%	3.45
The knowledge/information must involve some CPD points	11%	7%	27%	43%	12%	3.38
The knowledge/information must be an electronic copy	9%	11%	43%	24%	13%	3.23
The knowledge/information must contain graphs and pictures	6%	17%	44%	27%	6%	3.10
The knowledge/information must be a hard copy	26%	17%	41%	13%	2%	2.50

**Table 55: Question 15 Grade the importance of the following barriers in keeping you from staying up to date with the latest medical research or guidelines.**

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	
I think that lectures, conferences or training courses take place at inconvenient times	20%	23%	17%	34%	6%	2.84
I don't have time to look for knowledge/information	10%	33%	21%	28%	9%	2.93
I think that lectures, conferences or training courses take place at inconvenient places	21%	26%	16%	32%	6%	2.77
I think there is too much knowledge/information available	11%	33%	22%	28%	6%	2.85
I think that scientific articles are too difficult to understand	26%	29%	24%	18%	2%	2.43
I don't want to spend money on buying journal articles, attending lectures or training courses	30%	26%	23%	18%	2%	2.37
I don't have money to buy journal articles or attend lectures and training courses	41%	32%	11%	15%	1%	2.02
I don't have access to senior doctors or nurses that can tell me about new knowledge/information	50%	22%	15%	10%	4%	1.95
I forget to look for updated knowledge/information	27%	45%	20%	6%	2%	2.12
I am not aware any lectures, conferences or training courses where I work	46%	29%	15%	9%	1%	1.89
I don't know how to find the knowledge/information I am looking for	46%	41%	6%	6%	0%	1.72
I don't have internet access	77%	12%	4%	4%	4%	1.45
I don't have access to a printer to make a hard copy	73%	16%	4%	2%	5%	1.50
I don't have access to knowledge/information	32%	55%	11%	2%	0%	1.84
I don't think it is necessary to find new knowledge/information	67%	28%	4%	1%	0%	1.39

**Table 56: Question 16 How would you prefer to stay up to date with the most recent medical knowledge?**

	Never	Rarely	Sometimes	Often	Always	
Using the internet to do searches, access databases or other websites	1%	6%	18%	34%	40%	4.06
Reading journal articles on the internet (electronic copy)	1%	5%	23%	45%	26%	3.89
Getting journals like CME through the mail (hard copy)	2%	6%	22%	41%	28%	3.87
Receiving emails to notify me automatically of research findings or updates in guidelines	2%	15%	16%	35%	32%	3.79
Meeting with pharmaceutical representatives	11%	6%	21%	51%	11%	3.45
Attending lectures	2%	10%	30%	46%	11%	3.54
Consulting an expert as needed (personally, via telephone, via email)	0%	15%	38%	38%	10%	3.43
Attending conferences	4%	13%	37%	30%	16%	3.41
Attending training courses	2%	20%	38%	33%	7%	3.23
In service training onsite by an expert in the field	13%	20%	21%	34%	12%	3.12
Regular discussion at meetings with colleagues (for example on ward rounds)	10%	18%	39%	29%	4%	2.99
Reading text books	5%	24%	38%	28%	5%	3.04
Spur of the moment discussions with colleagues that you work with as needed	16%	22%	37%	22%	4%	2.76

### **5.3.5. Results of the combined ranking for questions 13, 14 and 16**

The results of the combined rankings are shown in table format for the following:

- a. Question 13 ranked against question 14 (Table 57).
- b. Question 13 ranked against question 16 (Table 58).
- c. Question 16 ranked against question 14 (Table 59).

The individual substatements that were answered significantly different from a random process are again highlighted in green.

The results of these combinations indicate that the respondents consider reliable scientific journal articles available on the internet as the most preferred source for keeping knowledge up to date.



**Table 57: Combined question 13 and question 14**

		14.) Factor importance when looking for knowledge														
		Reliable source	Quality	To the point	Easy access	Easy to understand	Relevant to my duties	Get the knowledge/information fast	Place that I usually use to find information	Free	Research or guidelines from South Africa	CPD points	Electronic copy	Contain graphs and pictures	Be a hard copy	
<b>13.) Which of the following sources do you use to keep your medical knowledge up to date with the latest research or guidelines?</b>	<b>AVG</b>	<b>4.89</b>	<b>4.83</b>	<b>4.67</b>	<b>4.61</b>	<b>4.60</b>	<b>4.55</b>	<b>4.48</b>	<b>4.05</b>	<b>4.00</b>	<b>3.45</b>	<b>3.38</b>	<b>3.23</b>	<b>3.10</b>	<b>2.50</b>	
Reading scientific journal articles	4.00	4.45	4.41	4.34	4.30	4.30	4.27	4.24	4.02	4.00	3.73	3.69	3.62	3.55	3.25	
Internet search	3.83	4.36	4.33	4.25	4.22	4.21	4.19	4.15	3.94	3.91	3.64	3.60	3.53	3.46	3.16	
Academic lectures	3.66	4.27	4.24	4.16	4.13	4.13	4.10	4.07	3.85	3.83	3.55	3.52	3.45	3.38	3.08	
Meeting with pharmaceutical representatives	3.45	4.17	4.14	4.06	4.03	4.02	4.00	3.96	3.75	3.73	3.45	3.41	3.34	3.27	2.98	
Attending conferences	3.41	4.15	4.12	4.04	4.01	4.01	3.98	3.95	3.73	3.71	3.43	3.40	3.32	3.26	2.96	
Specific websites for information	3.32	4.10	4.07	3.99	3.96	3.96	3.93	3.90	3.68	3.66	3.38	3.35	3.27	3.21	2.91	
Reading guidelines that are available where you work	3.23	4.06	4.03	3.95	3.92	3.91	3.89	3.85	3.64	3.62	3.34	3.30	3.23	3.16	2.87	
Attending training courses	3.22	4.05	4.02	3.95	3.91	3.91	3.88	3.85	3.63	3.61	3.34	3.30	3.23	3.16	2.86	
Consulting an expert in the field in person	3.10	3.99	3.96	3.88	3.85	3.85	3.82	3.79	3.57	3.55	3.27	3.24	3.16	3.10	2.80	
Reading text books	3.04	3.96	3.93	3.85	3.82	3.82	3.79	3.76	3.54	3.52	3.24	3.21	3.13	3.07	2.77	
Using the internet to access databases	2.96	3.93	3.90	3.82	3.79	3.78	3.76	3.72	3.51	3.48	3.21	3.17	3.10	3.03	2.73	
Spur of the moment discussions with colleagues	2.80	3.85	3.82	3.74	3.71	3.70	3.68	3.64	3.43	3.40	3.13	3.09	3.02	2.95	2.65	
Newspapers, magazines or listening to the radio	2.56	3.73	3.70	3.62	3.59	3.58	3.55	3.52	3.30	3.28	3.01	2.97	2.90	2.83	2.53	
Regular scheduled discussions with colleagues	2.37	3.63	3.60	3.52	3.49	3.48	3.46	3.42	3.21	3.18	2.91	2.87	2.80	2.73	2.43	
Posters put up where you work	2.22	3.55	3.52	3.45	3.41	3.41	3.38	3.35	3.13	3.11	2.84	2.80	2.73	2.66	2.36	
Class notes from when you were still studying	1.52	3.21	3.18	3.10	3.07	3.06	3.04	3.00	2.79	2.76	2.49	2.45	2.38	2.31	2.01	

**Table 58: Combined question 13 and question 16**

		16.) How would you prefer to stay up to date with the most recent medical knowledge?													
		Internet searches or access databases	Reading journal articles on the internet	Getting journals like CME through the mail (hard copy)	Receiving emails to notify me automatically of research findings or updates in guidelines	Meeting with pharmaceutical representatives	Attending lectures	Consulting an expert as needed	Conferences	Training courses	In service training onsite by an expert in the field	Regular scheduled discussions with colleagues	Reading text books	Spur of the moment discussions with colleagues	
<b>13.) Which of the following sources do you use to keep your medical knowledge up to date with the latest research or guidelines?</b>	<b>AVG</b>	<b>4.06</b>	<b>3.89</b>	<b>3.87</b>	<b>3.79</b>	<b>3.54</b>	<b>3.45</b>	<b>3.43</b>	<b>3.41</b>	<b>3.23</b>	<b>3.12</b>	<b>3.04</b>	<b>2.99</b>	<b>2.76</b>	
Reading scientific journal articles	4.00	4.03	3.95	3.93	3.90	3.77	3.73	3.71	3.71	3.62	3.56	3.52	3.49	3.38	
Internet search	3.83	3.95	3.86	3.85	3.81	3.68	3.64	3.63	3.62	3.53	3.48	3.43	3.41	3.29	
Academic lectures	3.66	3.86	3.77	3.76	3.73	3.60	3.55	3.54	3.54	3.45	3.39	3.35	3.32	3.21	
Meeting with pharmaceutical representatives	3.45	3.76	3.67	3.66	3.62	3.49	3.45	3.44	3.43	3.34	3.29	3.24	3.22	3.10	
Attending conferences	3.41	3.74	3.65	3.64	3.60	3.48	3.43	3.42	3.41	3.32	3.27	3.23	3.20	3.09	
Specific websites for information	3.32	3.69	3.60	3.59	3.55	3.43	3.38	3.37	3.37	3.27	3.22	3.18	3.15	3.04	
Reading guidelines that are available where you work	3.23	3.65	3.56	3.55	3.51	3.38	3.34	3.33	3.32	3.23	3.18	3.13	3.11	2.99	
Attending training courses	3.22	3.64	3.55	3.54	3.51	3.38	3.34	3.32	3.32	3.23	3.17	3.13	3.10	2.99	
Consulting an expert in the field in person	3.10	3.58	3.49	3.48	3.45	3.32	3.27	3.26	3.26	3.16	3.11	3.07	3.04	2.93	
Reading text books	3.04	3.55	3.46	3.45	3.41	3.29	3.24	3.23	3.23	3.13	3.08	3.04	3.01	2.90	
Using the internet to access databases	2.96	3.51	3.43	3.41	3.38	3.25	3.21	3.20	3.19	3.10	3.04	3.00	2.98	2.86	
Spur of the moment discussions with colleagues	2.80	3.43	3.35	3.34	3.30	3.17	3.13	3.12	3.11	3.02	2.96	2.92	2.90	2.78	
Newspapers, magazines or listening to the radio	2.56	3.31	3.23	3.21	3.18	3.05	3.01	2.99	2.99	2.90	2.84	2.80	2.77	2.66	
Regular scheduled discussions with colleagues	2.37	3.21	3.13	3.12	3.08	2.95	2.91	2.90	2.89	2.80	2.74	2.70	2.68	2.56	
Posters put up where you work	2.22	3.14	3.05	3.04	3.01	2.88	2.84	2.82	2.82	2.73	2.67	2.63	2.60	2.49	
Class notes from when you were still studying	1.52	2.79	2.71	2.70	2.66	2.53	2.49	2.48	2.47	2.38	2.32	2.28	2.26	2.14	

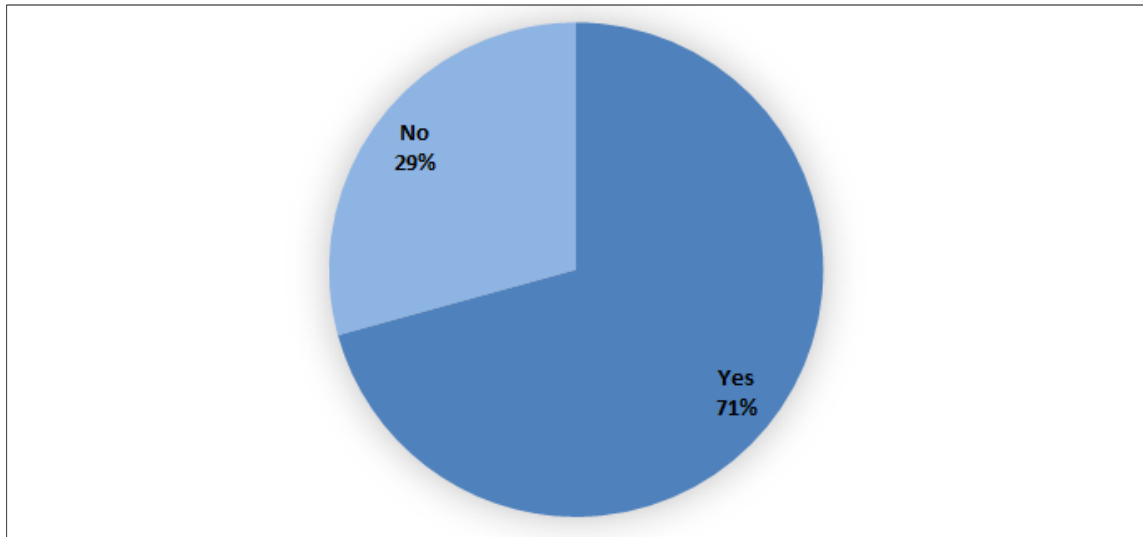
**Table 59: Combined question 14 and question 16**

		14.) Factor importance when looking for knowledge													
		Reliable source	Quality	To the point	Easy access	Easy to understand	Relevant to my duties	Get the knowledge/ information fast	Place that I usually use to find information	Free	Research or guidelines from South Africa	CPD points	Electronic copy	Contain graphs and pictures	Be a hard copy
<b>16.) How would you prefer to stay up to date with the most recent medical knowledge?</b>	<b>AVG</b>	<b>4.89</b>	<b>4.83</b>	<b>4.67</b>	<b>4.61</b>	<b>4.60</b>	<b>4.55</b>	<b>4.48</b>	<b>4.05</b>	<b>4.00</b>	<b>3.45</b>	<b>3.38</b>	<b>3.23</b>	<b>3.10</b>	<b>2.50</b>
Internet searches or access databases	<b>4.06</b>	4.48	4.45	4.37	4.34	4.33	4.30	4.27	4.05	4.03	3.76	3.72	3.65	3.58	3.28
Reading journal articles on the internet	<b>3.89</b>	4.39	4.36	4.28	4.25	4.24	4.22	4.18	3.97	3.95	3.67	3.63	3.56	3.49	3.20
Getting journals like CME through the mail (hard copy)	<b>3.87</b>	4.38	4.35	4.27	4.24	4.23	4.21	4.17	3.96	3.93	3.66	3.62	3.55	3.48	3.18
Receiving emails to notify me automatically of research findings	<b>3.79</b>	4.34	4.31	4.23	4.20	4.20	4.17	4.13	3.92	3.90	3.62	3.59	3.51	3.45	3.15
Meeting with pharmaceutical representatives	<b>3.54</b>	4.21	4.18	4.10	4.07	4.07	4.04	4.01	3.79	3.77	3.49	3.46	3.38	3.32	3.02
Attending lectures	<b>3.45</b>	4.17	4.14	4.06	4.03	4.02	4.00	3.96	3.75	3.73	3.45	3.41	3.34	3.27	2.98
Consulting an expert as needed	<b>3.43</b>	4.16	4.13	4.05	4.02	4.01	3.99	3.95	3.74	3.71	3.44	3.40	3.33	3.26	2.96
Conferences	<b>3.41</b>	4.15	4.12	4.04	4.01	4.01	3.98	3.95	3.73	3.71	3.43	3.40	3.32	3.26	2.96
Training courses	<b>3.23</b>	4.06	4.03	3.95	3.92	3.91	3.89	3.85	3.64	3.62	3.34	3.30	3.23	3.16	2.87
In service training onsite by an expert in the field	<b>3.12</b>	4.01	3.98	3.90	3.87	3.86	3.84	3.80	3.59	3.56	3.29	3.25	3.18	3.11	2.81
Regular scheduled discussions with colleagues	<b>3.04</b>	3.96	3.93	3.85	3.82	3.82	3.79	3.76	3.54	3.52	3.24	3.21	3.13	3.07	2.77
Reading text books	<b>2.99</b>	3.94	3.91	3.83	3.80	3.79	3.77	3.73	3.52	3.49	3.22	3.18	3.11	3.04	2.74
Spur of the moment discussions with colleagues	<b>2.76</b>	3.82	3.79	3.71	3.68	3.68	3.65	3.62	3.40	3.38	3.10	3.07	2.99	2.93	2.63

### 5.3.6. Question 17 and 18

The majority of respondents (71%) indicated that they treat HIV patients.

#### Question 17 Are you responsible for managing or treating HIV infected patients in South Africa?



The results of question 18 are shown in Table 60. This indicates that 81% of the respondents were aware of the new DoH guidelines released in April 2013 with 72% aware of where they could access a copy. The majority (71%) indicated that they followed these guidelines for patient management, although 70% would prefer to use other HIV guidelines. The majority (89%) indicated that they did not have any training on using the current HIV guidelines.

**Table 60: Question 18 If you answered ‘Yes’ to question 17, please complete this section. If you answer ‘No’ to question 17 do not answer this section**

	Yes	No
Are you aware of the new HIV guidelines released by the Department of Health (DOH) in April 2013?	81%	19%
Have you read the new DoH HIV guidelines released in April 2013?	65%	35%
Do you know where to find a copy of the new DoH HIV guidelines on the internet?	72%	28%
Do you have your own copy or access to a copy of the new DoH HIV guidelines (hard/electronic copy)?	62%	38%
Have you had any training in using the new DoH HIV guidelines?	11%	89%
Do you feel you need training in using the new DoH HIV guidelines?	63%	38%
Are you following the new DoH HIV guidelines for patient management?	71%	29%
Do you prefer to use other HIV guidelines and not the DoH guidelines?	30%	70%

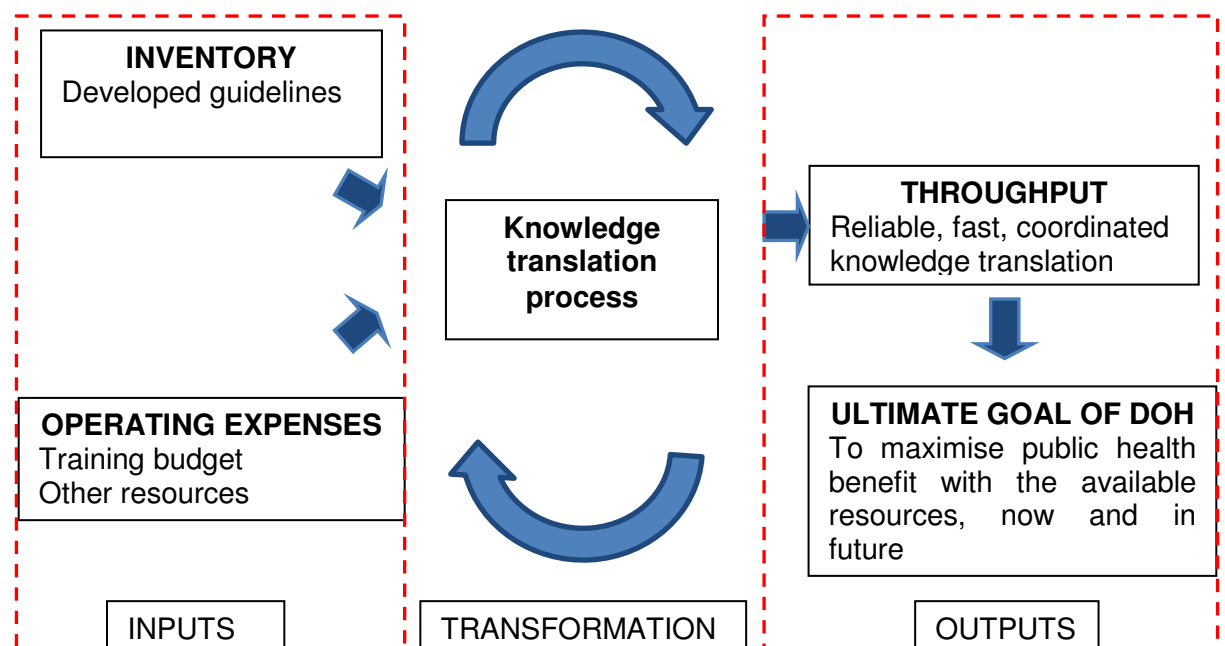
## 5.4. Research question 3: Thinking Processes of TOC

### 5.4.1. Overview

The Thinking Processes of TOC were applied to the qualitative data from a knowledge translation in the public sector point of view. A graphical representation of knowledge translation in the public sector, as coordinated by the DOH, is shown in Figure 17.

This figure was designed by redefining the three basic measurements of inventory, operating expenses and throughput, using an approach similar to the one used by Motwani *et al.* (1996). Knowledge, which is captured in the DOH guidelines prior to being implemented into practice, is analogous to inventory. The money and resources that are used to convert the guidelines (inventory) into practice are redefined as the operating expenses of the system. The developed guidelines are converted into throughput by the process of knowledge translation, reaching the goal of putting knowledge into practice. The goal of the system is to maximise knowledge translation throughput. This might assist the DOH to reach its ultimate goal, namely to maximise the public health benefit. Knowledge translation organisations play an important role in the knowledge translation process, but are not included in this diagram, as it is a stakeholder relationship that falls outside of the DOH system.

**Figure 17: System representation of knowledge translation in the DOH**



Source: Adapted from Motwani et al. 1996

## **5.4.2. Intermediate objectives map**

### **1. Define the system**

The system was defined as the process of knowledge translation as it takes place within the Department of Health.

### **2. Goal: getting knowledge into practice**

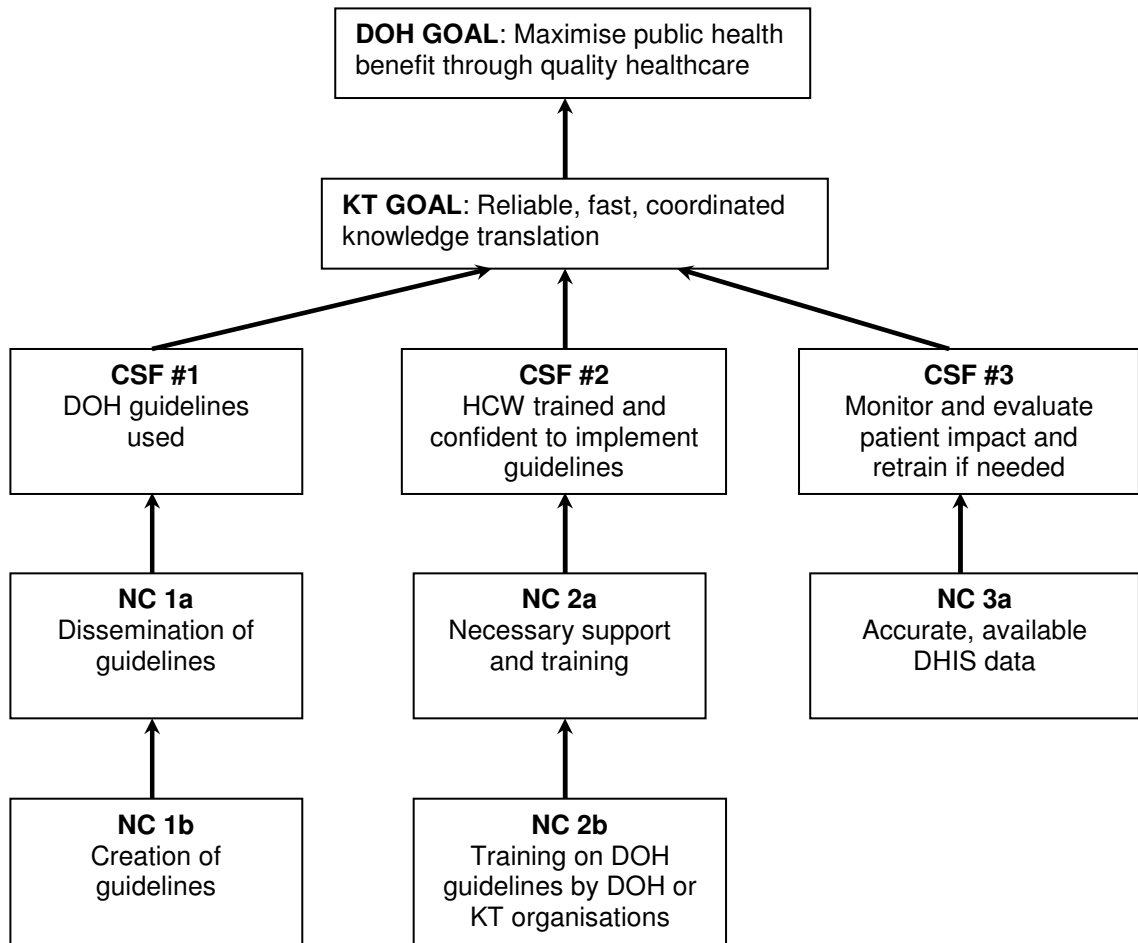
- Goal of the DOH: maximise public health benefit through quality healthcare.
- Goal of knowledge translation: reliable, fast, coordinated knowledge translation.

### **3. Critical success factors (CSF) and necessary conditions (NC)**

- CSF #1: Healthcare workers should use the DOH guidelines in practice.
  - To achieve CSF #1, guidelines must be created (1b) and disseminated (1a).
- CSF #2: Healthcare workers should be trained and confident to implement guidelines into practice.
  - To achieve CSF #2, healthcare workers must be trained to use the DOH guidelines by either the DOH or the KT organisations (2b) followed by adequate support (2a).
- CSF #3: The impact of training must be evaluated and monitoring to determine training gaps and retrain healthcare workers if necessary.
  - To achieve CSF #3, accurate DHIS data must be collected which measures patient impact (3a).

The intermediate objectives map that was constructed from the above data is shown in Figure 18.

**Figure 18: Intermediate objectives map**



**5.4.3. Current reality tree**

Through construction of the CRT, five undesirable effects were identified, which was traced back to their respective root causes and shown in Figure 19.

The first and second UDE relate to skills that are lost after training. Three reasons were identified namely: healthcare workers that do not have the confidence to implement guidelines, healthcare workers that are promoted from clinical to managerial roles and staff turnover. Healthcare workers were not confident due to limited support after training, which was a result of lack of telephone and mentor access. This goes back to the root cause of not having either monetary or human capital resources available. HCW also did not have enough opportunity in rural areas to practice skills, due to a limited exposure to certain diseases. Too many staff rotations resulted in healthcare

workers not gaining the necessary confidence in newly acquired skills, with these rotations exacerbated by the shortage of staff.

The third UDE relates to healthcare workers, especially in urban areas, resisting change. This resistance can be explained by the overloading of healthcare workers with too much information due to new guidelines being released continuously. The root cause was identified as the lack of a systematic approach for updating and distributing new knowledge by the DOH.

The fourth and fifth UDE relate to healthcare workers that are not trained on the new guidelines. The causes of this undesirable effect include that healthcare workers are resistant to attend training, KT organisations get short notice from the DOH to train healthcare workers as well as the release of too many guidelines. The root cause was identified as the many managerial levels within the DOH, which results in slow communications to healthcare workers and KT organisations.

The sixth UDE relates to the confusion that may arise because of the many different versions of the DOH guidelines that KT organisations create and HCW prefer to use. The cause of this observation goes back to the DOH guidelines, which are not user friendly. The root cause identified was that the DOH guidelines do not meet the healthcare worker's requirements.

The answer to the question "what to change?" is shown in Table 61 with a plan of how to bring about that change.

**Table 61: What to change?**

Root cause	What to change	Plan
#1	Resources not available	Outside the DOH span of control
#2	No plan for systematic release of guidelines	Resolve in FRT
#3	Many DOH management layers	Resolve in EC and FRT
#4	DOH guidelines does not meet the healthcare worker's requirements	Resolve in FRT



A key to reading the CRT in Figure 19 as well as FRT in Figure 21 is provided in Table 62 (Dettmer, 2007).

**Table 62: Key to reading CRT and FRT**




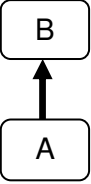
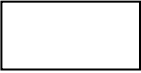
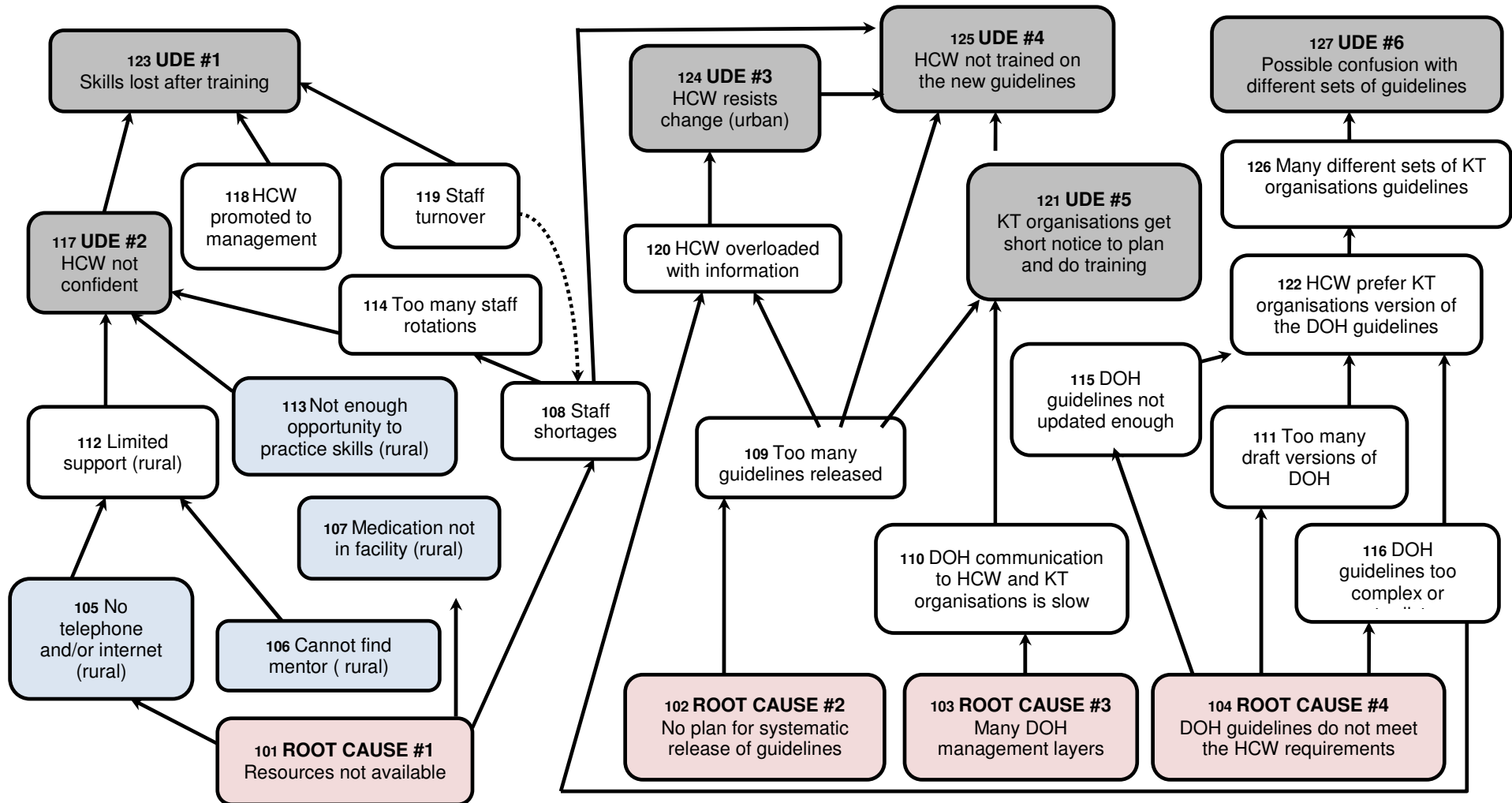
	<p>Entity, which may be a cause or an effect.          UDE: shaded grey          Root cause: shaded red          Related to mainly rural areas: shaded blue</p>
	<p>Causality arrow (Tail = cause and head=effect)</p>
	<p>Negative reinforcing loop</p>
	<p>If "<u>A</u>" (cause) <u>then</u> "B" (effect)</p>
	<p>Injection</p>

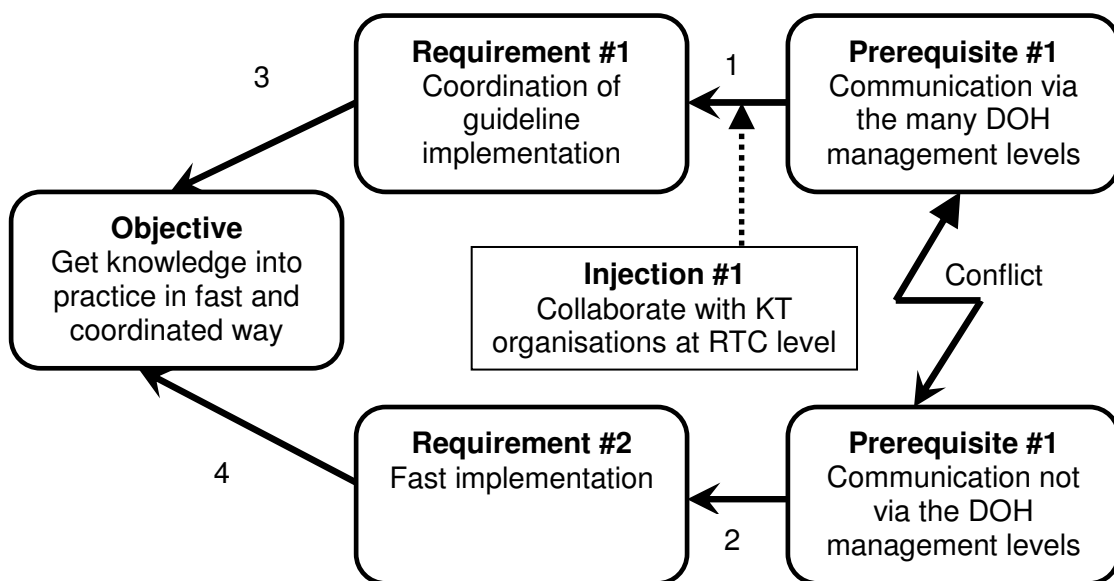
Figure 19: Current reality tree



#### 5.4.4. Evaporating cloud

Communication to HCW regarding new guidelines takes place via the many DOH management levels, which slows the process of knowledge. This was used as a prerequisite condition in the EC and is shown in Figure 20. KT organisations have to wait for communication to move from national to provincial through several other layers in the form of a circular communication prior to arranging training sessions with facilities (Refer (5.2.3.2.2.2.1.3.4, Table 38, nr 2). The conflict was identified as having DOH communication vs. not having DOH coordination to implement guidelines.

**Figure 20: Evaporating cloud**



Evaluating the assumption under arrow 1 namely, DOH communication is the only way to coordinate guideline implementation, is an invalid assumption. This is not the only way that guideline implementation can be coordinated, as is shown by the injection which solves the conflict. This answers the second question of the TP's namely "what to change to?" If the DOH collaborate with the KT organisations and empower them to communicate the message of new guidelines directly to facilities, the effort will still be coordinated but faster. The DOH can still follow its normal process, but the planning of the KT organisations activities and subsequent implementation will not be delayed.

#### **5.4.5. Future reality tree**

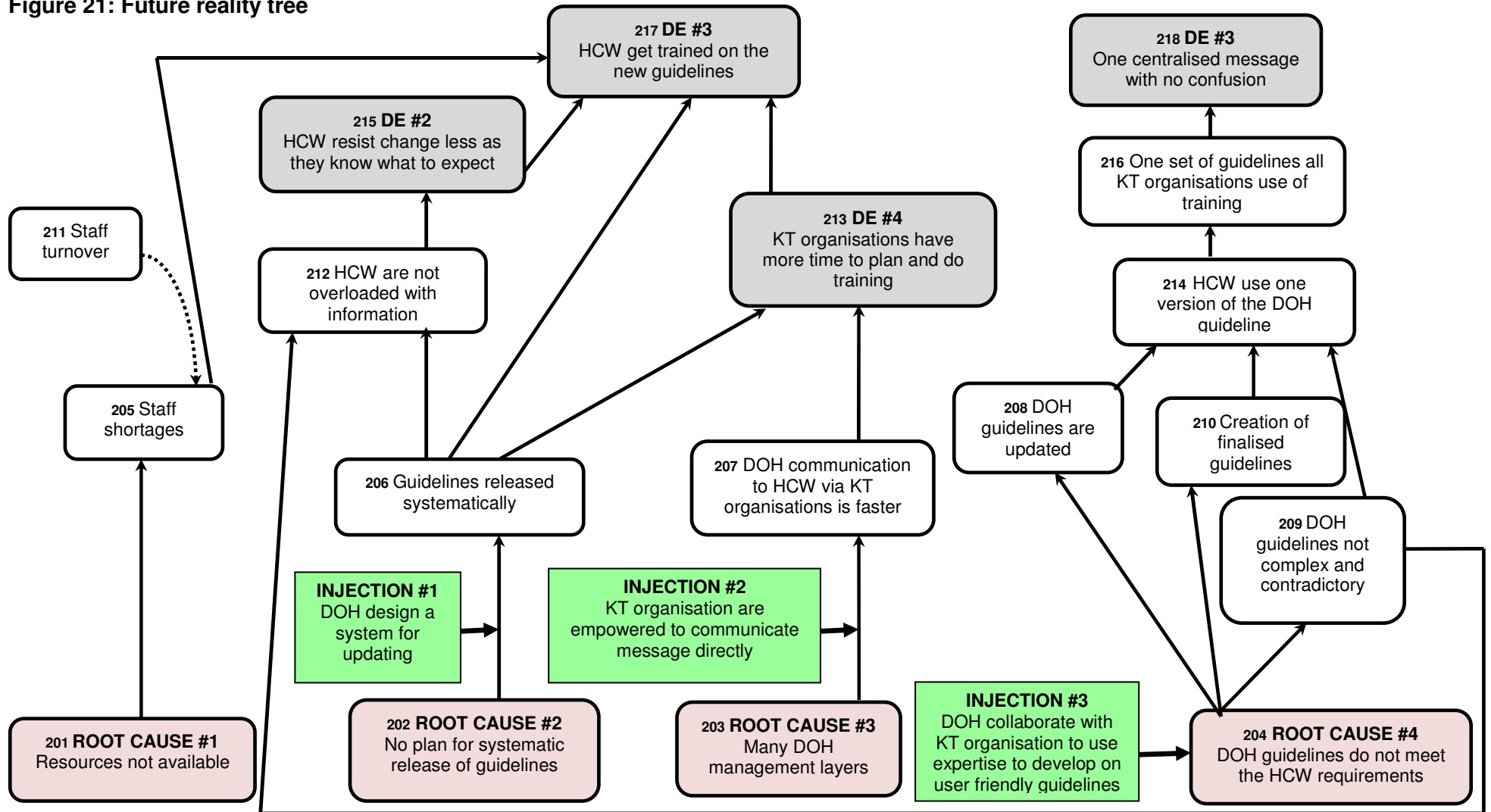
A future reality was drawn which is shown in Figure 21. It takes into account the injections necessary to reach the desired effect.

The first injection relates to the suggestion that the DOH should design a system for updating the guidelines, which will better coordinate the release of guidelines. Both KT organisations and healthcare workers will have time to plan and prepare better for new guidelines. The desired effect, namely that HCW will be trained on the guidelines will be reached.

The second injection comes from the idea generated from the evaporating cloud, which suggests empowerment of knowledge translation organisations to communicate to HCW regarding the implementation of new guidelines. Knowledge translation organisations and the DOH already collaborate at the regional training centre (RTC), and communication can occur at this level, with KT organisations disseminating the message from this level to facilities. This will make knowledge translation faster, and increase the available time for KT organisations to plan training with facilities.

The third injection relates to increased collaboration between the DOH and KT organisation. KT organisations have knowledge synthesis expertise as proven by their own hard copy materials. Using this expertise in conjunction with the DOH, one user-friendly guideline can be created. This will lead to less possible confusion, as well as save on some of the resources of KT organisations.

Figure 21: Future reality tree



## **CHAPTER 6: DISCUSSION OF RESULTS**

### **6.1. Introduction**

Knowledge translation describes the process of getting knowledge into practice (Canadian Institutes of Health Research, n.d.). Good knowledge translation leads to a healthy workforce and economy, whereas poor knowledge translation wastes resources and leads to public health deterioration (Buchan, 2004; Chassin & Galvin, 1998; Department of Health, 2011; Drolet & Lorenzi, 2011; Grimshaw *et al.*, 2012; Straus *et al.*, 2011). Failure to translate knowledge is present at all levels of healthcare, but is especially prominent at the primary healthcare level (Bailey & Pang, 2004; Cuellar-Montoya *et al.*, 2004; Godlee *et al.*, 2004; Grol, 2001).

This research evaluated knowledge translation in South Africa at the primary healthcare level from both a knowledge translation organisation's point of view, as well as a healthcare worker's point of view. This approach was chosen to obtain two different perspectives on knowledge translation in the South African context. Systems thinking using the Thinking Processes of Theory of Constraints were applied to the data relating to the public sector, in order to identify ways in which knowledge translation can possibly be optimised. This research focused on what is described in the literature as the T3 knowledge gap, which is the gap between proven clinical uses of research and the application in clinical practice (Drolet & Lorenzi, 2011).

### **6.2. Discussion of research question 1**

#### **6.2.1. Overview**

Research question 1 aimed to evaluate the strategies of organisations involved in translating knowledge to primary healthcare workers in South Africa. This research question was answered by collecting qualitative data through conducting twelve semi-structured interviews, with nine knowledge translation organisations. Graham *et al.*'s (2006) knowledge to action model was used as a basis to analyse the different organisation's knowledge translation strategies. The healthcare workers in the public and private sector represent the knowledge users in this research.

#### **6.2.2. The South African knowledge translation context**

##### **6.2.2.1. Overview**

South Africa's healthcare system consists of the public and private healthcare sector, which differs in several ways from each other (Department of Health, 2011). The

relatively under-resourced public sector, is predominantly nurse led and serves the majority of the South African population (Department of Health, 2011). In contrast to this, the well-resourced private sector, is predominantly doctor led and serves the minority of the South African population (Department of Health, 2011).

This research identified four different subcontexts within the overall bigger South African healthcare context, which included: the rural public, urban public, urban private and rural private subcontexts. The barriers and facilitators to knowledge translation in these four environments were similar in some cases, but different in others. This research found that organisations had specific ways in which they modified their knowledge translation strategies to suit each specific set of circumstances where possible. This flexibility is crucial, as successful knowledge translation depends on understanding the barriers and facilitators present in a specific context and adapting the knowledge translation strategy accordingly (Santesso & Tugwell, 2006; Grimshaw *et al.*, 2012; Straus *et al.*, 2013).

#### **6.2.2.2. The public sector**

In the rural public sector, the remoteness of the facilities combined with difficulty in reaching these areas via road are the biggest challenges facing knowledge translation organisations. Knowledge translation in these areas tends to be slow, with organisations struggling to get mentors to work there. In many of these rural facilities, the general infrastructure is lacking in terms of not having the internet and functioning telephones available. This prohibits two-way communication between organisations and healthcare workers to exchange information. Furthermore, organisations are unable to provide healthcare workers with the necessary support. The general shortage of resources, for example medication, makes it difficult for healthcare workers to follow the guidelines at all times, even if they have received the necessary training. In addition, healthcare workers face transport challenges in rural areas, which make attending off-site knowledge translation sessions, even when in close proximity to the rural area, difficult.

Organisations noted that healthcare workers in urban areas in the public sector, generally get a large amount of training. This is supported by the observation that there seems to be more underlying frustration and resistance to training. Transportation was not a problem in these areas, and many facilities have internet and telephones to enable two-way communication.

### **6.2.2.3. The private sector**

Organisations noted that in the private sector, doctors had less time to attend training courses. Attending training courses also involves a double cost to general practitioners, as they have to pay for both the course and another doctor to manage their practice in their absence. Private practitioners work independently, which means there is less opportunity to network with colleagues to exchange both tacit and explicit knowledge.

There were concerns regarding the lack of coordination between the public and private sector in terms of patient care and referrals. It is interesting to note that the DOH started a campaign in March 2013 to contract private practitioners to do sessions in the public sector in an attempt to improve primary healthcare (Department of Health, 2013). This would however require private practitioners to become familiar with all the relevant treatment guidelines used in the public sector. It can be argued that this approach will improve the coordination between the two sectors.

### **6.2.3. Knowledge translation organisations in South Africa**

#### **6.2.3.1. The type of organisations and their goal**

The different types of knowledge translation organisations that were interviewed included, three non-governmental organisations, three university affiliated organisations, one government municipality and one membership organisation. Organisations described the main goal of their knowledge translation strategy as trying to improve the healthcare system, training with the goal of sustainability, and aiming to revolutionise primary healthcare. Knowledge translation organisations act as knowledge brokers that help with the management of knowledge within both the public and private sector by creating knowledge, disseminating knowledge and building capacity through training activities. This is in keeping with the literature's description of knowledge brokers as knowledge managers, linkage agents and capacity builders (Oldham & McLean, 1998). These organisations also act as intermediaries in the public sector by strengthening the flow of information between the DOH and healthcare workers.

#### **6.2.3.2. The influence of funding**

The funding model of each particular type of organisation had a major influence on the scope, sector and the amount of knowledge translation the organisation was capable of doing. Most organisations rely on donor funding, membership fees or training course



fees. Some funding from the United States, for example, mandates a focus on HIV in specific districts, which have been extremely useful in upscaling ART in the public sector. However, because this funding has the effect of allocating organisations to specific districts, it creates a barrier in terms of providing healthcare workers with support, sharing of training materials between organisations and leads to low level competition in some instances. Organisations that rely on course fees tend to focus on a wider range of topics, are not limited to specific areas, and does training in both the public and private sector. The interviewed government municipality does training of its own staff, but was constrained by the training budget coming from the relevant municipality. The interviewed private organisation focused on training HCW in the public sector on a laboratory test developed by them, and uses its own internal money to do so.

#### **6.2.3.3. The sector and focus**

This research found that the majority of organisations conduct knowledge translation in the public sector. It can be argued that by concentrating knowledge translation in the public sector as opposed to the private sector, up to 84% of the South-African population can benefit from these efforts (Department of Health, 2011).

More than half of the interviewed organisations had an exclusive focus on HIV and conditions surrounding HIV. There have been concerns in the past regarding the fragmentation of the South African healthcare system brought about by programmes focused exclusively on HIV, resulting in non-communicable diseases being marginalised (Mayosi *et al.*, 2009). What was however observed was the increasing shift of organisations from HIV only programmes, towards more integrated knowledge translation strategies. There are several factors that could be responsible for this shift, which includes the increased emphasis on integration coming from the DOH as well as the organisations themselves. Some organisations anticipate decreased HIV related funding in the future, which necessitates them to diversify into a wider, more integrated, commercial focus. Other organisations analysed the morbidity and mortality trends in South Africa and are convinced that integration is the right approach for healthcare in the future.

#### **6.2.3.4. Collaborative relationships**

##### **6.2.3.4.1. Overview**

Most organisations formed collaborative relationships with the goal of planning knowledge translation activities, sharing knowledge translation resources and expertise, or gaining access to resources. Four different types of collaborative relationships were identified: between knowledge translation organisations themselves, with the DOH, with nursing colleges and with pharmaceutical companies.

##### **6.2.3.4.2. Collaboration between KT organisations themselves**

This type of collaboration was beneficial in terms of sharing training materials and hosting training events together which saves costs. It is noted in the literature that collaborative relationships where experiences related to integrated care can be shared are especially important when trying to integrate existing HIV and TB services into other non communicable disease programmes (Mayosi, Lawn *et al.*, 2012). One organisation has done extensive research into integrated knowledge translation in primary care, which can potentially be extremely beneficial to other organisations that currently have more HIV focused programmes.

##### **6.2.3.4.3. Collaboration with the DOH**

It is essential for organisations to collaborate with the DOH through the regional training centres. This is not only to determine training needs, but also to plan the who, where and how of training activities. The interaction of KT organisations with the DOH faced several challenges. Organisations felt that the DOH had too many health priorities and programmes requiring simultaneous implementation, which compete for resources as well as healthcare workers' attention and time. This makes planning a systematic, coordinated knowledge translation strategy difficult.

Some organisations suggested that the DOH focus on certain areas rather than trying to improve everything simultaneously. This view seems to be in contrast with integration, which implies addressing a wide range of different disease conditions. Organisations also suggested increased central coordination within the DOH with a system for updating new knowledge, which is communicated to all stakeholders timeously. Lastly, one organisation felt that the DOH was lacking in the necessary knowledge translation expertise in terms of balancing the clinical agenda with the public health agenda to maximise the output from the limited available resources.

Management layers within the DOH, from the national to clinic level, cause knowledge translation delays. Organisations mentioned that there were many instances where they were aware of new DOH guidelines before the clinics received the communication from national level. Organisations are however prohibited by the DOH to start planning training activities with facilities before communication has filtered through all the required organisational levels. Several organisations mentioned that this causes pressure on both the organisations and healthcare workers to do last minute guideline implementation. Resistance to certain programmes between the DOH management layers was also observed. This bureaucracy causes unnecessary delays. Organisation felt that the new minister of health was playing a key role in bringing about positive changes needed in public healthcare. This is in keeping with the view of the World Health Organization (2005a) that identifies political will as an important facilitator of knowledge translation in the healthcare environment.

#### **6.2.3.4.4. Collaboration with colleges and pharmaceutical companies**

One organisation collaborates with two nursing colleges to address the pre-service training gap observed in public sector nurses. This ensures that nurses receive the knowledge and skills to work in primary healthcare prior to qualifying. Some organisations also collaborate with pharmaceutical companies to sponsor training handouts and training events. However, there were concerns regarding the influence of pharmaceutical companies on knowledge content, with too much focus on new rather than basic medications.

#### **6.2.4. Knowledge translation needs**

##### **6.2.4.1. Identification of needs**

In Graham *et al.*'s (2006) knowledge to action model, understanding knowledge users and their needs is an essential element of the knowledge translation process (Straus *et al.*, 2009). Organisations use various ways to determine these needs. Some organisations use course evaluation forms in both the public and private sector and personal interaction in the public sector, which is an example of the identification of a felt need. One organisation was of the opinion that felt needs should not be used to determine training gaps, which is in keeping with the literature. Felt needs are identified by the healthcare workers and is subjective, it therefore does not necessarily reflect a person's true needs accurately (Gilliam & Murray, 1996 as cited in Kitson & Straus,

2010.) Using course evaluation forms is however the only way in which private sector needs are currently determined.

In the public sector, organisations also use file audits and analysing quality indicators from the DHIS data to identify certain levels of performance and trends. This is an example of the identification of a normative need, which represents performance up to a certain required level as defined by an expert (Gilliam & Murray, 1996 as cited in Kitson & Straus, 2010). According to literature, quality indicators represent a good way to identify knowledge gaps as long as these indicators are suitable and reliable (Straus *et al.*, 2013). The DHIS is a system that was established in 2000, which aggregates data from primary healthcare facilities in South Africa (Mayosi, Lawn, *et al.*, 2012). Some organisations pointed out that healthcare workers did not always complete DHIS registers adequately, which may bring the reliability of this data into question. This is in keeping with research done in three Kwazulu-Natal districts by Mate, Bennett, Mphatswe, Barker, and Rollins (2009), where they found that it was impossible to track the performance and outcomes of the Prevention of Mother-to-Child Transmission (PMTCT) programme due to incomplete and inaccurate DHIS data.

One organisation suggested identifying needs by observing the referrals from primary to higher healthcare levels. This would be an example of an expressed training need, as it relies on observing the healthcare worker's actions to determine the training gaps (Kitson & Straus, 2010).

#### **6.2.4.2. Current gaps identified**

Organisations identified both knowledge level and knowledge translation process gaps. The knowledge gaps identified included the pre-service training gap as well as other gaps at the primary healthcare level itself. One of the concerns currently in primary care, is that the focus on capacitating nurses in terms of ART with the NIMART programme, has led to some doctors in both the public and private sectors being left behind in terms of knowledge translation. Task shifting from doctor initiated to nurse initiated ART, is crucial to enable SA to upscale ART to more patients in the public sector (Georgeu *et al.*, 2012). Six of the nine organisations are currently offering NIMART training. Organisations are however concerned about complicated ART cases that are referred to doctors, who do not always have the necessary basic HIV management knowledge.

## **6.2.5. Understanding the knowledge user**

### **6.2.5.1. The public sector**

Organisations identified different reasons why public and private sector healthcare workers stay up to date.

In the public sector, it is less important for healthcare workers to actively look for new knowledge themselves. This is because the DOH provides mandatory guidelines healthcare workers have to follow, with training activities coordinated by the regional training centres.

Organisations identified the attitude of healthcare workers as either a facilitator or barrier to guideline implementation. This is in keeping with the literature, which identifies attitudinal barriers as important in explaining why implementation of guidelines into practice fails (Cabana *et al.*, 1999). Attitudinal barriers included healthcare workers being resistant to change as well as a lack of motivation most likely due to being overworked. Organisations found that proper communication prior to training could create the necessary acceptance to overcome this observed resistance. Attitudinal facilitators included the positive attitude amongst rural healthcare workers when attending training sessions and lectures.

Organisations also observed that the healthcare workers sometimes attended training sessions for the wrong reasons. This included healthcare workers that attended training to get a day of work or to build their *curricula vitae*.

### **6.2.5.2. The private sector**

In the private sector where doctors have more freedom to choose a patient management strategy, organisations felt that the CPD point requirements from the HPCSA was an important motivating factor for doctors to attend training sessions. This was however not the only reason, as it was noted that some private practitioners were interested in staying up to date. Where private companies use knowledge translation organisations to train groups of healthcare workers in the private sector, showing the potential impact of training on a company's bottom line, is important for organisations to illustrate, as training is expensive.

## **6.2.6. Knowledge tools used during knowledge translation**

### **6.2.6.1.1. Overview**

The knowledge to action model describes knowledge creation as a funnel, with knowledge becoming increasingly more useful to knowledge users as it moves through the different levels of this funnel (Graham *et al.*, 2006). Most organisations were involved in creating all types of knowledge, including first, second and third generation knowledge. Organisations felt that the translated knowledge should be kept simple and focused on the basics. Second and third generation knowledge is used by organisations to create hard copy, web-based and mobile-based tools, which forms an integral part of their knowledge translation strategy.

### **6.2.6.1.2. The use of hard copy tools**

Hard copy tools can be classified as forming part of the dissemination-implementation continuum as organisations are actively involved in translating knowledge to knowledge users (Lomas 1993, Straus *et al.*, 2013). Organisations identified many challenges related to the DOH guidelines in the public sector, which led to the design of their own hard copy training materials. These challenges included that the guidelines were too complex, contained contradictory statements between different sets of guidelines or were simply not updated enough. As an example, the latest edition of the standard treatment guidelines and essential medicines list (EML) for the primary healthcare sector was released in 2008 (Department of Health, 2008). This document states that the necessary effort has gone into matching these guidelines with the other priority programme guidelines like HIV and that it is a “reflection of current epidemiology norms and recent developments in medicine” (Department of Health, 2008). Organisations noted the large time gap between the latest version of this document released in 2008 and other guidelines for example, the 2013 HIV guideline. Organisations suggested that this guideline should be updated annually, to keep up with constantly changing medications and other guidelines. Thus far, only four versions of this guideline have been released since 1996 (Department of Health, 2008).

In an effort to overcome some of these guideline barriers, organisations repackage existing DOH guidelines and consolidate with them with other guidelines and sources to create coherent documents that are user-friendly. It has been shown that guidelines that are simple to understand by all target groups have a greater chance of being implemented (Francke, Smit, de Veer, & Mistiaen, 2008). The approach organisations are following agrees with Graham’s model of adapting knowledge to suit the knowledge

user (Graham *et al.*, 2006). Many organisations preferred to develop their own hard copy tools, which raises the question of duplication, which consumes resources unnecessarily. Another disadvantage of each organisation having its own version of the guidelines is that it may lead to confusion amongst healthcare workers and patients.

#### **6.2.6.1.3. The use of web-based tools**

In contrast to hard copy tools, web-based tools rely on knowledge diffusion, as it needs a motivated knowledge user to access that knowledge which is mainly a passive process (Lomas 1993, Straus *et al.*, 2013). The advantages of using web-based tools for knowledge translation include that the majority are open source and cover a wide variety of topics. Organisations were concerned about the underutilisation of online content for which possible reasons included computer illiteracy, lack of internet access, the knowledge user's preferences and lack of awareness of the particular organisation's website. One organisation also observed that some private practitioners in rural areas preferred hard copy materials to web-based materials. Organisations overcame some of these challenges by bringing out hard copy tools like books for healthcare workers who did not want to use the internet.

One suggestion for the future was the use of virtual communities of practice to link specialists at higher levels of care to primary healthcare workers to discuss difficult cases. An example in the literature of where healthcare workers in resource-limited settings have been successfully linked with experts is the HIV online provider education (HOPE) programme (Kiviat *et al.*, 2007). Internet infrastructure as well as computer literacy is currently the main barriers in South Africa to using this strategy. This situation may improve in the future, with the DOH currently increasing its focus on internet-based technology, which includes the upgrading of infrastructure, with the release of their "eHealth strategy for 2012-2016" (Department of Health, 2012b).

#### **6.2.6.1.4. The use of mobile-based tools**

One organisation's use of mobile-based tools in the form of weekly text messages to reach nurses, leverage the fact that most SA healthcare workers own mobile phones in their personal capacity. M-health or mobile-health, which represents the use of mobile phones to provide healthcare information, is increasingly seen as a solution in developing countries because of the wide availability of mobile phones (Kahn, Yang, & Kahn, 2010). This represents an innovative way of translating knowledge in South

Africa, especially to healthcare workers in rural settings, where there is a lack of internet access as well as nurses that might not be familiar with using the internet.

### **6.2.7. Dissemination and implementation in the public and private sector**

Overall, organisations preferred practical training sessions to didactic lecturing as a knowledge translation method. This is in keeping with the literature, which shows that interactive and practical based knowledge translation is superior to didactic lecturing in terms of effectiveness (Prior *et al.*, 2008).

In the public sector, most of the knowledge translation strategies target nurses which includes an element of on-site training with either one-on-one mentoring or group training sessions. Organisations identified many advantages of on-site training. Firstly, it decreases the impact on service delivery, as it does not remove healthcare workers from facilities. Secondly, it gives healthcare workers the opportunity to apply the learning in practice immediately. Thirdly, it provides an immediate focus on the challenges experienced in the clinical setting. Lastly, on-site training can be conducted using a team-based approach, which fits the context of healthcare workers practicing as teams in the public sector. The team-based approach is important, as training an individual healthcare worker may lead to the specialisation of that person in a specific role. This creates a problem if that person is not in the clinic on a particular day. The team based approach also fits in with the suggestion of improving knowledge translation in the future by using communities of practice between healthcare workers at a clinic to share their learning experiences. One organisation feels that small regular training sessions on-site at group level, brings about more change than longer or individual sessions.

It was noticed that one of the advantages of the NIMART programme was the use of mentors that provide nurses with practical clinical advice when needed. Mentor support builds healthcare worker's confidence that make the implementation of knowledge in practice possible. This is in keeping with the literature, that identifies an individual's confidence as crucial in determining if they will actually perform the trained task (Grossman & Salas, 2011). Another factor identified as important in gaining confidence, was the opportunity to apply in practice what was learnt during training. In rural areas, there were sometimes a lack of opportunities to apply certain skills, which resulted in a loss of skills over time, which was in contrast to what was observed in urban areas.



Organisations used different mentoring-models, with some organisations having their own mentors, whilst others trained nurse managers in the public sector to become mentors.

The challenges facing organisations that do on-site training include that it is labour intensive, time consuming, and that it is difficult to get mentors for rural areas. This is exacerbated by the shortage of resources in terms of funding and human capital, which constrains the internal ability of organisations from doing more knowledge translation.

In the private sector, which is predominantly doctor led, knowledge translation strategies focus on targeting doctors with short courses, which sometimes include an interactive or practical component, lectures and conferences.

#### **6.2.8. Measurement and evaluation of knowledge translation**

It is important to evaluate knowledge translation interventions to establish if the desired impact was achieved (Straus *et al.*, 2010). Organisation's measurement and evaluation strategies were evaluated using an adapted version of Kirkpatrick's education evaluation model (Kirkpatrick, 1976; Issenberg *et al.*, 2005; Steinert *et al.*, 2006; Yardley and Dornan, 2012). All organisations, except the private KT organisation, had some direct method to evaluate the impact of their respective knowledge translation strategies. The organisations involved in on-site training mostly focused on measuring patient outcomes, which represent the highest level (level 4) of educational impact according to the model. Patient's outcomes were measured by doing retrospective file audits and analysing improvements in DHIS data.

One organisation suggested that facilities choose their own indicators to monitor, which would make it more suitable to the HCW as organisations observed that HCW were unsure of how to interpret the DHIS data themselves. This is in keeping with a study conducted in 10 rural clinics in South Africa, that found that even though healthcare workers understood how to collect DHIS data, there was little interpretation and use of the data (Garrib *et al.*, 2008).

Other methods for evaluation included post-course feedback forms (Level 1) and pre- and post-course assessments (Level 2), which has the disadvantages of not ultimately measuring if a change in practice did take place after the educational intervention.

Organisations felt that private primary care was not entirely up to standard and that it is important to continue training in the private sector. The quality of care in the private sector is however difficult to monitor with examples in the literature of both excellent and poor private care (Coovadia, Jewkes, Barron, Sanders, & McIntyre, 2009).

## **6.2.9. Current barriers to knowledge translation**

### **6.2.9.1. The public sector**

According to Cabana *et al.* (1999), there are three types of barriers that prevent the implementation of guidelines: barriers affecting knowledge, attitude and behaviour. All three types of barriers were identified in the public sector.

Barriers that affect knowledge mostly relates to guidelines not being available in facilities or HCW that were not familiar in how to apply these guidelines. Barriers that affect attitude were already mentioned in 6.2.5.

It was noted that many of the knowledge translation barriers in the public sector resided at a policy and environmental level. Policy barriers relate to DOH (refer 6.6.2.3.4.3). At the environmental level, the shortage of staff resulted in healthcare workers being unable to attend training sessions. This shortage of staff was exacerbated by a high staff turnover as well as promotion of staff to management level. The literature indicates that South Africa faces an overall shortage of healthcare workers with only 66 doctors and 388 nurses per 100 000 of the population according to a WHO (World Health Organization, 2006). Even though this is higher than the required WHO level, huge discrepancies between the public and private sector as well as urban and rural areas remain (Health Economics and HIV & AIDS Research Division, 2009). This is illustrated by the fact that only an estimated 30% of doctors and 60% of nurses currently work in the public sector (Health Economics and HIV & AIDS Research Division, 2009). In 2007/2008 the shortage of HCW in South Africa's public sector alone was estimated at 79 791 (Health Economics and HIV/AIDS Research Division, 2009).

### **6.2.9.2. The private sector**

In contrast to the public sector, no external barriers could be identified in the private sector. The main attitudinal barriers organisations identified were the perceived reluctance amongst especially older practitioners to be trained on treating HIV as well as the cost of training sessions to the private practitioners.

### **6.2.10. Summary of research question 1**

All nine knowledge translation organisations had a strategy to translating knowledge in the South African healthcare sector, which includes many to all of the steps mentioned by Graham *et al.* (2006) knowledge to action cycle. Understanding the context was knowledge user was extremely important in determining the strategy most likely to achieve the desired level of knowledge translation. This is due to the presence of different barriers and facilitators in the public and private sector, as well as urban and rural areas. Organisations successfully overcame many barriers by adapting their knowledge translation strategies to meet the needs of the knowledge users within their context. Barriers that reside at the policy and environmental level remain difficult to overcome.

## **6.3. Discussion of research question 2**

### **6.3.1. Overview**

Research question 2 aimed to evaluate the way in which primary healthcare workers stay up to date with the latest knowledge as well as their preferred method of staying up to date. This research question was answered by using an online survey to collect quantitative data. Ninety-two responses were collected in total, of which 82 responses could be used in the analysis. The majority of the sample consisted of white, male English and Afrikaans speaking, general practitioners, working in urban private practices. Most of the respondents were experienced doctors that have been in practice for longer than 15 years. The answers obtained from the survey was compared to some of the knowledge translation organisations' views regarding the private sector specifically.

### **6.3.2. Sources used to keep up to date**

The sources that private practitioners used to keep up to date included scientific journal articles, internet searches, academic lectures and pharmaceutical representatives.

The use of pharmaceutical representatives tie in with the concern of knowledge translation organisations with regards to the pharmaceutical industry being a potential knowledge translation barrier as there is a focus on new rather than the basic medication.

It was interesting that systematic reviews did not get a significant number of responses as systematic reviews are increasing seen as the basic building block of knowledge translation putting individual studies into context (Grimshaw *et al.*, 2012). It is unclear what the reason for this observation is and may include lack of awareness or lack of access to these databases.

Discussion with colleagues and talking to experts also did not get a significant number of responses. This is in keeping with knowledge translation organisations that point out that private sector doctors have less opportunity to network with colleagues. It has however been shown that communities of practice play an important role in enhancing knowledge translation (Thomson *et al.*, 2013).

### **6.3.3. Important factors when looking for information**

Respondents considered sources that were reliable and of high quality as the two most important factors when looking for information. Other factors that were important included information being to the point, easy to access and understand, relevant to their duties, fast to access, freely available and in a place where they usually find information. These findings are in keeping with review by Dawes and Sampson (2003) on information seeking behaviours in doctors.

### **6.3.4. Barrier that keeps respondents from staying up to date**

Private practitioners identified no significant barriers to keeping their knowledge up to date. This is in contrast to the literature where primary care physicians identify time constraints, difficulty in formulating a question, lack of a search strategy and difficulty in interpreting the evidence as barriers to using electronic resources (Coumou & Meijman, 2006). KT organisations were of the opinion that a lack of time and cost associated with training was hindering private practitioners from staying up to date. This concern could however not be identified from the respondents themselves.

### **6.3.5. Preferences for staying up to date**

The respondents exhibited a strong tendency towards using the internet to stay up to date. Doctors indicated that they preferred to use the internet to do searches, want to read journal articles online and would like to get email reminders to notify them of new knowledge. Other preferences included getting journals through the mail, meeting with pharmaceutical representatives, and attending lectures.

The fact that this survey collected responses using the internet, would have selected doctors that are comfortable in using the internet and online platforms. This could explain the difference between the collected data and literature, which indicate doctors still preferred paper sources, despite the availability of electronic sources (Coumou & Meijman, 2006). Further evidence could be provided by a study conducted of 133 doctors working in the private sector in Kwazulu-Natal, where only 36% indicated that they use the internet to obtain information about HIV (Naidoo, Jinabhai, & Taylor, 2010). In the study by Naidoo *et al.* (2010), the questionnaires were distributed by hand, fax and email versus this survey that exclusively made use of the internet. The knowledge translation organisations also indicated that their web-based tools were underutilised, despite having a wide variety of open source content.

The conclusion is thus drawn that respondents in this survey most likely represent a distinct subgroup of medical practitioners that prefer to use the internet.

#### **6.3.6. HIV: guidelines and treatment**

This survey found that 71% of the respondents treated HIV patients. Most of the doctors who treated HIV patients, were aware of the DOH guidelines and knew where to access it. Of the respondents that treated HIV, 71% indicated that they followed the DOH guidelines, whilst the rest preferred to use other guidelines to manage HIV. The majority of respondents (90%) did not have any formal training on these guidelines, with almost two thirds indicating that they would like training on these guidelines. These findings are similar to a study done in KZN in 2006 of 331 doctors in the private sector, where 76% of them indicated that they wanted more knowledge and training in terms of HIV management (Naidoo, Jinabhai, & Taylor, 2008). It is interesting to note that organisations were of the opinion that older general practitioners were reluctant to learn more about HIV. This was however not reflected in the collected sample, which consisted mostly of older, more experienced general practitioners.

#### **6.3.7. Summary of research question 2**

The 82 respondents consist mainly of experienced private practice doctors in the urban sector, which indicated a preference for using internet based sources to stay up to date. This is in contrast to the knowledge translation organisations' observation that web-based materials and content are largely underutilised. It is however possible that the group surveyed represents a selected subgroup of medical practitioners, due to the internet based nature of the survey.

## **6.4. Discussion of research question 3**

### **6.4.1. Overview**

Research question 3 used the Thinking Processes of TOC to identify ways in which knowledge translation in primary healthcare in the public sector can possibly be optimised. The Thinking Processes of TOC represents a useful way to identify solutions to non-physical constraints in a system (Scheinkopf, 1999). The Thinking Processes uses a systematic approach to identify and structure a problem with its associated barriers, followed by building and implementing a solution that ultimately improves the system (Scheinkopf, 1999; Mabin, Forgeson, & Green, 2001).

The public health sector, which is managed by the DOH, represents the system to which the TP of TOC were applied. The Department of Health's ultimate goal is to provide "a long and healthy life for all South Africans", which includes delivering quality healthcare (Department of Health, n.d.). Eccles and Mittman (2006) state that the quality of healthcare is improved when evidence-based research is implemented into practice. Thus, it can be argued that knowledge translation is one of the building blocks that make it possible for the DOH to fulfil its mission statement.

### **6.4.2. The system's goal**

The DOH uses their developed guidelines combined with the necessary resources to achieve knowledge translation. The intermediate objectives (IO) map identified the goal of knowledge translation in the public health sector as the fast, coordinated, reliable knowledge translation. The success of the DOH's knowledge translation rests on the successful implementation of the DOH guidelines into public sector facilities. This requires that healthcare workers are confident and trained to use the DOH guidelines, which is combined with the necessary monitoring to evaluate the impact on patient care indicators.

### **6.4.3. Undesirable effects and possible solutions**

The current reality tree identified several undesirable effects, which is hindering the process of knowledge translation in the public sector. The answer to the first TP question, "what to change?", was traced to four root causes, of which three reside under the control of the DOH.

The first root cause, which relates to a lack of resources, falls outside the control of the DOH. A shortage of resources is an example of a physical constraint, which in this case is the lack of infrastructure that needs to be addressed at a higher level by the South African government.

The second, third and fourth root causes are all non-physical constraints which lie within the DOH's control. The second root cause was that currently no plan for the systematic release of new guidelines exists. The solution suggested by using the future reality tree is that such a system should be put in place by die DOH management team. The suggested solution will give knowledge translation organisations more time to plan training activities with facilities and hopefully decrease healthcare worker resistance. The desired effect is that more HCW will be successfully trained to use the guidelines.

The third root cause, were the many DOH management layers. This slows knowledge translation, as organisations cannot start planning training efforts until the DOH communication has reached HCW via all required managerial layers. The solution identified through applying the evaporating cloud is that KT organisations should be empowered by the DOH at a regional training centre level, to enable faster communication and planning of training efforts. If knowledge translation organisations can communicate directly to healthcare workers from the RTC level, it eliminates several managerial layers, with the message reaching the clinic staff sooner.

The fourth root cause is that the guidelines of the DOH does not meet the requirements of HCW, which leads to HCW preferring knowledge translation organisations' versions of the guidelines. The solution suggested by using the future reality tree, is that the DOH must collaborate with the knowledge translation organisations during the guideline design process, to enable one user-friendly document to be released to all HCW. This will lead to one centralised message, which means there will be no healthcare workers or patient confusion and save knowledge translation organisation's resources.

#### **6.4.4. Summary**

The Thinking Processes of TOC helped to identify possible solutions to getting the new guidelines into practice in a fast, reliable and coordinated manner by addressing some of the policy constraints within the DOH. This requires increased collaboration between knowledge translation organisation and the DOH, both in the design of user friendly

guidelines, and in terms of communication to healthcare workers. The DOH also needs to design a system of updating the guidelines on an annual basis, to enable both HCW and KT organisations to plan better around training programmes.



## **CHAPTER 7: CONCLUSION**

### **7.1. Aim of this research**

The aim of this research was to evaluate knowledge translation in the primary healthcare context of South-Africa. This was done by evaluating both knowledge translation organisations and knowledge users using a qualitative dominant, mixed methods approach. Systems thinking was applied to this data using the Thinking Processes of Theory of Constraints, to come up with suggestions to optimise knowledge translation in specifically the public sector.

### **7.2. Research findings**

In the first part of this research, nine knowledge translation organisations that were interviewed, all have the underlying philosophy of creating value for healthcare workers and the health system as a whole by providing a service that aims to close the research to practice gap. Collaborative relationships between these organisations and other stakeholders are vital to the success of their knowledge translation strategy.

The knowledge translation strategy of these organisations is inextricably linked to the context in which it takes place. This research identified four subcontexts within the larger South African context. Each of these subcontexts need to be understood in terms of the facilitators and barriers that may influence knowledge translation.

Organisations provided numerous examples of knowledge translation barriers and ways in which these barriers were overcome. To name a few:

1. In rural areas where internet infrastructure is lacking, one organisation uses mobile phone text messages to translate knowledge to nurses in these facilities.
2. To minimise the impact of knowledge translation activities on service delivery, some organisations are doing on-site training.
3. Where healthcare worker resistance to training is encountered, organisations try to create buy-in through communicating with healthcare workers.

Funding plays an important role in determining both the scope and sector of organisations. Organisations are however increasingly shifting from HIV focused programmes towards wider, more integrated knowledge translation strategies.

Most organisations have comprehensive approaches to knowledge translation which include knowledge creation, dissemination, implementation and monitoring. Organisations involved in knowledge creation, produce hard copy, web-based and mobile-based materials that are used to translate knowledge to healthcare workers. Organisations use various methods to determine the needs of knowledge users, as well as the knowledge translation gap in the healthcare system. This information is used to plan their knowledge translation activities. The dissemination and implementation of knowledge into practice generally makes use of more effective methods in the public sector as compared to the private sector. In the public sector, knowledge translation consists of mentoring as well as on-site group training. In contrast, the private sector relies more on the use of practical courses, lectures and conferences conducted at training venues. In the public sector, there is also mentor support after training as well as evaluation of the impact of training by looking at DHIS data. In the private sector, there is limited to no support after training and no formal evaluation of the actual impact of training.

In the second part of this research, a survey of 82 knowledge users that was conducted for this study, indicated a preference for using internet-based sources to stay up to date. This was in contrast to the underutilisation of online content reported by the knowledge translation organisations. The respondents identified no significant barriers to staying up to date with the latest medical knowledge, which is in contrast to what is found in the literature. However, due to the internet-based nature of the survey, the respondents might represent a distinct subgroup of medical practitioners, and are not necessarily representative of the population.

In the third part of this research, the Thinking Processes of TOC was used to identify possible ways in which the knowledge translation process can be optimised. To reach the ultimate goal of getting new guidelines into practice in the public sector, increased collaboration between KT organisations and the DOH is ultimately needed. This will assist with the design of a single set of user-friendly guidelines and help with streamlining the communication and implementation of these guidelines. The DOH also needs to design a system for updating the guidelines to enable both HCW and KT organisations to plan better around training programmes.

### **7.3. Managerial implications**

Knowledge translation organisations have extensive expertise of the knowledge translation process in the South African context. These organisations understand the needs of knowledge users, especially when it comes to the design of user-friendly guidelines. Increasing the collaboration between these organisations as well as with the DOH is important to enable the sharing of knowledge translation expertise.

In terms of knowledge users, organisations had concerns regarding underutilisation of online content. However, the knowledge users that were surveyed in this study revealed that there is a subset of healthcare workers that prefer to update their knowledge by using the internet. It raises the question of a lack of awareness of the online content KT organisations are offering, and if more active marketing might increase the use.

Lastly, the TP of the TOC represents a way of logically analysing a system to reveal factors that is constraining the system's performance. Managers can use this method to find the answer to complicated problems, by tracing it to the root cause, and surfacing underlying possibly incorrect assumptions as illustrated in this research. By applying the TP of TOC in this research, possible ways in which the knowledge translation process within the DOH system can be improved was identified. This includes increasing the collaboration and empowerment of knowledge translation organisations by the DOH, which will streamline guideline implementation and assist with the design of user-friendly guidelines. The DOH can also consider designing a system for updating the guidelines to enable both HCW and KT organisations to plan better around training programmes.

### **7.4. Research limitations restated**

#### **7.4.1. Qualitative research limitations**

The research limitations include that judgement sampling was used to identify organisations, which means that the results cannot be projected beyond the sample to the population. Qualitative data analysis is subjective in nature, and thus the researcher's own personal biases could have influenced the interpretation of the data, especially because the researcher actively works in the healthcare field. Some participants were interviewed face to face which includes social cues and body language, whilst others were interviewed telephonically, which may influence the interpretation of the data. For some organisations, only one participant was used

versus two participants for other organisations. This may lead to the under or over representation of some organisation's data.

#### **7.4.2. Quantitative data**

The research limitations include that the sample was not necessarily representative of the population as convenience sampling was used to select the initial respondents followed by snowball sampling. This means that the results from this survey cannot be projected onto the rest of the population. The sample was collected using an online survey tool, which means it was biased towards individuals who had access to the internet and were comfortable with using internet platforms. Self-selection bias cannot be ruled out, and it is possible that the primary HCW that responded to the survey are the same HCW that try to keep their medical knowledge up to date and see it as important. Due to the sampling method, the non-response rate can also not be determined.

#### **7.4.3. Thinking processes of Theory of Constraints**

Firstly, the undesirable effects within the public sector were identified from the KT organisations and give an indirect opinion of the challenges within the DOH system. Only Organisation 3, which is a government municipality, falls within the DOH. Secondly, the fact that the researcher is a healthcare worker may have led to bias when solutions to optimise knowledge translation were constructed.

#### **7.5. Recommendations for future research**

This qualitative arm of this research evaluated knowledge translation from an organisational perspective. This research can be expanded by doing qualitative research on the primary healthcare workers that have received training from the interviewed knowledge translation organisations. This will provide new insights into the perceptions of knowledge users and serve as direct feedback to knowledge translation organisations.

The quantitative arm of this research contained a skewed sample representing mostly private sector doctors in urban areas who use the internet. This can be expanded to the public sector primary healthcare workers, which should specifically include nurses, as this sector is nurse-led. An effort can be made to reach private sector doctors that may not use the internet by using manually distributed surveys. An effort should be

made to include more rural primary healthcare workers to enable comparisons to their urban counterparts.

The Thinking Processes of TOC provides only an indirect view of the processes within the DOH. Future research can focus on evaluating training at the Regional Training Centre level and talking to people involved in designing some of the guidelines used in the public sector system.

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## APPENDIX 1: QUALITATIVE, SEMI-STRUCTURED INTERVIEW GUIDE

Dear colleague,

Title of study: Evaluating knowledge translation practices in the South African primary healthcare setting using the Theory of Constraints

I am an MBA student at the Gordon Institute of Business Science at the University of Pretoria. I am conducting research on knowledge translation in primary healthcare and you are invited to volunteer to participate in this research project. Before you agree to participate you should understand what is involved, and you should not participate if you are not happy with what we expect from you.

Knowledge translation is the process of getting knowledge from research into practice. I am trying to establish how organisations are translating knowledge to healthcare workers in primary care to help them stay up to date with the newest medical research and guidelines. This research will help us to better understand knowledge translation to primary healthcare workers in South Africa.

I am asking you to assist me by participating in an interview that will take about 1 hour to complete. This interview will be recorded and subsequently transcribed after the interview. All data will be kept confidential and no person or organisation will be directly identified in the report. Your participation is voluntary and you can withdraw at any time without penalty. The information from this interview may be used for e.g. publication by the researchers. If you have any concerns, please contact me or my supervisor. This protocol was approved by the Research Ethics Committee of the GIBS and the Faculty of Health Sciences Research Ethics Committee at the University of Pretoria.

Our details are as follows:

Researcher	Marcelle Myburgh Department of Medical Virology University of Pretoria	Supervisor	Pieter Pretorius Gordon Institute of Business Science (GIBS) University of Pretoria
Email	<a href="mailto:marcelle79@gmail.com">marcelle79@gmail.com</a>	Email	<a href="mailto:Pretoriusp@gibs.co.za">Pretoriusp@gibs.co.za</a>
Phone	082 333 9072	Phone	082 893 0477

Signature of participant: \_\_\_\_\_

Date: \_\_\_\_\_

Signature of researcher: \_\_\_\_\_

Date: \_\_\_\_\_

### Interview questions

1. Which knowledge translation practices are you currently using in your organisation?
2. Why did you decide to use these knowledge translation practices specifically?
3. How do you evaluate the impact of your knowledge translation activities in improving healthcare workers' knowledge?
4. How were these measures identified?

## APPENDIX 2: QUANTITATIVE SURVEY

Dear colleague,

Title of study: Evaluating knowledge translation practices in the South African primary healthcare setting using the Theory of Constraints

I am an MBA student at the Gordon Institute of Business Science at the University of Pretoria. I am conducting research on knowledge translation in primary healthcare and you are invited to volunteer to participate in this research project. Before you agree to participate you should understand what is involved, and you should not participate if you are not happy with what we expect from you.

Knowledge translation is the process of getting knowledge from research into practice. I am trying to establish how healthcare workers are finding knowledge to stay up to date with the latest medical research and guidelines. I also want to establish how healthcare workers would prefer to obtain knowledge to stay up to date. This research will help us to better understand knowledge translation to primary healthcare workers in South Africa.

I am asking you to assist me by completing the attached questionnaire which should take no more than 20 minutes of your time. Please answer all questions as honestly as possible. For each of the statements, mark the appropriate block with a cross. I will collect the questionnaire from you or you may leave it with your clinic or hospital manager in the box provided. Alternatively you may complete the questionnaire anonymously online using the link provided.

Your participation is voluntary and you can withdraw at any time without penalty. The questionnaire is anonymous and all data will be kept confidential. Please do not write your name on the form. Once you hand in your questionnaire, you cannot recall consent. By completing the survey, you indicate that you voluntarily participate in this research. The information from this questionnaire may be used for e.g. publication by the researchers. If you have any concerns or questions please contact me or my supervisor. You will not be identified as a participant in any publication that comes from this study. This research ethics committee of the University of Pretoria, Faculty Health Sciences granted written approval for this study.

Our details are as follows:

Researcher	Marcelle Myburgh Department of Medical Virology University of Pretoria	Supervisor	Pieter Pretorius Gordon Institute of Business Science (GIBS) University of Pretoria
Email	<a href="mailto:marcelle79@gmail.com">marcelle79@gmail.com</a>	Email	<a href="mailto:Pretoriusp@gibs.co.za">Pretoriusp@gibs.co.za</a>
Phone	082 333 9072	Phone	082 893 0477

## Demographic information

1. Sex	Male <input type="checkbox"/> Female <input type="checkbox"/>
2. Age (years)	25 and younger <input type="checkbox"/> 26-35 <input type="checkbox"/> 36-40 <input type="checkbox"/> 41-45 <input type="checkbox"/> 46-50 <input type="checkbox"/> 51-55 <input type="checkbox"/> 56-60 <input type="checkbox"/> older than 60 <input type="checkbox"/>
3. Home language	English <input type="checkbox"/> Afrikaans <input type="checkbox"/> isiZulu <input type="checkbox"/> isiXhosa <input type="checkbox"/> Setswana <input type="checkbox"/> Other _____
4. Race	African <input type="checkbox"/> Asian <input type="checkbox"/> Coloured <input type="checkbox"/> Indian <input type="checkbox"/> White <input type="checkbox"/> Other _____
5. Current job title	Nurse <input type="checkbox"/> Clinical associate <input type="checkbox"/> Doctor <input type="checkbox"/> Family physician (specialist) <input type="checkbox"/> Dentist <input type="checkbox"/> Other _____
6. Years in healthcare	2 years or less <input type="checkbox"/> 3-5 years <input type="checkbox"/> 6-10 years <input type="checkbox"/> 11 -15 years <input type="checkbox"/> 16-20 years <input type="checkbox"/> More than 20 years <input type="checkbox"/>

## Work information

7. Which province do you work in	Gauteng <input type="checkbox"/> Northwest <input type="checkbox"/> Limpopo <input type="checkbox"/> Mpumalanga <input type="checkbox"/> Free state <input type="checkbox"/> Northern Cape <input type="checkbox"/> Western Cape <input type="checkbox"/> Eastern Cape <input type="checkbox"/> Kwazulu-Natal <input type="checkbox"/>
8. How would you classify the area where you practice	Urban (town or city) <input type="checkbox"/> Rural <input type="checkbox"/> Peri-urban (just outside the boundaries of a town or city) <input type="checkbox"/>
9. Which health sector do you work in	Public sector <input type="checkbox"/> Private sector <input type="checkbox"/>
10. Type of Facility	Private practice <input type="checkbox"/> Clinic <input type="checkbox"/> Hospital <input type="checkbox"/> Other _____
11. Internet access (tick ALL the boxes that are applicable)	At work only <input type="checkbox"/> At home only <input type="checkbox"/> At home and at work <input type="checkbox"/> No access <input type="checkbox"/>
12. Type of internet access (tick ALL the boxes that are applicable)	Fixed line <input type="checkbox"/> Mobile device (e.g. cell phone) <input type="checkbox"/> No access <input type="checkbox"/> Other _____

## Questions

13. Which of the following sources do you use to keep your medical knowledge up to date with the latest research or guidelines?

	1	2	3	4	5
	Never	Rarely	Sometimes	Often	Always
a) Spur of the moment discussions with colleagues you work with					
b) Consulting an expert in the field in person, telephonically, or via email					
c) Regular scheduled discussions with colleagues at meetings e.g. ward rounds					
d) Reading text books					
e) Reading your class notes from when you were still studying					
f) Reading guidelines that are available where you work					
g) Reading posters put up where you work					
h) Reading scientific journal articles (hard or electronic copy)					
i) Meeting with pharmaceutical representatives					
j) Attending academic lectures					
k) Attending conferences					
l) Attending training courses					
m) Using the internet to do searches on topics you are interested in e.g. using Google search					
n) Using the internet to access databases that have summaries like Cochrane library or Up to date					
o) Using the internet to visit specific websites for information e.g. HIV Clinicians society etc.					
p) Using the media e.g. reading newspapers, magazines or listening to the radio					

Please specify any other sources used to keep up to date \_\_\_\_\_

14. How important are the following factors to you when looking for knowledge to keep you up to date with the latest research or guidelines

	1	2	3	4	5
	Not important	Slightly important	Neutral	Moderately important	Extremely important
a) I must be able to get the knowledge/information fast					
b) The knowledge/information must be from a reliable source					
c) The knowledge/information must be of a high quality					
d) The knowledge/information must be to the point					

e) The knowledge/information must be relevant to my duties					
f) The knowledge/information must be research or guidelines from South Africa					
g) The knowledge/information must contain graphs and pictures					
h) The knowledge/information must be an electronic copy					
i) The knowledge/information must be easy to understand					
j) The knowledge/information must be easy to access					
k) The knowledge/information knowledge must be free					
l) The knowledge/information must be in a place that I usually use to find information					
m) The knowledge/information must involve some CPD points					
n) The knowledge/information must be in a hard copy					

Please state any other factors that are important to you when looking for knowledge

---

15. Grade the importance of the following barriers in keeping you from staying up to date with the latest medical research or guidelines?

	1	2	3	4	5
	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
a) I don't have the time to look for knowledge/information					
b) I don't have access to knowledge/information					
c) I forget to look for updated knowledge/information					
d) I think there is too much knowledge/information available					
e) I don't think it is necessary to find new knowledge/information					
f) I don't have internet access					
g) I don't have access to a printer to make a hard copy					
h) I don't have access to senior doctors or nurses that can inform me of new knowledge/information					
i) I don't want to spend money on buying journal articles or attending lectures, conferences and training courses					
j) I think that scientific articles are too difficult to understand					
k) I don't know how to find the knowledge/information I am looking for					
l) I am not aware any lectures, conferences or training courses where I work					
m) Lectures, conferences or training courses take place at inconvenient times					
n) Lectures, conferences or training courses take place at inconvenient places					
o) I don't have money to attend buy journal articles or attend lectures, conferences and training courses					

Please state any other barriers that prevent you from staying up to date

---

16. How would you prefer to stay up to date with the most recent medical knowledge?

	1	2	3	4	5
	Never	Rarely	Sometimes	Often	Always
a) Spur of the moment discussions with colleagues that you work with as needed					
b) Consulting an expert as needed (personal, telephonically, email)					
c) Regular discussion at meetings with colleagues (morbidity and mortality meetings, journal club and ward rounds)					
d) Reading text books					
e) Getting journals like CME through the mail (hard copy)					
f) Reading journal articles on the internet (electronic copy)					
g) Meeting with pharmaceutical representatives					
h) Attending lectures					
i) Attending conferences					
j) Attending training courses					
k) In service training on-site by an expert in the field					
l) Receiving emails to notify me automatically of research findings or updates in guidelines					
m) Using the internet to do searches, access databases or other websites					

Please state any other ways in which you prefer to stay up to date \_\_\_\_\_

17. Are you responsible for managing or treating HIV infected patients in South Africa?

a) Yes	
b) No	

18. If you answered "Yes" to question 17, please complete this section. If you answered "No" to this question 17, do not answer this section

	1	2
a) Are you aware of the new HIV guidelines released by the Department of Health (DoH) in April 2013?	Yes	No
b) Have you read the new DoH HIV guidelines released in April 2013?	Yes	No
c) Do you know where to find a copy of the new HIV guidelines on the internet?	Yes	No
d) Do you have your own copy or access to a copy of the new DoH HIV guidelines (hard copy or electronic copy)?	Yes	No
e) Have you had any training in using the new HIV guidelines?	Yes	No
f) Do you feel you need training in using the new HIV guidelines?	Yes	No
g) Are you following the new HIV guidelines for patient management?	Yes	No
h) Do you refer to use other guidelines and not the DoH guidelines?	Yes	No

**Thank you for your participation**