DEVELOPMENT OF A CHECKLIST FOR ASSESSING COMPLETION OF PATIENT REPORT FORMS BY PARAMEDICS IN SOUTH AFRICA

A dissertation submitted in fulfilment of the requirements for the degree of Master of Health Sciences in Emergency Medical Care in the faculty of Health Sciences at the Durban University of Technology

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DECLARATION OF ORIGINALITY

This is to certify that this work is entirely my own and not that of any other person, unless explicitly acknowledged (including citation of published and unpublished sources). The work has not previously been submitted in any form to the Durban University of Technology or to any other institution for assessment or for any other purpose.

Name: Robert Bruce Mckenzie

Signed: __ _____

Date: _____6 September 2021_____

ETHICAL CLEARANCE

This is to certify that the research studies conducted for the purposes of this dissertation have the approval of the Institutional Research Ethics committee (IREC) of the Durban University of Technology in KwaZulu-Natal.

Institutional Research Ethics Clearance number: 172/19

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ABSTRACT

Introduction

The completion of medical records is of vital importance and is seen as an integral part of patient care. One of its key functions is to facilitate continuity of care when the responsibility for medical care of a patient is transferred from one healthcare practitioner to another. In the pre-hospital environment, paramedics use patient report forms (PRFs) to record the details of the patient's condition and the treatment provided to the patient. Poor documentation of medical care by paramedics on PRFs has been shown to increase mortality among patients treated by paramedics. There are several other potential consequences of poorly completed medical documentation which place the patient at risk, including a longer hospital stay, increased medical costs, duplication of tests and poor communication between multidisciplinary teams. Current advice for South African paramedics on how to complete a PRF and the information that is required to be recorded on a PRF is limited.

Aim of the study

The aim of this study was to develop a checklist to assess the quality of vital patient information recorded, and the documentation of patient care provided, by South African paramedics in the pre-hospital environment.

Objectives

The objectives to achieve this were:

1. to retrieve and list data elements for the completion of a PRF by conducting a scoping review;
2. to refine the information and seek expert consensus by using a Delphi survey to determine which data elements satisfied the criteria for assessment on the proposed checklist; and
3. to design and develop a checklist based on the data elements agreed upon by experts in the Delphi survey.

Methods

A scoping review was conducted to identify what information is available, useful and significant for the completion of a PRF. Expert consensus on what specific important information is required for the completion of a PRF (and therefore needs to be part of the proposed checklist) by paramedics in South Africa was obtained through a three-round Delphi survey.

Results

Based on the results of the scoping review, a three-round Delphi survey was used to develop the list of elements for a proposed checklist. This checklist can be used to assess and audit the recording of vital patient information and the documentation of patient care provided by paramedics.

Conclusion

Poor medical documentation has multiple direct and indirect implications for patient care. It has been shown that South African paramedics omit vital information when completing PRFs. A checklist was developed to be used in quality assurance programmes to assess the completion of PRFs. Further research regarding the effectiveness of the checklist is required.

DEDICATION

I would like to dedicate this research to my family, who have never stopped believing in me.

Charline Mckenzie, thank you for being the amazing woman that for are and for being my beautiful wife and partner.

Adrian Mckenzie, the world is yours. Reach out and take hold of it.

Bradley Mckenzie, I really believe that one day you will change the world.

Mia Mckenzie, never settle to other people's standards. Never settle into other people's ideas of who you should be. Continue loving, being feisty and striving forward. Always be the heroine, that you already are.

To my parents Jeanette and Colin, thank you for never giving up on me and for all that you have done for me.

To my grandparents, looking down on me from heaven. Thank you for showing me the life, you taught me to live. Your actions were louder than words and you led by perfect example.

Trust in the Lord with all your heart and lean not on your own understand, in all your ways acknowledge him and he will make your paths straight.

Proverbs 3:5-7

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To all the EMS educators and colleagues in training institutions. Never forget why you became an educator. The impact that you have on your students will save many lives.

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Glossary of terms List of Abbreviations

- Emergency Medical Services (EMS):

  the system that organises all aspects of the care provided to patients in the pre-hospital environment (Finlayson, 2017: 4).

- Patient Report Form (PRF):

  also known as a patient care report. Is a document used in the pre-hospital hospital setting to record all patient care activities and circumstances related to the emergency response (Sanders & McKenna, 2002: 1582).

- Health Professions Council of South Africa. (HPCSA):

  The Health Professions Council of South Africa is a statutory body, established in terms of The Health Professions Act (HPCSA, 2021. Para 1 line1).

- Emergency Department (ED) or Emergency Centre (EC): The section of a hospital or other health care facility that is designed, staffed, and equipped to treat injured people and those afflicted with sudden, severe illness (The free dictionary, 2021. Para 1 line1-3) .

- Healthcare Practitioners (HCP):

  This is a general term used to describe a range of medical professions (including doctors, nurses, and paramedics) who are registered and licensed to provide medical care (Law insider, N.D. para1 line 1&2).

1. CHAPTER ONE – INTRODUCTION

1.1. Introduction

This chapter will provide an introduction to the problem of a lack of medical documentation on patient report forms (PRFs), despite its importance in the medical management of patients. The problem statement, research questions, and the research aim and objectives will be presented. This is followed by a brief breakdown of the chapters in this document.

1.2. Study background

There are several important factors associated with patient handover. The transferring of care from a paramedic, who has been treating a patient in the pre-hospital environment, to another health care practitioner (HCP) in the emergency department (ED), is of great importance in maintaining the quality and safety of the chain of care. For patient safety, as well as the continuity of patient care, an appropriate patient handover is required. Most research regarding clinical handovers has focused on nurse-to-nurse or physician-to-physician handovers in the hospital environment. Little is known about effective information transfer from paramedics to in-hospital staff. There is only a limited amount of research focusing on the patient handover from paramedics who have treated the patient in the pre-hospital environment to ED staff, such as nurses and doctors, in the in-hospital environment (Hovenkamp *et al*., 2018: 1; Carter *et al*., 2009: 280). The handover process from pre-hospital to in-hospital staff is a high-risk event. During the handover process there are several problems that can occur. These include the loss of patient related-information, miscommunication, misinformation, and information errors which can ultimately negatively affect continued patient care, patient safety and quality of care. This can also be associated with increased medical costs and can affect the ability to defend against a complaint or litigation (Carter *et al.,* 2009: 280).

To help avoid several of these issues, medical records are used. Medical records that are detailed and comprehensive are a critical component of safe and effective healthcare. Medical records are used to support patient care and the continuation of patient care, as medical documentation allows all staff to see the patient's history and prior medical care, and to understand the patient's diagnosis and response to treatment. They also allow for practitioners to synthesise the patient's information in preparation for further evaluation and treatment

options. Despite the importance of medical documentation, the documentation of patient care in critical care areas, is often poor (Bergrath *et al*., 2011: 320; Ngo *et al*., 2016: 305) .

1.3. Research questions

This research sought to answer the following questions:

a. What information is useful and significant for the completion of a PRF in South Africa?

b. What are the data elements required for the development of a checklist to ensure the quality of vital patient information recorded, and patient care provided, by South African paramedics in the pre-hospital environment?

1.4. Research aim and objectives

The aim of this study was to develop a checklist to assess the completion and quality of the recording of vital patient information and patient care provided by South African paramedics in the pre-hospital environment.

The objectives necessary to achieve this were:

a. to identify and list potential data elements required for the satisfactory completion of a good quality patient report form (PRF) by conducting a scoping review;
b. to refine the information and, by seeking expert consensus, use a questionnaire to determine which variables will become the data elements to be included on the proposed checklist; and
c. to design and develop a checklist based on the data elements agreed upon by experts in the Delphi study and the scoping review for the post-hoc quality assessment of PRF completion.

1.5. Researchers interest in the topic

The researcher, an emergency care practitioner (ECP) in the Kwa-Zulu Natal Department of Health ambulance service, has previously performed quality assurance of the ambulance service in the municipal district.

If a complaint was received, or as part of the routine quality assurance process, PRFs would be reviewed, and it was often found that limited information had been recorded and that important information was often omitted. Using anecdotal evidence, a checklist to ensure the

quality of PRFs was drawn up. However, this checklist was not evidence-based, and potentially not user-friendly. Therefore, the need to develop a checklist that is evidence-based was the motivation for conducting research on this topic.

1.6. Dissertation structure

Chapter 1– Introduction.

In this chapter, the problem of poor communication and the effect thereof on patient outcomes is introduced, ending with the problem statement.

Chapter 2 – Literature review

This chapter provides a background to the current situation in South Africa; the need for good quality medical documentation; the handover process; problems due to lack of documentation; and where PRF documentation is used.

Chapter 3 – Methods

The methods chapter provides details relating to the research, with regard to the aim of the research and ethics approval from the Institutional Research Ethics Committee. Participant confidentiality is also discussed. The details of the methods used to conduct the scoping review and the Delphi study are discussed separately in Chapters Four and Six.

Chapter 4 – Scoping review methods

This is a short chapter in which the methods used to conduct the scoping review are presented. This includes the details of the scoping review plan that was used, and the search strategy.

Chapter 5 – Scoping review results

This chapter details the scoping review findings and explains how the results from the scoping review were converted into data elements for the Delphi survey.

Chapter 6 – Delphi survey methods

The justification for using a Delphi survey and the purpose of a Delphi survey are explained, before the methods used to conduct the Delphi survey are discussed in this chapter.

Chapter 7- Delphi survey results

The results from each round of the Delphi survey are presented. The challenges in getting survey feedback and decreased responses received, resulting in the termination of the Delphi survey, are also explained here. This is followed by the list of data elements identified for the development of the checklist tool. In this chapter the designed checklist is presented.

Chapter 8 – Discussion.

The essential findings from the research are summarised and discussed in light of existing literature. What checklists are, and how they may be used, is explained, before the details of how the checklist for this research was developed are provided.

Chapter 9 – Conclusions and Recommendations:

This chapter provides a summary of the research conducted and future recommendations regarding the checklist

1.7. Conclusion

This chapter has provided a brief introduction into the problem of a lack of medical documentation on PRFs, despite its importance in the medical management of patients. The problem statement and research questions, as well as the research aim and objectives have been presented. This is followed by a breakdown of the chapters in this document. The next chapter explores the importance of medical documentation, specifically from a pre-hospital perspective.

2. CHAPTER TWO – LITERATURE REVIEW

2.1. Introduction

In modern medical practice, medical documentation is viewed as part of patient care (Dehghan *et al*., 2013: 441). The need for medical documentation is multifaceted. This literature review reports on the available knowledge regarding the need for, and the importance of, medical documentation; specifically, the importance and relevance of paramedic medical documentation. Apart from the importance of medical documentation, the review will discuss common patient handover processes used by paramedics to transfer the responsibility of patient care to hospital-based healthcare practitioners (HCPs). The consequences of failing to document patient care, problems encountered during the handover process, and the use of medical documentation for quality improvement and research are discussed. The need for, and use of, checklists during the handover process, and during the quality assurance of medical documentation completed by paramedics, will also be highlighted in this chapter.

2.2. Medical documentation

In South Africa patient records are an ethical and legal requirement for healthcare providers, as stipulated by the Health Professions Council of South Africa (HPCSA). A health record is defined by the HPCSA "as any relevant record made by a healthcare practitioner at the time of, or subsequent to, a consultation and / or examination or the application of health management". The HPCSA continues by clarifying that a "health record contains the information about the health of an identifiable individual recorded by a healthcare professional, either personally or at his or her direction" (HPCSA, 2016b: 5). It is important that patient report forms (PRFs) contain clear notes that are accurate, complete, and with as much information as possible about the patient, as it is the medical documentation which is referred to if there are any issues arising regarding consent; confidentiality; allegations of negligence; disciplinary action; or any legal litigation (van Huyssteen, 2016: 89 and 120).

Paramedics in South Africa have extensive practice protocols. Emergency care practitioners, the highest qualification level available to register on the HPCSA emergency care board, now have a range of skills and capabilities, such as rapid sequence intubation; the use of emergency ultrasound; administering medication, including thrombolytic and paralytic agents;

and more (HPCSA, 2018: 1-229). Regardless of the South African paramedics' level of training, patients being transported to hospital will already have had some medical care when they arrive at hospital. The information regarding the initial findings and the treatment provided to the patient by the paramedic in the pre-hospital environment needs to be transferred to the clinicians in the hospital – normally the emergency department. This is when responsibility for patient diagnosis, treatment, or ongoing care is transferred from one healthcare professional to another (Goldberg *et al*., 2017: 14).

The transition of care for the patient at the emergency department is the first of many physical transition points for the patient, where the location and the person/s responsible for the care of the patient change (Makkink *et al*., 2019: 87). This is commonly referred to as the patient handover/handoff, which is defined by Dawson, King and Grantham (2013: 394) as "the transfer of professional responsibility and accountability for some or all aspects of care for a patient, or group of patients, to another person or professional group on a temporary or permanent bases". Information about pre-hospital events and findings can help ensure expedient and appropriate patient care. However, the effectiveness of the information transfer from paramedics to HCPs in the hospital environment during the handover is not well known (Carter et al., 2009:396) The few studies that do exist on the handover of patients from the ambulance service to the emergency department suggest that the nature, content and quality of information passed between the ambulance service and hospitals vary (Bost *et al*., 2012: 134). The focus of research regarding patient handover has traditionally addressed the in-hospital environment. Much of the literature focuses on the importance of accurate medical documentation, but there is little focus on how to improve the quality of the information recorded, or how to identify the data elements required for handover from the pre-hospital to hospital environment (Jensen, Lippert & ØStergaard, 2013: 965). The majority of pre-hospital to hospital handovers are done by paramedics, using a combination of verbal and written elements to hand the patient over to in-hospital HCPs (Dawson, King & Grantham, 2013: 393; Jensen, Lippert & ØStergaard, 2013: 965). During the handover process, the continuity of care needs to be ensured through a series of actions, where responsibility for patient care, and information regarding medical management initiated for the patient, is transferred to the receiving HCP (Sanjuan-Quiles *et al*., 2019: 196).

2.3. The handover process

An effective handover is critical and knowledge about pre-hospital events, findings and treatment can assist in achieving optimum patient management by contributing to expedient and appropriate care in the emergency department (Carter *et al.,* 2009: 280). Patient handovers from the ambulance crew to emergency department (ED) staff occur on a large scale every day; but studies on the transfer of patients between ambulance services and EDs are limited (Jensen, Lippert & ØStergaard, 2013: 1; Sanjuan-Quiles et al., 2019: 170). The handover process is acknowledged as a high-risk period during patient management, which requires improvement (Dawson, King & Grantham, 2013: 396). Handover communication has been identified as a weak point during patient management. Accurate and effective handover communication is central to ensuring continuity of care (Iedema *et al*., 2012: 627). Information regarding patient management can be conveyed by paramedics to hospital staff through a combination of methods. Pre-alerting the hospital about patient arrival, verbal handover and written documents are examples of such handover steps(Bost *et al*., 2012: 136 and 138).

2.3.1. Pre-alerting the hospital

'Pre-alerting' refers to notifying the receiving hospital staff of a patient, while the paramedics are en route to the hospital with the patient (this does not occur with all patients). Some information about the patient is provided to the hospital. This information is often limited. This allows the hospital time to prepare staff and equipment to treat the patient before the patient arrives in the casualty unit. This is to avoid any delays in ongoing treatment of the patient once the patient arrives in the unit. This information may be recorded on a white board or note paper and there is seldom any permanent record of this information, as its main function is to alert the facility prior to the patient's arrival (Evans *et al.*,2010: 1).

2.3.2. Verbal handover

Verbal handovers routinely occur when paramedics arrive in the emergency department with a patient. The paramedics tell the hospital staff about the patient. Thus, there is rapid transfer of information about the patient to the receiving clinicians (while patient management is on-going and while there is a transition of care occurring). The verbal handover has been found to be the main method of patient handover. However, the content and quality of the information passed between the paramedics and hospital staff during the handover varies. The variation is due to several factors: the paramedics' past experiences; the handover method; the language used;

the education levels of the staff; experience levels and the preferred method of handover of both the giver and receiver of information. All these are contributing factors to the variations in the information transferred during patient handovers (Bost et al., 2012: 136).

This has led to the development of several acronyms or aide-memoirs to ensure the detailed verbal handover of patients. These acronyms have reportedly been useful during handovers when used in the correct context, but the extent to which they are used in every day practice is not known. Examples of common handover acronyms are MIST (or derivatives thereof), which includes the Mechanism of injury/illness, Injury or illness, Signs and Treatment, originally from the UK; and the SBAR (Situation, Background, Assessment and Recommendation) or ISBAR (Introduction, Situation, Background, Assessment and Recommendation) systems being used across the USA (Bost et al., 2012: 136).

2.3.3. Written handover

PRFs are critical legal documentations as they form part of the patients' records (van Huyssteen, 2016:10 and 89). These are written records containing important information about the early phases of the care of the patient and the handover (Knutsen & Fredriksen, 2013: 1).They are used by paramedics as either a paper-based or electronic record of all patient care activities and circumstances related to the emergency response (Sanders & McKenna, 2002: 1582). The use of PRFs by paramedics to document patient care is in line with international practice (London Ambulance Service, 2014: 1-35). PRFs contain important information about the early phases of patient are, which may be important for continued medical care, and interpretation of clinical findings and treatment strategies, after the patient has been admitted (Knutsen & Fredriksen, 2013: 1). This documentation is required in addition to the verbal handover, and is the only lasting proof of what has been conducted correctly during the treatment of the patient (Spicer & Sobuwa, 2014: 64).

PRFs are completed by the paramedics responsible for the medical care of the patient and form part of the standard documentation completed for the handover of a patient from paramedics to clinicians in the ED. The document, and the clinical information recorded on the document, has the potential to significantly impact patient care as it details information regarding pre-hospital care. The PRF is a written record detailing patient information, which can include

patient demographics; ambulance crew details; details of patient management; and relevant medical management that the paramedics have provided to the patient. Missing information, or illegibly recorded information on the PRF (which may be due to documentation tools, personal training etc.), hinder the transfer of information using the PRF and can result in lost information. (Redfern, Brown & Vincent, 2009: 658-659).

The responsibility for the patient is finally transferred to the receiving clinicians when they sign on the PRF for receiving the patient. In South Africa, the handing over of responsibility of the patient is clearly regulated by the HPCSA (2016 a: 27), where it is legislated that the paramedic has to hand the patient over to a person with the same or a higher qualification. The signature on the PRF of a person, with the same or higher qualification as the paramedic, is an acknowledgement that the transfer of patient care has taken place and is no longer the responsibility of the paramedic.

2.4. The role of patient documentation

The documentation of pre-hospital emergency medical care (which is recorded on PRFs) is crucial for the transfer of information to the ED (Bergrath *et al*., 2011: 260). The documentation of patient care is now seen as part of patient care and the information on the PRF will form part of the patient care record, which is vital to the ongoing management of the patient. Documentation provides written evidence of patient progress. It should include the rationale for, and the underlying critical thinking behind, clinical decisions and interventions (Dehghan *et al*., 2013: 441). Poor medical records can misinform, or result in poor communication between, multidisciplinary healthcare teams/professionals involved in the patient's care. This discontinuity in clinical care can result in duplication of tests and increased medical costs, and can lead to a longer hospital stay (Mathioudakis *et al*., 2016: Table1; Dehghan *et al*., 2013: 441; Sanjuan-Quiles *et al.,* 2019: 169).

2.4.1. Communication failures and errors

There is an additional risk, to critically ill or injured patients, during the handover from the EMS to ED, due to the time-critical nature of the handover process and multiple human factors

(Fitzpatrick, Maxwell & Craigie, 2018: 2). The need for improvement during this high-risk period has led to the initiation of research into the handover process from pre-hospital to hospital staff. There is limited literature related to handover within the African context, but research conducted thus far, internationally, has identified several barriers that hinder effective patient handover (Goldberg *et al.,* 2017: 14; Makkink, *et al.,* 2018:87).

The inter-professional interaction which takes place in stressful and time-sensitive environments, often around an unstable patient, makes the patient handover a complex and high-risk event. This can result in information loss, misinformation and high rates of error (Dawson *et al.,* 2013:306; Makkink *et al.*, 2018:87).

The impact of insufficient or inaccurate information transfer during handover cannot be overlooked, as any information that is not transferred during the handover may be lost. When there is information lost during the handover, the resulting discontinuity in patient care can result in a 60 - 80% increase in adverse events. The problems of loss of information, ineffective communication and communication errors have been found to be so significant that they have been identified as a common cause of preventable disability and death (Evans *et al.*, 2010:1; Sanjuan-Quiles *et al*., 2019: 169; Carter *et al.,* 2009:283).

Failure to communicate information and data could have occurred because of failure by paramedics to record the data in the chaotic pre-hospital environment, or failure to communicate the information during handover (Carter *et al.,* 2009:283). The failure of EMS personnel to document basic measurements of patient physiology at the scene has been associated with a greater-than-twofold increased risk of mortality (Laudermilch *et al.,* 2010: 6). Failure to effectively communicate the information could be the result of several factors. Noise in the emergency department, the condition of the patient, and how many times the handover needs to be repeated to receiving staff (additional staff may arrive during or after the handover and request that the handover be repeated) all lead, potentially, to missed information. This, combined with how busy the emergency unit is and how much time is allocated for the handover, is one of several factors that may affect information transfer during handover (Dawson, King & Grantham, 2013: 393).

The process of clinical handover used by clinicians and paramedics was found, by Bost *et al.* (2011:136-137), to vary; with the handover process, typically, having been learnt, by observing peer behaviour and from previous personal experiences. This can lead to a lack of structure in

the clinical handover and the loss of information during handover. Information provided by paramedics during handover is vital, as initial treatment in the hospital is based on information provided by the paramedics. However, despite the importance of information transfer during handover, Evans *et al.* (2010:1) found that 18% of information, initially handed over verbally by paramedics, was incorrect. The use of a standardised approach to handover communication is advocated by many, including the World Health Organisation (Dojmi Di Delupis *et al*., 2014: 580).

It has also been found that it is not uncommon for vital information not to be transferred during the handover process. Suggestions for a tool to guide paramedics in the handover process have led to the development of several initiatives aimed at standardising communication during the handover process. These range from checklists to acronym-based prompts or mnemonics. The use of mnemonics during patient handover by pre-hospital staff has been well documented and is regarded as common practice, with evidence suggesting that standardised mnemonics can reduce handover duration and repetition, and improve the consistency of the handover process. This standardisation of the handover process has resulted in fewer errors. The use of mnemonics is intended to simplify the communication process and avoid reliance on the memory during the handover process by cueing the information provider on information that needs to be provided. Multiple different mnemonics have been developed to address several different aspects of the patient handover. These mnemonics are designed to be simple and consider the limitations in the pre-hospital field. Certain mnemonics have a narrow focus, like AMPLE (allergies; medications; past medical history; last meal; and event prior) which focuses on the patients' medical history. Other mnemonics are not as specific and provide a broader context (Fitzpatrick *et al.*, 2018:1-7; Iedema, 2012:627-628).

While the intention of mnemonics has been to standardise communication, some have also been criticised due to the lack of specificity, as the letters in the mnemonic do not indicate the level of importance or patient variables. (They do not prioritise the important information first in the mnemonic; or all information is seen to have equal importance.) Of vital importance when mnemonics are used is that the mnemonic needs to be standardised, or it may be a barrier during patient handover. In addition, the information handed over verbally with the use of a mnemonic needs to be recorded on the PRF, as many paramedics do not use mnemonics when completing the PRF, and PRF completion is only based on memory. Within the South African

EMS field, discrepancies have been found in the use of mnemonics, based on the region and the qualification of the EMS provider (Fitzpatrick *et al.,* 2018:1-7; Makkink, *et al.*, 2018:89).

2.4.2. Failure to record handover information in hospital notes

Information handed over by paramedics contains important details about the patient's initial presentation, the initiation of patient care and changes to the patient's condition. Verbal handovers are brief (needing to transfer as much information, as quickly as possible) and take between one and five minutes to complete (Bost *et al.,* 2012: 136). The information provided by paramedics in a verbal handover is frequently not recorded in the hospital records (Dojmi Di Delupis *et al*., 2014: 579). Only about 67% of information handed over by paramedics is accurately recorded in the patients' medical records. To further complicate this, the retention of the information once paramedics have verbally handed the patient over to the receiving staff at the hospital is problematic. Information recall from receiving staff can be as low as 36% (Evans *et al.*, 2010:1). Additionally, more than 25% of hospital notes have shown omissions and misinterpretations, when compared to the notes on the PRF. This makes the PRF an important record of patient management, as the lack of documented information at the time of handover increases the risk of missed information. This missing information, that was not transferred or recorded during the handover, has been termed an 'information gap'. These information gaps can lead to possible threats to the safety of the patient, or longer stays in the emergency department (Bost *et al*., 2012: 139; Jensen, Lippert & ØStergaard, 2013: 936)

2.4.3. Clinical scores

There are several clinical scores that are calculated using certain vital signs and clinical parameters of the patient. These scores are used in patient management, diagnosis, prognosis, and triage. These scores incorporate the values of several vital signs, values, or patient responses, in their calculation. Examples are the revised trauma score (RTS), or the triage early warning score (TEWS). Scores that can be calculated using variables that are able to be recorded in the field are more popular and have been used to assess and triage a patient's condition. These scores, therefore, require specific and accurate patient variables to be calculated. The variables need to be recorded, so that scores can be used to show a trend by being able to compare what the scores were initially and then what they were subsequently (Barnes *et al.*, 2017:235).

2.4.4. Clinical audit

While the scope of practice of South African paramedics is comparable to practitioners in first world settings, the quality of this care is not known. Traditionally, the development of pre-hospital emergency care quality systems has been poor. This is concerning, as up to 45% of deaths and 36% of all disability-adjusted life years are potentially amenable to secondary prevention via pre-hospital and in-hospital care. With the quality of patient care now being seen as a fundamental component of healthcare, there has been increased scrutiny of pre-hospital care, making it essential for the EMS to have quality control and quality improvement programmes in place to monitor the system's overall performance and the effectiveness of pre-hospital interventions (El Sayed, 2012: 1). Quality systems are vitally important, as the quality of care provided is now perceived to be a greater barrier to reducing mortality than insufficient access to health care in LMICs, with which the South African health system shares several attributes. Quality assurance and clinical governance are complex systems, which rely on accurate data collection. The development of quality systems aimed at improving and optimising care can have a significant impact on healthcare (Bloomer, Burns & Ware, 2013:324; Howard *et al.*, 2019b:186). Being able to assess/measure quality is a prerequisite to quality improvement and the role of quality systems is central to improving the delivery and effectiveness of healthcare. One way of assessing quality is the clinical audit of PRFs. This is because, within the low- to middle-income country setting, poor quality has become a larger barrier to reducing mortality than insufficient access; where 60% of deaths from conditions amenable to healthcare, are due to poor quality care (Howard *et al.,* 2019a: 1 and 6)

One of the first steps to measure quality is the development of quality indicators. Quality indicators are "the degree to which health services for individuals and populations increase the likelihood of desired health outcomes and are consistent with current professional knowledge" (Howard *et al*., 2019b: 185 and 186). Quality indicators are vital to the development of quality systems. In South Africa, and internationally, EMS response times have traditionally been used as a generic quality indicator. However, the use of time-based quality indicators has been found to have been over-emphasised and are a poor predictor of quality of care. In KwaZulu-Natal this is especially true, as the EMS is unable to meet the required response time targets, as they have been found to be unachievable and poorly researched. Most clinical indicators that have been developed for the EMS were developed in north America. Several of these clinical-based

quality indicators are applicable in the South African context (Howard *et al*., 2019b: 185 and 186; Haugland *et a.,* 2019:1; Finlayson, 2017: 2).

Quality indicators and information recorded on the PRF can form part of trigger tools. These have been successfully used in other fields of medicine, specifically in the hospital environment, and are now being developed for the EMS system. The potential for adverse events in the pre-hospital environment is significant, due to the challenging environment in which pre-hospital practitioners practise, and the prompt decisions they are required to make, which are often based on limited information. A trigger tool is a retrospective sampling strategy used to identify cases where there is a potential risk for adverse events and harm. This is achieved through reviewing the patient's medical records and recognising abnormal or unexpected patient values or measurements, or patients who meet predefined criteria. This is done to identify patients who are at risk and to measure rates over time to evaluate improvements. Trigger tools are time effective, cost effective and sensitive in identifying at-risk patients and adverse events. There have been significant advances in the development and use of trigger tools for the EMS field (Howard *et al.*, 2018:1; Howard *et al.*, 2017:391).

2.4.5. Research

EMS documentation of information is often performed in chaotic and complex settings, yet the research that is being conducted relies on this information. (Staff & Sovik, 2011:2; Smith, Boyle & MacPherson, 2004:2422-2439). Research data from the pre-hospital field that is recorded often lacks common variables or is not accurately recorded. This can result in incompatibility of data on templates, which affects multi-centre research. Templates for documenting information require specific common sets of data, variables and quality indictors, requiring accurate and reliable information to have been recorded on the patients' medical documentation (Kruger *et al*., 2011:2). Research collection templates require aspects of the patient's management and condition to be recorded on the PRF, in order to collect the data required for these various activities. The need for accurate information, and the use of this information, was the primary focus of many of the articles encountered in the scoping review, and this information was then used in the research. Research on the topic of patient handover from EMS to hospital staff is limited. The research that has been conducted is preliminary and further research on the handover is recommended (Dawson, King & Grantham, 2013: 396). An additional issue with

collecting data from PRFs is that if the information is incomplete, illegible, or inaccurate, this could result in the information being excluded from the research. The use of electronic PRFs only eliminates the issue of illegible handwriting, but not the issue of lost or incorrect information (Brice, Friend & Delbridge, 2008: 187).

2.4.6. Evidence in litigation

Emergency medical services (EMS) can, without a doubt, be described as a grey area in the field of medical law. EMS is the first link in the chain of healthcare services, but the pre-hospital environment is not nearly as regulated and predictable as in-hospital situations. Paramedics work under difficult and sometimes extreme conditions, which could ultimately lead to several grounds for litigation, and the practitioners in this field are left with very limited legal certainty. There is also little research in South Africa concerning EMS and medical law (van Huyssteen 2016: 84 and 85).

Information and clinical notes in medical documents are written for future reference, to be able to provide proof of patient care after the fact. This is essential, not only for continued medical management of the patient at the time; but if there is a contested medical decision, then the medical notes are also consulted. The phrase ‘if you didn’t write it down, it didn’t happen’ is a common phrase regarding medical documentation and infers that clinical information needs to be recorded to prove continuity of care, since the courts tend to consider that a treatment, decision or procedure did not happen, unless it is recorded in the medical notes (Mathioudakis *et al*., 2016: 371). Since medical practitioners treat thousands of patients in their careers, they will not be able to remember the relevant clinical details of all the patients they have treated. The practitioner will have to refer to the medical documentation they recorded at the time of treating the patient, to be able to remember the details regarding management of the patient. Medical records need to be thorough and adequate, to assist the practitioner to reconstruct the essential parts of a patient’s care, in the future (possibly even years later), without having to rely on memory. A third person may also have to do the same, with only the notes as reference. This is one of the reasons why poor-quality medical records make it difficult to defend clinical negligence claims or an HPCSA disciplinary inquiry. Medical records should contain significant and sufficient information regarding the care of the patient (Medical Protection Society, 2014: 4; van Huyssteen, 2016: 84 and 85).

2.5. The use of checklists

Due to the chaotic pre-hospital environment in which the EMS operates, traditionally the use of mnemonics has been favoured as a method of recalling information during handover. However, recently it has been proposed that checklists can be applied to all aspects of clinical practice. Checklists are generally used as a method of error and safety management to decrease the risk to the individual. Checklists can be used to guide one through a task (read-do format), with the intention of preventing errors, or to confirm (challenge-confirm format) that tasks have been completed. Checklists have been used in the EMS field and have been shown to be beneficial, improving adherence to guidelines, and outcomes, in terms of airway management; patient records; identification and triage; and other pre-hospital interventions (Chen *et a.l*, 2016:2432-2439).

The benefit of a checklist was also shown by Smith, Boyle & MacPherson (2004:2422-2439), who developed a checklist/quality assessment tool to quality assess PRFs once they had been completed. The specific variables from a PRF that needed to be included in the checklist were researched and a quality assessment tool was developed. When the checklist was implemented, it resulted in over 90% of assessed PRFs passing the quality assessment at the two ambulance services where it was implemented during the trial period in Australia.

2.6. The use of a protocol on how to complete a PRF.

While this is lacking in South Africa, internationally paramedics are guided by their ambulance services, or by local legislation, on how to complete a PRF, through the use of detailed protocols. These include descriptions for each section of the patient report form, where advice and guidance is provided on how the PRF must be completed. This varies, based on country and service. One example is the detailed policy provided by the London Ambulance Service, which provides detailed explanations on how each part of the PRF should be completed (London Ambulance Service, 2014: 1-35). The guidance by the HPCSA for medical documentation does not focus on the pre-hospital environment and therefore has limited applicability (HPCSA, 2016b: 2).

2.7. Conclusion

The purpose of medical documentation, especially in the context of recording the medical care provided to patients by paramedics in the pre-hospital field, and for facilitating the transition of care from paramedics to medical staff in the ED, has been discussed in this chapter. The consequences of failing to record information are multifaceted and can have direct and indirect implications on patient care. Consequences which have been discussed include the loss of information, interruptions in patient care, and having inadequate information available to defend against a complaint or malpractice accusation.

3. CHAPTER THREE – METHODS

3.1. Introduction

This is a short chapter that focuses on the research design and gives details of where the study took place and the target population for the research; as well as information on the ethics approval that was required before the initiation of the research project. To facilitate the presentation of the methods and results of the scoping review and the Delphi survey, these will be presented in separate chapters. The details and full explanation for doing this are given in this chapter.

3.2. Research design

This is dual-method study in which information (potential data elements) necessary for the completion of PRFs was sourced during a scoping review, before being evaluated by industry experts by means of a Delphi survey. The experts provided additional information on the topic before seeking consensus on what were the most important data elements required for the completion of a PRF. The combined information from the two methods was used to develop the checklist tool.

3.3. Study setting and population

This study focused on the pre-hospital environment in South Africa during handover from the EMS to the ED. The research focussed on both the public and private sectors across South Africa, as the requirement for documentation is universal. The study focused on the pre-hospital-to-hospital handover process and not the inter- or intra-hospital handover process. While there are similarities in the handover processes, this aspect of handover has been extensively researched and documented. The research focused on healthcare professionals, who have experience in the handover of patients from the pre-hospital to in-hospital environment, in the healthcare setting in South Africa. The inclusion criteria guided which healthcare providers were eligible to participate in the research. The practitioners who participated in the research were advanced life support paramedics, nurses, and doctors.

3.4. Ethics approval

Ethics approval for this study was obtained from the Durban University of Technology's Institutional Research Ethics Committee (172/19), as detailed in Appendix A. Once the ethics clearance had been obtained, the scoping review and Delphi survey were conducted.

3.5. Presentation of methods and results for the scoping review and the Delphi survey.

For ease of reading and to create a useful presentation of the data from the scoping review and the Delphi survey, the methods used in, and the results from, the scoping review and the Delphi survey are each presented in separate chapters. Chapter Four details the methods used for the scoping review; followed by Chapter Five, where the results of the scoping review are presented. Thus, the methods and results from the scoping review are presented in their entirety before a description of the Delphi survey. The methods which were used to conduct the Delphi survey are presented in Chapter Six, before the detailed results of the Delphi survey are presented in Chapter Seven. This allows for a stepwise approach to the presentation and reporting of the research as the scoping review results inform the first round of the Delphi survey. If the chapters had not been split, the methods used to conduct the Delphi survey would have been presented prior to the presentation of the results of the scoping review.

3.6. Conclusion

This chapter has detailed the aim and research strategy of this research. The details of the ethics approval to conduct the research, obtained from the DUT IREC have been presented. An explanation of how the scoping review and Delphi survey are going the be presented in the following chapters has also been provided.

4. CHAPTER FOUR – SCOPING REVIEW METHOD

4.1. Introduction

Limited research has been conducted on the topic of checklists for PRFs, especially in South Africa. A scoping review was conducted to identify the essential variables for patient handover and the audit of a patient report form. This chapter will provide an overview of the methods used to conduct the scoping review. This will include the background of scoping reviews, and the rationale for using a scoping review for this research. The strategy used to conduct the scoping review will also be detailed. The results from the scoping review will be presented in the following chapter.

4.2. Background to scoping reviews

Scoping reviews are explorative in nature. They are used to address a broad research question and to examine what research has been conducted or what evidence is available on a topic. This can be used to identify gaps in the research knowledge base, emerging evidence/new trends and the clarification of key concepts. The located data is charted to graphically represent the range of evidence, instead of necessarily developing new knowledge (Peters *et al.,* 2015: 141-146).

With systematic literature reviews, the information and knowledge synthesis is actively undertaken. The goal is to answer related and specific questions by using multiple study designs to analyse quantitative evidence, from prior research. The methodological quality of the studies included is important, as the intention of conducting the systematic review is to synthetise new knowledge and understanding from the reviewed quantitative evidence (Peters *et al.,* 2015: 141-146).

Scoping reviews are a relatively new methodology and are used for synthesising research evidence; and often to map existing literature. The sources used in scoping reviews are generally broad and not as specific as those routinely included in systematic reviews. Scoping reviews generally do not exclude articles based on quality, as their primary aim is to map the evidence; unlike systematic reviews which exclude studies which do not conform to quality thresholds. The sources used in scoping reviews are generally broad and not as specific as systematic reviews, as scoping reviews can collect data from any existing literature. They may

be conducted to determine the value and probable scope of a full systematic review (Peters *et al.,* 2015: 141-146).

There is little-to-no research available on the data elements that are required for the development of a checklist to audit patient report forms in South Africa. The scoping review was used to identify what information is available on the data elements which are important for PRF completion. This was done to create an initial list of data elements for round one of the Delphi survey. The focus was to find research about which data elements should be on a checklist, rather than analyse the research methodology of the limited research available. The sources of data that were considered in the search, and which sources of data that were to be included and excluded, were pre-defined in the scoping review (Peters *et al.,* 2015: 141-146).

4.3. Scoping review protocol

This scoping review was guided by a protocol developed a priori. The protocol and scoping review were based on the guidance provided by the Joanna Briggs Institute (Peters *et al.,* 2015: 141-146). The objectives of the scoping review were as follows:

- to identify what research has been conducted on the information that is required for PRF completion;
- to identify where this research has been conducted; and
- to ascertain what data elements are required for the completion of a PRF and what research has already been conducted on this topic.

The plan also guides and provides uniformity on how the information will be searched for. Several points needed to be defined prior to starting the search.

Population:
This is the ‘who’ focus of the research. The focus for this study was on paramedics who hand patients over to hospital staff, including doctors and nurses in the emergency department.

Concept:
The concept is the principal focus of the plan. For this research, the concept was identified as the information that is required for the quality completion of a PRF and what research has already been conducted on this topic. The scoping review mapped research conducted, and

focussed on identifying the information or data elements required for safe patient handover. The aim was to identify what essential information must be handed over to the receiving practitioner and then be recorded on the PRF by EMS caring for the patient, to help ensure continuity of care.

Context:
The context of the scoping review encompassed details about the specific setting (such as acute care, primary healthcare, or community), or discipline (such as education, pharmacy, or nursing) of the data being examined. This research focussed on the handover of the patient to hospital staff by the EMS, to nurses and doctors, which normally occurs in the ED (or intensive care unit), since the information required for medical documentation in the hospital environment (when moving patients to different wards in the hospital or at shift change) has been well researched and documented.

4.4. Scoping review strategy

A three-step strategy was used to conduct the scoping review. This strategy was based on guidance provided by the JBI (Peters *et al.,* 2015: 141-146).

4.4.1. Step one of scoping review strategy

An initial limited search was conducted using PubMed. Results contained in the title and abstract of the retrieved papers and keywords were searched. The results from this search, under the guidance of a librarian, were used to create key words and these key words were developed into Boolean phrases.

Commonly used synonyms or alternate phrases regarding the topic were also included in the Boolean phrase to broaden the search. The synonyms were separated by the word OR as not to limit the search and to allow the search engine to select any of the included synonyms. Some of the key words were short phrases, such as ‘patient care report’ with the words placed between inverted commas so that the whole phrase and not the individual words were searched. The synonyms/key phases were searched with the word AND in between the synonyms and key phrases. This was so that any combination of the keywords and their synonyms were searched

The Boolean phrases which were developed are: Documentation; OR “patient report form” OR “patient care report” OR “medical record” OR “ambulance call report” OR handover OR “clinical report” OR “handoff” AND Paramedic OR “emergency medical technician” OR “emergency medical service” OR EMS OR pre-hospital OR “allied Health Personal” as well as AND Quality OR audit OR checklist OR “quality indicators”

4.4.2. Step two scoping review strategy:

A second search using the Boolean search terms was conducted using several medical search engines. The search engines that were used were PubMed, Cinahl, Summon and Scopus. The same Boolean search phrases were used in the four search engines. However, the search options available for each search engine varied slightly, based on the different search options available in the search engine.

When searching in Scopus, only one search was required, as the search options allowed the title, abstract and keywords to be searched at once. When using PubMed, two searches were required. First the title and abstract, were searched, and then a separate search using the medical sub-heading (MeSH) terms was required. The title, abstract and subject terms were searched individually when using Summon. This was similar to the search in Cinahl, which required three searches, as the title, abstract and main words, needed to be searched separately.

4.4.3. Step three of scoping review strategy

The reference list of all identified articles was scanned for additional relevant articles. No additional articles were found.

4.5. Data extraction

A data extraction document was used to record the relevant details of the articles found during the scoping review search. Using the data extraction document, the researcher and a second reviewer independently reviewed the articles, deciding if the article was relevant to the study. For articles that the reviewer decided should be included in the study, the reviewer independently recorded the relevant variables identified from the article, on the data extraction

document. This was done on an Excel® (Microsoft Corp, Redmund WA) spreadsheet where the articles for full review were listed and the data elements per reviewer recorded. From the spreadsheet, it could be seen which articles the reviewers agreed or disagreed on, and the data elements found in the article by the reviewer.

If there was a disagreement between the reviewers after both had independently reviewed the articles, the reviewers discussed the relevance of the articles to the study and negotiated whether the article must be included or not. The main reasons for excluding an article, where the article was not applicable to the study, were if they focused on the in-hospital (e.g., ICU) environment, or no relevant patient variables were listed. There were several articles that the reviewers could not agree on, and the study supervisor decided on inclusion or exclusion of the articles as a third reviewer.

4.6. Conclusion

What a scoping review is and the reason for using a scoping review over other types of reviews has been explained in this chapter. The three-step scoping review process, based on the guidance of the Joanna Briggs Institute, has been detailed. The results from the scoping review will be presented in the next chapter.

5. CHAPTER FIVE – SCOPING REVIEW RESULTS

5.1. Introduction

In this chapter the results of the data analysis of the scoping review are presented. The details of why articles were excluded, followed by how data elements were recorded on the data extraction tool, are given. The results from the scoping review were analysed and presented in order to identify data elements for the first round of the Delphi survey.

5.2. Search results

The search yielded 2452 citations. An additional nine articles on the topic of PRFs which had been sent to the researcher were added as additional articles. This totalled 2461 results.

The duplicate search results (n=736) were then removed, leaving 1725 results. Results that had been published prior to the year 2000 (n=260), were removed from the results (as per the scoping review plan). The non-English results (n=30) were then removed. The remaining search results (n=1435) were assessed according to the relevance of the title and abstract and were removed if not relevant to the study. This screening process removed 1386 results. The results that were seen to be relevant to the study (n=47) were then reviewed fully.

Following the full-text review process, there were 21 publications which were included in the study. The variables relevant to PRFs from the 21 articles were used. The variables from the different studies were recorded on the Excel® spreadsheet and the variables were grouped according to topic. This formed the basis for the first round of the subsequent Delphi study as these were the data elements used in the first round of the Delphi survey.

Following the data extraction process from the scoping review, the following data elements were identified. The data elements were grouped according to subject headings based on the purpose of the element. The elements identified in the scoping review are listed below.

The data elements from the scoping review	
Patient demographics:	• Name • Surname • Patient's age • Patient's sex • Patient's date of birth (DOB) • Patient's identity number • Patient's address • Family contact information • Patient's GP's address • Patient's race
Case/ambulance/crew details	• Date • Case number • Identification of pre-hospital providers • Qualification of pre-hospital providers • Ambulance call sign or registration number • Time the call was received at the communication centre • Type of dispatch • Result of dispatch • Type of transportation • Time ambulance arrived on scene • Time leaving scene • Time patient arrived at hospital • Receiving hospital • Mileage mobile to scene • Mileage at scene • Mileage at destination
Patient background /history	• Chief complaints/symptoms • Time of onset of symptoms • Events prior to calling ambulance • Medical history/co-morbidity • Patient priority/condition • Allergies • Medication patient is taking • Patient's last meal/drink consumption • Conditions/surrounds where patient was found
Injuries/illness/MOI	• Mechanism of injury/nature of Illness • Injuries sustained and anatomical location • Pain score • Death of an occupant in the same compartment • Patient was restrained/unrestrained • Patient mobility • Approximate impact speed • Airbag deployment damage to car/intrusion • Extrication time

	• Estimated crash speed • Blood loss in the field (quantity)
Vital signs	• Blood pressure • Pulse rate • Respiration rate • Glasgow Coma Score • SpO2 • ECG analysis • End tidal CO2 • Capillary refill • Temperature • TEWS Score • HGT • AVPU/ LOC • Skin colour • Pupils • RTS • MAP • CVP
Treatments/ procedures	• Assessment summary of primary assessment (ABCDE) • Treatment and response to treatment • Oxygen therapy given • Fluid therapy given • Diagnostic procedures undertaken • Lung sounds assessment • Breathing procedures used • Circulation procedures used • Details of medications administered • Immobilisation
Patient handover	• Name and signature of person handing patient over • Name and signature of person receiving patient • Time of handover
Airway management	• Assessment of the airway • Indication for intubation • Devices used in airway management
In general, on the PRF	• Legibility of writing on PRF • Is patient diagram clearly labelled? • Are patient refusals documented with patient signature? • Vitals repeated every 20 minutes • Recommendations regarding further treatment
If applicable: CPR	• Bystander CPR • Shocks delivered • Occurrence of ROSC is specified • Duration of CPR • Was CPR appropriate?

If applicable: ventilator settings	• Peak airway pressure • Vent mode • PEEP • Tidal volume • Minute volume

Table 5.1 The data elements from the scoping review

PRISMA flow diagram

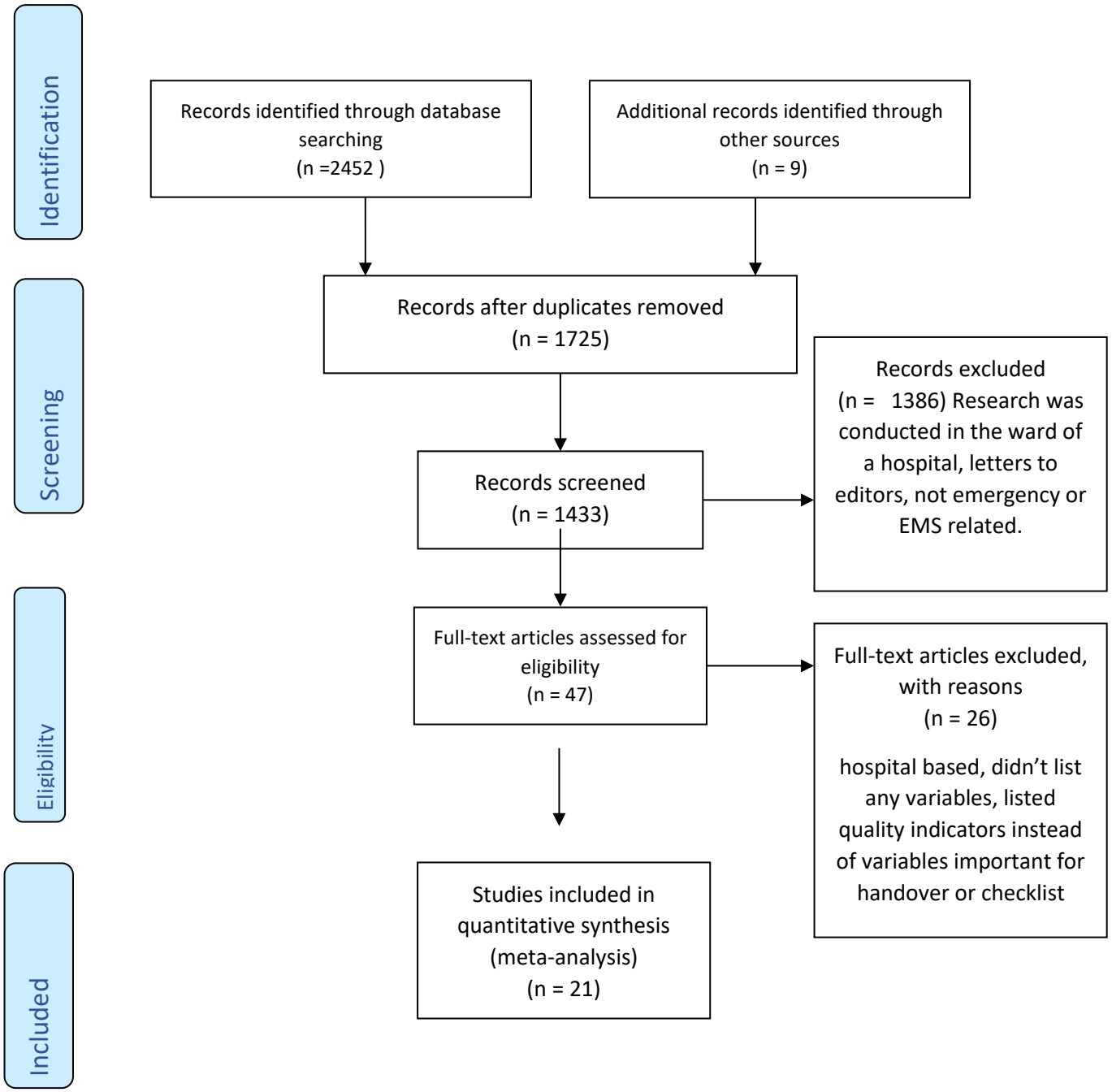

Figure 5.1 Prisma flow chart

5.3. Conclusion

This chapter has detailed the results of the scoping review and has described the process of excluding articles after conducting the scoping review, leaving 47 articles for full review before the data elements from 21 articles were selected. The results from the scoping review have also been summarised in a Prisma chart. The next chapter will detail the methods used to conduct the Delphi survey.

6. CHAPTER SIX – METHODS USED FOR DELPHI SURVEY

6.1. Introduction

In this chapter, background information regarding the use of Delphi surveys will be presented. Thereafter, the rationale for using a Delphi survey for this research is justified. The role and recruitment of expert participants for Delphi surveys is detailed, prior to an explanation of the criteria needed to be met by the participants, in order to participate in the Delphi survey for this research. The methods used to plan and conduct the three-round Delphi survey are then discussed.

6.2. Choice of survey technique for this study

For this research, an online Delphi survey was used to reach a consensus on which data elements are required for the proposed checklist tool. The Delphi technique is similar to other consensus techniques. However, there were several advantages to using the Delphi technique, which is why it was chosen for this research.

Advantages include:

- participants can come from a large geographical area
- limited costs
- wide reach of the study

  participants do not have to travel to meetings
- participation is confidential
- participants remain unknown to each other.

Disadvantages to using the Delphi:

- non-participation of participants
- participants may require reminders to submit their surveys (McMillan, King & Tully, 2016: 658-662).

6.3. Background and historical development of Delphi surveys

The need for effective decisions in situations where there was contradicting or limited information led to the use of several brainstorming techniques, including the Delphi survey. It

was developed in the 1950's as a technology forecasting tool by the RAND corporation (Hasson, Keeney & McKenna, 2000: 1008-1011). Delphi surveys are used as a structured process to develop and identify consensus by experts on a topic or problem (Holey *et al.,* 2007: 51). A Delphi survey is a group facilitation process for decision making, among isolated, anonymous respondents. It is a multi-stage process, with each stage building on the previous stage. The participants provide responses to questions, with the intention of producing specific ideas or solutions to a problem. The questions posed to the participants form part of a questionnaire, which is used to collect qualitative comments from the participants on a topic. These questions could be open-ended questions on the topic, or based on published scientific literature. The information gained from the first round is then fed back to participants in a quantitative form through a second survey where modification of the responses is allowed. The results from the second questionnaire help in the formation of the third quantitative questionnaire. This process is repeated until a consensus is reached, or the number of returns for each round decreases. Agreement can be determined by the aggregate of responses (There is a move to a subjective level; or there is a consistency of answers between successive rounds). This process is aimed at guiding group opinion towards a final decision, through the triangulation of subjective group judgements, analytical techniques, and the experience of the participants. This results in a decision or consensus, which could not have been made by one person alone (Cantrill, Sibbald & Buetow, 1996: 67; Hasson, Keeney & McKenna, 2000: 1009-1011; Holey *et al.,* 2007: 51)

6.4. Modern use of the Delphi survey

As the Delphi survey is seen as a flexible technique, there are now many different forms of the Delphi survey in existence, which has resulted in a rise in the use of the Delphi technique, especially in healthcare and social science research. The use of a Delphi survey as a research tool is now a common strategy in medical and health sciences research (Hasson, Keeney & McKenna, 2000: 1008-1011). The technique can be used to research a topic when there is:

- contradictory or insufficient information;
- to explore or expose underlying assumptions or information leading to different judgements;
- to seek out information to generate a consensus; and

- to correlate information and judgements (Hasson, Keeney & McKenna, 2000: 1009-1011).

The Delphi technique allows for structured interaction between the group participants, but not the face-to-face communication a structured questionnaire uses. This allows for anonymity of the panel members. An advantage of participant anonymity is that it negates the power differentials between people. These power differentials could mean that people feel they may not be able to contribute their own views. Application of the Delphi technique is also more flexible as it does not require the participants to meet at a certain time and place. This allows for the participation of larger groups. The questionnaires are emailed, thereby avoiding the need to travel, and can be answered at the participants' convenience (McMillan, King & Tully, 2016: 658-662).

There is no standard method or clear guidelines to calculate a panel size for a Delphi survey. The number of participants will affect the potential for ideas and the amount of data to be analysed. The higher the number of participants, the more data is generated; and therefore more data needs to be processed, which may result in difficulties with the analysis, and may lead to diminishing participation, as participants become fatigued from being repeatedly questioned about the same topic. Too few participants may limit data generation or group consensus. Participants in the survey are individuals, often termed 'experts', who are knowledgeable on the topic being investigated. They are not randomly chosen, but are often selected for a purpose, to apply their knowledge on a certain problem or topic which is related to the problem under investigation. There needs to be a balance between selecting experts who will be impartial, so that the information obtained reflects current knowledge and perceptions, and experts with knowledge and interest in the research topic (Hasson, Keeney & McKenna, 2000: 1009-1011; McMillan, King & Tully, 2016: 658-662).

As discussed, the participants in this research were not randomly chosen, but were recruited due to their knowledge on the topic (Hasson, Keeney & McKenna, 2000: 1009-1011). In order to obtain representative information, while being able to ensure that participants were knowledgeable about the subject matter, the following criteria for the inclusion of the participants in this Delphi study were developed:

- be in the health/ medical/ legal profession;

- have a post-matric qualification (e.g., CCA/National Diploma); and
- have at least five years clinical experience.
    - In the participants' consent letter they were required to confirm that they met the listed requirements.

The exclusion criteria, applied to choose participants in the Delphi study, were:

- basic life support paramedics;
- intermediate life support paramedics; and
- emergency care technicians.

6.5. Recruitment of participants for this study

The intention was to recruit forty participants for participation in this Delphi survey. Potential Delphi survey participants were identified from the existing known practitioner lists obtainable from the HPCSA in the category ANT (paramedics with a Critical Care Qualification or a National Diploma in Emergency Medical Care) and emergency care practitioners (ECP), as well as doctors (MBChB) who are engaged in the listed clinical activities; and other experts on the Medical Board, as listed in the inclusion criteria. This was used to create a provisional database of industry experts to approach to potentially participate in the study. In addition to this, messages were sent through the researcher's social and professional networks, requesting potential interested participants to contact the researcher. Based on the responses a database of potential participants who met the inclusion criteria was developed. The potential participants had work experience in the pre-hospital field across South Africa in both the state and private health sectors, and had extensive knowledge in the EMS field.

The potential participants were then approached in writing (via email), requesting them to participate in the research. An information letter (Appendix B) was provided to the potential participants detailing information about the research. Participants who wished to participate in the research could click on the embedded link in the email, which was sent to them, to be able to read the letter of information, agree to participate in the research, and participate in the first round of the Delphi survey.

Confidentiality is one of the benefits of using a Delphi survey as the isolated participants are anonymous and not known to each other. An advantage of participant anonymity is that it

negates power differentials between people. These power differentials mean that people may feel they are unable to contribute their own views (Cantrill, Sibbald & Buetow, 1996: 67).

The details of the persons participating in the Delphi study are only known only to the researcher and study supervisors. All information regarding the participants was kept confidential and was recorded in a separate password-protected file on a password-protected computer that only the researcher can access. Participation in the study and the results of the survey were only available to the researcher and supervisors. The participants did not know who else was participating in the study and the individual answers were only known to the researcher and research supervisors. The participant details and collected data will be kept for five years and then deleted, as per the Durban University of Technology's policy: Guidelines For Research Data Storage (Durban University of Technology ND:1-4).

6.6. Delphi survey round one

The content for the first round of a Delphi survey may come from a variety of sources, including scientific literature, clinical practice, or results from previous research findings (Cantrill, Sibbald & Buetow, 1996: 67; McMillan, King & Tully, 2016: 7). The results of the scoping review (phase one of the research project) formed the basis of round one of this Delphi study. The results from the scoping review were grouped so that similar data elements were grouped together under a common topic. A common trend with Delphi surveys is for the initial study questionnaire to be used to collect information from participants, using open-ended questions, before asking them to conduct any rating (McMillan, King & Tully, 2016: 8). In this study, to identify any additional variables that are relevant to the South African context, participants were given the opportunity to provide answers to open-ended questions regarding data elements required for patient documentation on PRFs. These were data elements that they thought should be recorded in handover documentation, in addition to the variables that had been identified in the scoping review.

6.6.1. Data collection tool

Google forms were used to create the questionnaire used to conduct the Delphi survey. The form for the first round consisted of 17 sections. The first section contained the letter of information and the consent form for participants. This is where participants read the letter of information and consented to participate in the research, using a tick-box consent. This was

followed by a section which recorded relevant contact and demographic information from the participants.

In the remaining sections, under the respective topic headings, the relevant data elements identified in the scoping review were listed. Below this was an answer box where there was the option to mark with a tick-box, indicating that there was no additional input that the participant wished to contribute regarding the variables listed; or, using a short answer option box, the participant could add additional variables that they thought were relevant. The final section of the questionnaire allowed the participants to return to the question section or submit the form.

After the form for each round of the Delphi survey had been developed by the author, the researcher's supervisor and co-supervisor reviewed the form for errors before trialling the form by completing it as if they were participants, to assess the flow and usability of the form. Once the study supervisors had checked and reviewed the form, a third, independent reviewer also reviewed the form.

6.6.2. Data collection for round one

A summary of the research and a link to the Google form, for the first round of the Delphi survey, was emailed to all potential participants who had responded to the request to participate in the research. The closing date for returns was three weeks after the first emailing of the form. Two reminder emails were sent to potential email recipients, who hadn't responded at that time.

6.7. Round two of the Delphi survey.

In round one of the Delphi study, participants had the opportunity to add any variables that they thought were applicable to the South African context that had not already been discovered in the scoping review. The additional variables provided by the participants were added to the data elements found in the scoping review, to form the quantitative questions for round two of the Delphi survey.

In the first round participants were not asked to rate the importance of any of the variables. In the second and third rounds of the Delphi survey, participants would rate how important they thought each element was, using a Likert scale.

6.7.1. The use of the Likert scale

Likert-like scales are popular in research and are used to assess opinions, attitudes, or behaviours of the participants. They can be used to assess agreement, quality, likelihood, and experience. The advantage of Likert scores is that a series of questions is used, which breaks down complex problems into manageable parts. The questions are close-ended, which makes it easy for participants to respond. They also allow for greater insight into the topic being investigated as the answers are not binary (yes/no, true/false), which can allow for more detailed insights into the perceptions, opinions and behaviours of the participants. Disadvantages of Likert scores are that there can be response bias or subjective understanding of the topic. Participant apathy is also a concern, with participants losing interest in the questionnaire; or they may feel limited by the answer options provided (Bhandari, 2020: para 18 line 1 – para 26 line 2).

Likert scores are used to collect data by having participants answer a question or statement. Instead of using open-ended questions, Likert scores use a close-ended questioning system where answers to the question or statement are provided, and the different answers have a score attached to them. The scores are then analysed by using ordinal or interval scales. With ordinal scales, the answer has a rank that is higher or lower than others, but the exact differences between the items are not evenly spaced or clearly defined, or the difference between the two answers may not be the same. With interval scales, the difference between each question is the same, i.e. the difference between 1 and 2 is the same as the difference between 3 and 4 (Bhandari, 2020: para 18 line 1 – para 26 line 2). .

The Likert scoring and answers that were used in rounds two and three of the survey were as follows:

1= strongly disagree (This element should definitely be excluded from the checklist.)
2= disagree (I think that this element should be excluded from the checklist.)
3= neutral (I can’t decide if this element should be included or excluded the checklist.)
4= agree (I think this element should be included on the checklist.)
5= strongly agree (This element should definitely be included on the checklist.)

6.7.2. Round two form design

The design of the Google form used in the second round of the Delphi survey changed considerably. The form was divided into sixteen sections. The first section explained what the purpose of the second round of the Delphi survey was and stated the closing date for participation. In the second section, the participants recorded their names and surnames. This was required as the participants' individual responses needed to be sent to them when participating in round three. The third section of the form explained the Likert score and how it should be used. From section four, the heading of each section was labelled according to the grouping of the data elements and all the variables for assessment in that section were listed below the heading in individual question boxes. The different options for the Likert score were structured as multiple-choice questions where the participant could choose a score option by ticking the adjacent tick-box. All questions required a score to be selected to be able to move to the next section. Once all the sections had been answered, the final section allowed the participant to go back and change answers or submit the form.

6.7.3. Data collection for round two

A link to the Google form, for round two of the Delphi survey, was emailed to all participants who had participated in the first round of the Delphi survey. The closing date for returns was three weeks after the first emailing of the form. Two reminder emails were sent to potential email recipients, who hadn't responded at that time.

6.7.4. Level of agreement for rounds two and three

At the end of rounds two and three, analysis of the variables was undertaken and a level of agreement was determined. For this research, the Likert scores were analysed ordinally, as the difference between the answers on the Likert scale might have been seen subjectively by participants who might not have seen the differences in the scores as being the same. The 'strongly disagree' and the 'disagree' responses were grouped together (labelled 'disagree'), and the 'agree' and 'strongly agree' were grouped together (labelled 'agree'). If 80% of the participants chose the same option (agree, neutral, disagree) on the Likert scale for a particular variable, then that element was seen as having a high level of agreement.

Where there was a high level of agreement among the participants that an element should be included in the checklist, the element was placed on a list for inclusion in the checklist. If there

was a high level of agreement that the element should not be on the checklist, that variable was not put on the list or placed in the third round of the survey and was effectively removed from the survey. For data elements where a high level of agreement was not reached regrading inclusion or exclusion, then the element was included in the third Delphi round.

6.8. Round three of the Delphi survey

In the third round of the Delphi study, no new data elements were added. Data elements where the required level of agreement had not been reached in the second round of the Delphi survey were used in the third round of the survey.

6.8.1. Participants' individual results vs group results from round two

The Delphi survey is a multi-stage process with feedback provided to participants which allows for collective decision making (Cantrill, Sibbald & Buetow, 1996: 67 & 68). To provide individual feedback to participants that was only applicable to the participant, a table was developed for each participant. This table contained the data elements that were going to be assessed in round three. Next to each element was the score that the participant had given that variable during the second round of the survey. This was to remind the participant how they had rated that particular variable in round two.

A pie chart for each element that was going to assessed during round three was developed (one pie chart for each element). Using the coloured pie chart and the associated, labelled percentage, each pie chart showed how the group had rated each element during round two. Group feedback from round two of the survey was provided by a pie chart inserted as a picture below the associated question during the third round. An individual participant's response to a variable, reminding participants how they had scored the data elements in round two, was provided, when scoring the same variable again in round three; while the pie chart showing how the group rated a variable provided the opportunity for the participants to change their rating, if they so wished, during the third round of the survey. This feedback is what contributed to group consensus and agreement on the topic.

6.8.2. Form design for round three

As in the previous rounds, a Google form was used with the same design for the questions that had been used in round two. There was, however, an addition of the pie chart showing the group scoring of the variable in round two, which was inserted as a picture in the question box.

Each question box showed the element being assessed, the pie chart and the Likert scale below this. The participant would again rate the variable using the Likert scale.

6.8.3. Participation in round three

Only the participants who had responded in round two of the Delphi survey were sent an individualised email asking them to participate in the third round of the Delphi survey. An individual invitation was sent to each participant. In the email requesting them to participate in the round, there was a link to the table which had their ratings from round two, and a link to the survey was provided. The closing date of the survey was also stated in the email.

6.9. Conclusion

This chapter has detailed the background and modern day use of the Delphi survey when conducting research. The design of the Google forms used to conduct the research, and other important factors that were used to conduct the third round of the Delphi survey, have been presented and discussed. The results from the Delphi survey will be presented in the next chapter.

7. CHAPTER SEVEN – DELPHI SURVEY RESULTS

7.1. Introduction

In this chapter, the results of the data analysis of the Delphi survey are presented. The results are discussed in relation to the aim of the study, which was to develop a checklist tool to assess the quality of the recording, on a PRF, of vital patient information, and patient care provided by South African paramedics in the pre-hospital environment. Information about the participants' level of experience and qualifications is also presented. At the end of the chapter, the checklist designed to ensure the quality of PRFs will be presented.

7.2. Demographics of Delphi survey participants

The research population target group was South African paramedics, nurses and doctors. To identify the qualifications of the various healthcare professionals, and where they had had experience practising in South Africa, several questions were included in the survey. A total of 32 participants, who met the required inclusion criteria, participated in the first round of the Delphi survey. Most participants were practitioners registered with the Health Professions Council of South Africa. These included advanced life support paramedics (7), registered on the ANT register. The majority of the participants were emergency care practitioners (18), registered on the ECP register. Three doctors participated and one nurse also participated.

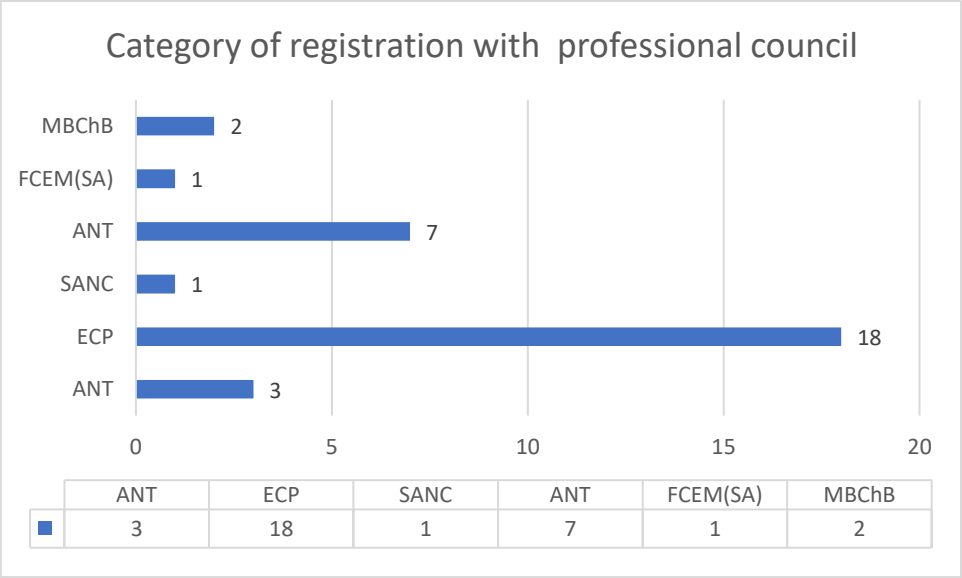

Figure 7.1 Participants' professional council registration category

Apart from the required five years' experience in the medical field, the participants were asked if they had experience practising in the state or private health sectors. The majority of participants (18) had had experience practicing in both the state and private health care settings; while 10 participants, indicated that they had only had experience practising in the state sector

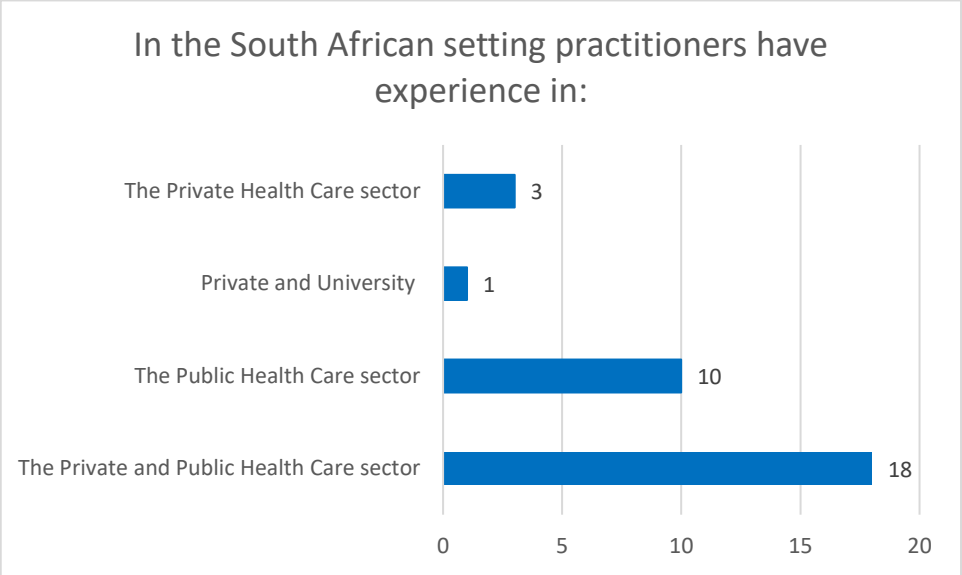

Figure 7.2 Participants' experience

7.2.1. Provinces where participants have practised

When asked which provinces the participants had previously worked in, KZN was the province where most of the participants (21) had had experience. This was followed by the Western Cape (8) and Gauteng (7). This shows that participants had experience practising across South Africa.

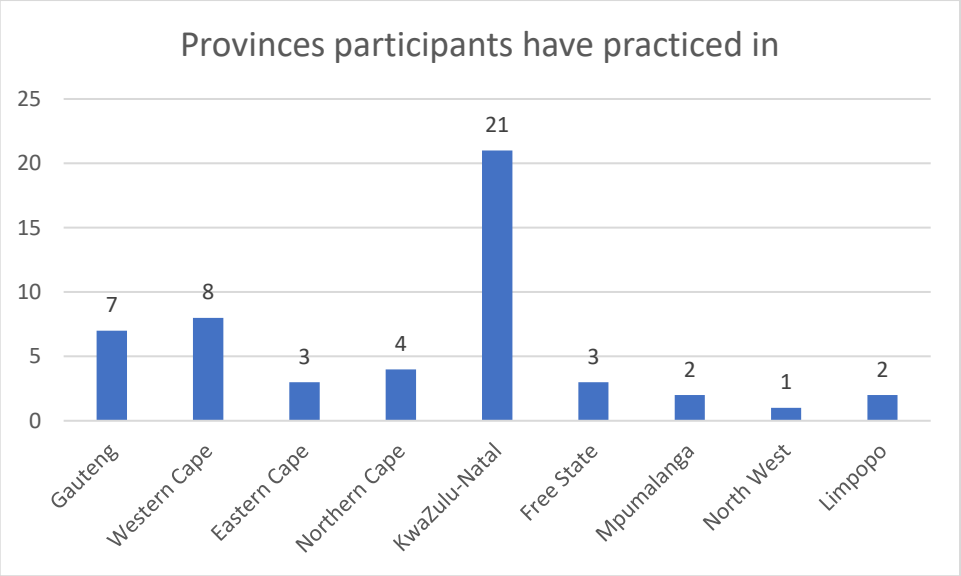

Figure 7.3 Provinces where participants have practised

7.2.2. Province where the practitioner was practising at time of survey

The majority of the survey practitioners were still practising in KZN at the time of the survey. It is worth noting that eight of the practitioners were currently practising outside the country. The remaining participants were practising in the Northern Cape, the Free State, the Western Cape and Gauteng.

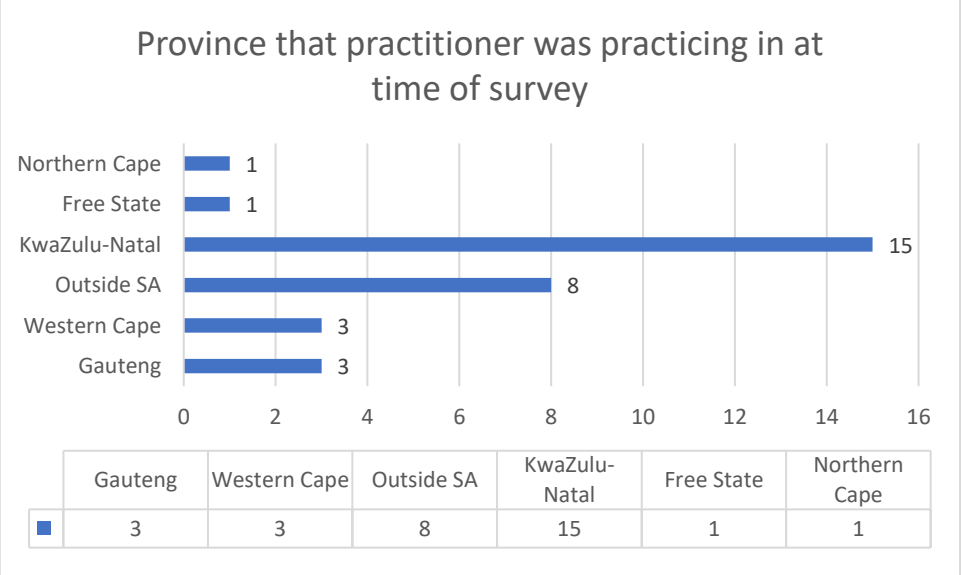

Figure 7.4 Province where the participant was practising at the time of the survey

7.3. Results from round one of the Delphi survey.

In this round, participants provided qualitative input by providing additional data elements that they thought should be included in the checklist. In this round there were eleven sections where participants could suggest additional data elements. One participant commented in all eleven sections. The average number of comments per participant was 4.9. Only two participants suggested no additional data elements. Participants made suggestions on each section of the questionnaire. The section pertaining to ventilator settings received the greatest number of comments, with participants making 25 suggestions in this section. The section which received the least number of suggestions was the patient demographics section, which received only eight comments.

Most participants used short answers to suggest variables; while some participants, instead of a short answer, gave a general comment about the data elements listed under the topic heading. General comments were checked for any suggestions of variables. Some variables suggested by participants were duplicated. These were merged when recording the responses. Comments from participants from the first round of the study were recorded on an Excel® (Microsoft Corp, Redmund WA) spreadsheet, under the relevant subject headings. The comments from participants from the first round of the Delphi survey are listed in Appendix C. The variables from the scoping review and the comments from the participants in round one were used to create the questions for round two of the Delphi survey.

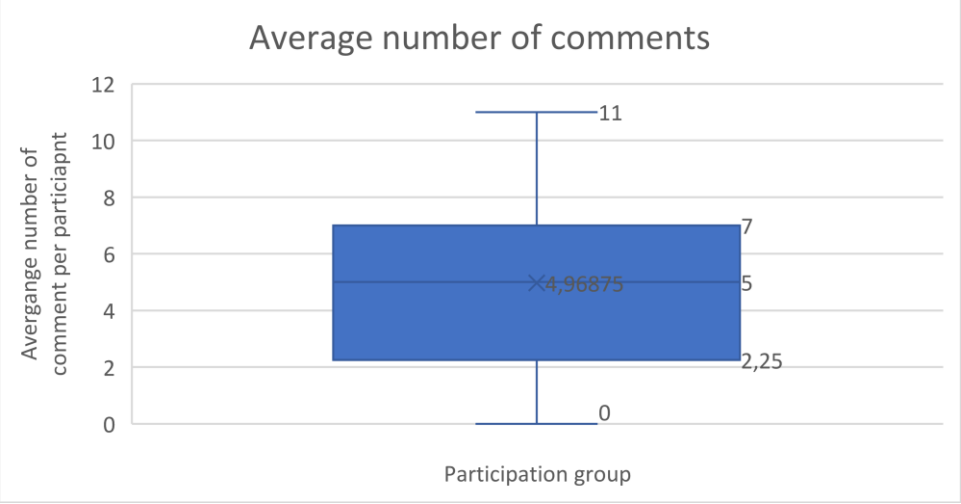

Figure 7.5 Average number of comments per participant

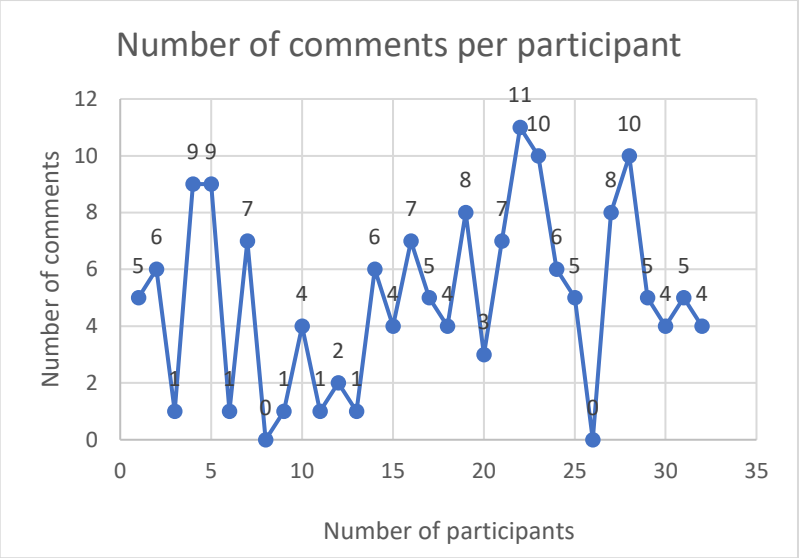

Figure 7.6 Number of comments per participant

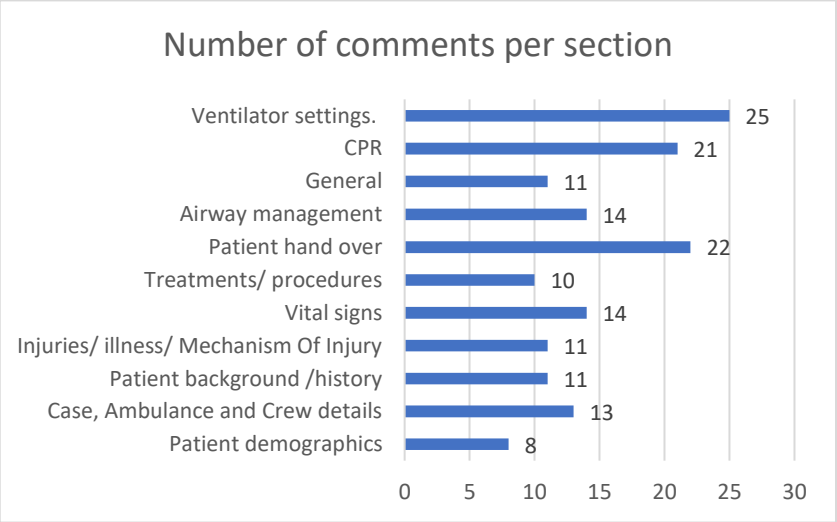

Figure 7.7 Number of comments per section in round one

7.4. Results from round two

The results for round two, where participants rated data elements, were recorded. Under the responses section in the form, it was possible to see how the group had rated the data elements from each question. Using Google forms, the results for the rating of each element by the participants was automatically calculated as a percentage. The results were exported to a spreadsheet. The agree/strongly agree and disagree and strongly disagree options were combined. Then the percentages for how the group had rated the variable could be totalled. This is how the level of agreement was assessed. The results from round two are recorded in Appendix D.

For variables where there was a high level of agreement (80%) that the element should be included in the checklist, it was removed from the subsequent survey to form part of the checklist, since a high level of agreement had already been achieved. In this round there were no data elements which the participants agreed should be removed from the survey, due them being seen as unimportant for the checklist.

In round two of the Delphi survey, 183 data elements were rated by the participants. In this round, 150 of the data elements met the threshold level of agreement of 80%, and therefore reflected ‘a high level of agreement’ among the participants. The 33 data elements where no level of agreement was met were reassessed in the third round of the survey.

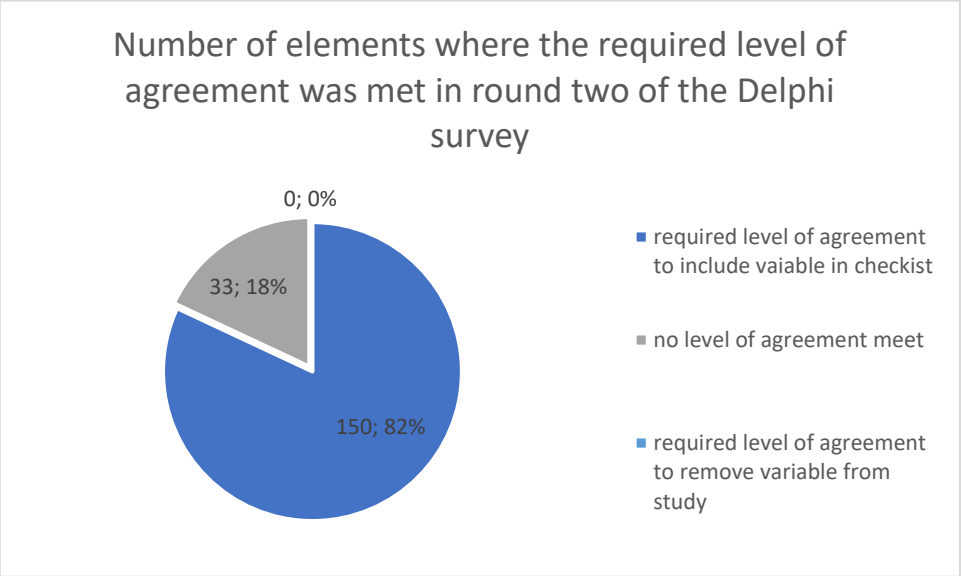

Figure 7.8 Number of elements where the required level of agreement was met in round two of the Delphi survey

7.5. Results from round three

The responses for round three were recorded and analysed in the same manner as in round two. The level of agreement was again calculated using percentages. The results from round three are recorded in Appendix D. Where there was a high level of agreement that a data element should be included in the checklist, it was added to the list of identified data elements from round two. These would be used as data elements in the design of the checklist tool. A high level of agreement was not reached for the remaining elements, either for disagree or neutral. These data elements were therefore removed from the study. Reminder emails were sent to participants, who had not responded, prior to the closing date.

Thirty-three data elements were assessed in the third round of the survey. In this round participants were able to see how the group had rated each of the remaining data elements in the previous round and could change their rating of the variables. This resulted in a high level of agreement being achieved for an additional 16 data elements, or 48 % of the data elements assessed in round three. At the end of the Delphi survey, participants had agreed on 166 data elements that they thought should be included in the design of the proposed checklist.

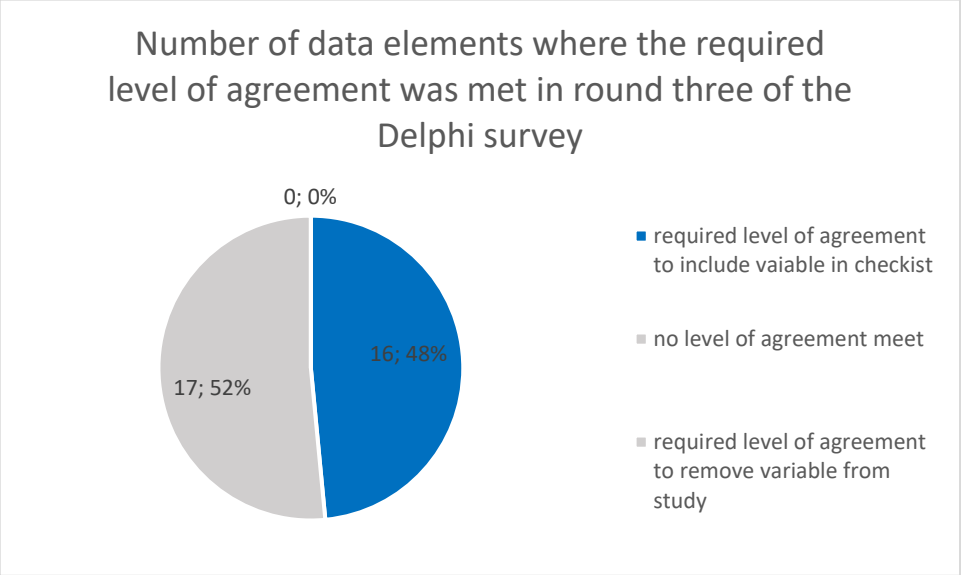

Figure 7.9 Number of elements where the required level of agreement was met in round three of the Delphi survey

7.6. End of Delphi survey

After the third round of the Delphi survey, the survey was closed. Reasons for this include:

- It was initially planned to only have three rounds.
- Participant attrition meant that the number of participants who participated in each subsequent round had decreased by the completion of the third round.
- Time was limited.
- The consensus on the data elements was substantial.

According to Hasson, Keeney and McKenna (2000: 1009-1011), these are in line with factors which are used to determine when to stop a Delphi survey, so that the results remain meaningful and avoid further sample fatigue.

7.7. Data elements that were edited after the Delphi survey

After completion of the Delphi study, it was found that several of the data elements provided by the participants during the Delphi survey were very similar, or duplicated or assessed the same topic, but were worded slightly differently. While this may not be a problem, it does present several challenges with the design and implementation of checklists, as checklists need to be clear and concise, with no superfluous or duplicated criteria (Scriven, 2005: 3-5). To resolve this issue, the author and co-supervisor independently reviewed all the data elements from round three on an Excel® (Microsoft Corp, Redmund WA) spreadsheet. In the adjacent column the reviewer recorded which data elements could be combined. The reason for combining the respective elements was also recorded. Once both reviewers had completed reviewing the list, the lists were compared. There were several data elements that the reviewers had not agreed should be combined. The reviewers then discussed the elements where there was a disagreement and after negotiation agreed on the data elements that could be combined.

Edited Data Elements		
Element that was removed	Action	Element that was used in checklist design
Qualification of pre-hospital providers	Removed as it's assessed by	HPCSA numbers of pre-hospital providers
Any change in recent behaviour (meds/ food/ activity etc)	Removed as it's assessed by	Events prior to calling ambulance/ Time of onset of symptoms
Time of onset of symptoms	Combined with	Events prior to calling ambulance/ Time of onset of symptoms
Time the ambulance was called	Removed as it's assessed by	Time the call was received at the communication centre
Incorporate AVPU	Removed as it's assessed by	Glasgow Coma Score (including breakdown of score)

Skin colour	Combined with	Skin (turgor pitting oedema subcutaneous emphysema/colour)
Treatments/ procedures	Removed as it's assessed by	Treatment and response to treatment
Results of POCUS/ eFAST (if applicable)	Removed as it's assessed by	Diagnostic procedures performed
Practice number of doctor receiving patient (if being received by a doctor)	Combined with	Qualification of person handing over and qualification of receiving practitioner including HPCSA, practice number or nursing council registration
Receiving facility	Removed as it's assessed by	Receiving hospital
Recording if patient was covered?	Removed as it's assessed by	Exposure and environmental control procedures done

Table 7.1 Edited data elements

7.8. The checklist for ensuring the quality of patient report forms

The results from the Delphi survey have been used to guide the design and development of the checklist to ensure the quality of PRFs. This is presented below:

PRF assessment checklist

Date:

PRF number:

Assessor name and signature:

	Section A Patient Demographics:	N/A	Yes	No
1	Patient's name	N/A	1	0
2	Patient's surname	N/A	1	0
3	Patient's age	N/A	1	0
4	Patient's sex	N/A	1	0
5	Patient's date of birth (DOB)	N/A	1	0
6	Patient's identity number	N/A	1	0
7	Patient's address	N/A	1	0
8	Patient's contact information	N/A	1	0
9	Family contact details	N/A	1	0
10	Medical aid details	N/A	1	0
	Total Score for section A		/	

	Section B Case/ Ambulance / Crew Details	N/A	Yes	No
1	District or region	N/A	1	0
2	Date	N/A	1	0
3	Case number	N/A	1	0
4	Names of pre-hospital providers	N/A	1	0
5	HPCSA numbers of pre-hospital providers	N/A	1	0
6	Ambulance call sign or registration number	N/A	1	0
7	Type of dispatch/case type - primary call or IFT;	N/A	1	0
8	Time the call was received at the communication centre	N/A	1	0
9	Time ambulance was dispatched	N/A	1	0
10	Time ambulance arrived on scene	N/A	1	0
11	Time of first patient contact	N/A	1	0
12	Time leaving scene	N/A	1	0
13	Time patient arrived at hospital	N/A	1	0
14	Location of patient/scene address	N/A	1	0
15	Receiving hospital	N/A	1	0
16	Mileage mobile to scene	N/A	1	0
17	Mileage at scene	N/A	1	0
	Sub total		/	
	If applicable			
18	Reason for delay e.g. rerouted, came across an accident, breakdown	N/A	1	0
19	If call cancelled - reason for cancellation	N/A	1	0
20	Call completion reasons, if other than patient transported to hospital (no patient found patient / refuses treatment etc)	N/A	1	0

	Sub total		/	
	Total Score for section B			
	Section C-Patient Background/History	N/A	Yes	No
1	Symptoms/chief complaints	N/A	1	0
2	Allergies	N/A	1	0
3	Past and present patient history (medical/ surgical history/disability/co-morbidity/ severity of pre-existing conditions/family history)	N/A	1	0
4	Medication patient is taking	N/A	1	0
5	Patient's last meal/drink consumption	N/A	1	0
6	Events prior to calling ambulance.	N/A	1	0
	Total Score for section C		/6	
	Section D- Injuries/Illness/MOI	N/A	Yes	No
1	Conditions where patient was found/social living circumstances	N/A	1	0
2	Documentation of pain	N/A	1	0
3	Mechanism of injury/nature of Illness	N/A	1	0
4	Documentation of injuries	N/A	1	0
5	Patient mobility/patient movement.	N/A	1	0
6	Blood loss? and quantity	N/A	1	0
	Sub total		/6	
	MOI from MVC if applicable	N/A	Yes	No
1	Death of an occupant in the same vehicle	N/A	1	0
2	Was patient restrained/unrestrained	N/A	1	0
3	Airbag deployment?	N/A	1	0
4	Damage to car/intrusion	N/A	1	0
5	Extrication time (if applicable)	N/A	1	0
6	Was patient ejected or did patient self-extricate	N/A	1	0
7	Other vehicles involved	N/A	1	0
8	Position of patient in vehicle during impact	N/A	1	0
	Sub total		/	
	Total Score for section D			
	Section E- Vital Signs and Clinical Findings	N/A	Yes	No
1	Blood pressure	N/A	1	0
2	Pulse rate	N/A	1	0
3	Pulse characteristics	N/A	1	0
4	Respiration rate	N/A	1	0
5	Respiratory rhythm	N/A	1	0
6	Lung sounds/air entry	N/A	1	0
7	Glasgow Coma Score (including break down of score)	N/A	1	0
8	SpO2	N/A	1	0

9	Capillary refill	N/A	1	0
10	HGT	N/A	1	0
11	Pupil reaction and size	N/A	1	0
12	MAP	N/A	1	0
13	Skin (turgor pitting oedema subcutaneous emphysema)	N/A	1	0
14	Patient priority/condition	N/A	1	0
15	Regular recording of vital signs, based on patient's condition	N/A	1	0
16	Treatments/procedures and response to treatment	N/A	1	0
17	Oxygen therapy administered	N/A	1	0
18	Fluid therapy administered	N/A	1	0
19	Diagnostic procedures performed	N/A	1	0
20	Breathing procedures	N/A	1	0
21	Circulation procedures	N/A	1	0
22	Details of medications administered (name, time, route and dose)	N/A	1	0
23	Physical examination findings/secondary survey	N/A	1	0
24	Disability procedures done	N/A	1	0
	Sub total		/24	
	If applicable			
1	End tidal CO2 (if applicable)	N/A	1	0
2	Details of devices or manoeuvres used	N/A	1	0
3	Results of POCUS/ eFAST (if applicable)	N/A	1	0
4	If patient was paced what the pacing rate and voltage	N/A	1	0
5	Thrombolytic checklist (if applicable)	N/A	1	0
6	Any treatment already administered by any other practitioner (if applicable)	N/A	1	0
7	Assessment of pelvis stability (if applicable)	N/A	1	0
8	Neuroprotective interventions (if applicable)	N/A	1	0
9	Immobilisation (if applicable)	N/A	1	0
10	New-born APGAR, weight, temperature of incubator,	N/A	1	0
11	Pre-hospital arterial blood gas analysis	N/A	1	0
12	ECG analysis (if applicable)	N/A	1	0
	Sub total		/	
	Total Score for section E		/	
	Section F- Patient Handover	N/A	Yes	No
1	Name and signature of person handing patient over	N/A	1	0
2	Name and signature of person receiving patient	N/A	1	0
3	Time of handover	N/A	1	0
4	Qualification and position of person handing over and qualification of receiving practitioner including HPCSA number/ nursing council registration/ practice number	N/A	1	0
5	Clarifications raised during handover or any concerns	N/A	1	0
	Sub total			
	If applicable			

6	Patient signed for refusal of services on the PRF	N/A	1	0
7	If the patient refused services, there is a witness signature	N/A	1	0
8	List of personal belongings (eg, cell phones, wallets, watch etc) and meds brought with patient and handed over	N/A	1	0
9	List of equipment left behind to be collected later	N/A	1	0
	Sub total		/	
	Total score for section F		/	
	Section G - In general, on the PRF	N/A	Yes	No
1	Recording if patient is comfortable and calm?	N/A	1	0
2	Recording if patient was covered?	N/A	1	0
	Total score for section G		/	
	Section H- Airway Management (if applicable)	N/A	Yes	No
1	Assessment of the airway	N/A	1	0
2	Indication for intubation	N/A	1	0
3	RSI/intubation check sheet (from preparation to confirmation)	N/A	1	0
4	Devices used in airway management (if applicable)	N/A	1	0
5	Details of airway management and airway procedures performed (including if RSI facilitated)	N/A	1	0
6	ETT depth secured/ ETT placement at teeth before and after transport.	N/A	1	0
7	Number of intubation attempts	N/A	1	0
8	Intubation successful/not successful	N/A	1	0
9	Patient's response to airway management	N/A	1	0
10	Suction requirements	N/A	1	0
	Total score for section H		/	
	Section I – CPR, if applicable	N/A	Yes	No
1	Living will/DNAR orders (if applicable)	N/A	1	0
2	Witnessed/unwitnessed arrest	N/A	1	0
3	Estimation how long patient was unresponsive before CPR was started	N/A	1	0
4	Was bystander CPR was being provided before EMS arrival on scene (duration of bystander CPR)	N/A	1	0
5	One-rescuer CPR or two-rescuer CPR	N/A	1	0
6	Manual or device (Autopulse/ Lucas) compressions	N/A	1	0
7	Was an AED or defibrillator monitor used?	N/A	1	0
8	Duration of CPR	N/A	1	0
9	ECG rhythms present and change of rhythms documented	N/A	1	0
10	Suspected cause of arrest (H's and T's)	N/A	1	0
11	Number of shocks delivered	N/A	1	0
12	Times for all evaluations and treatments during CPR	N/A	1	0
13	Medications administered (times, dose, route) during CPR	N/A	1	0
14	Patient's response to CPR	N/A	1	0

15	FiO2 used during CPR	N/A	1	0
16	ETCO2 reading during CPR	N/A	1	0
17	Post ROSC management? (if applicable)	N/A	1	0
	Total score for section I		/	
	Section J- Ventilator Settings if applicable	N/A	Yes	No
1	Peak airway pressure (or plateau, depending on mode)	N/A	1	0
2	Respiratory rate	N/A	1	0
3	Mode of ventilation SIMV/CPAP etc.	N/A	1	0
4	PEEP	N/A	1	0
5	Tidal volume	N/A	1	0
6	Minute volume	N/A	1	0
7	Plateau pressures (if using volume ventilation mode)	N/A	1	0
8	Insp time and exp time	N/A	1	0
9	ETCO2 readings	N/A	1	0
10	Morphology of ETCO2 waveform	N/A	1	0
11	Trigger flow	N/A	1	0
12	Alarm settings	N/A	1	0
	Total score for section K		/	

	Score	**Total**
Section A		
Section B		
Section C		
Section D		
Section E		
Section F		
Section G		
Section H		
Section I		
Section J		
Total		
Percentage		

Table 7.2 Checklist for ensuring the quality of patient report forms

7.9. Conclusion

The results from the Delphi survey have been analysed in this chapter. The complete list of data elements for inclusion in, and the development of, the proposed checklist tool, and a brief explanation of each data element, is listed in Appendix E. These data elements have been used to guide the design and development of the checklist, which is presented in Table 7.2.

The intended use of the checklist and the process used to design the checklist will be discussed in the next chapter.

CHAPTER EIGHT – DISCUSSION

8.1. Introduction

The aim of this study has been to develop a checklist to assess the comprehensiveness and quality of vital patient information and patient care provided by South African paramedics in the pre-hospital environment. In this chapter, the results of the study are discussed in order to address the research aim and objectives. The literature that has been cited in previous chapters, and new literature regarding checklists, is incorporated into this chapter to contextualise the discussion. In this chapter, the checklist, which has been the focus of this research, is presented.

8.2. Research already conducted

It has been shown by Spicer and Sobuwa (2014:1) that vital information is often omitted from PRFs. However, there has been limited research on the topic of PRFs and the handover information that is required. Bowen (2008:1-211) investigated the information required for the design of an PRF. Research on the patient care variables, which are perceived to be important during handover by South African paramedics, was conducted by Makkink *et al*. (2019 87-90). This research provided a list of patient-related criteria that are important for paramedics to mention during the handover of a patient. Internationally, van Vleet (2015:1-232) investigated the information required during patient handover to avoid communication errors. These studies focused on PRF design and the data elements important for handover. Research focusing on the use of a checklist to ensure a quality patient report form was conducted in Australia by Smith, Boyle and MacPherson (2004:2422-2439), who developed a checklist or a 'quality assessment tool', as they termed it, to ensure the quality of PRFs once they had been completed. The specific variables from a PRF that needed to be included in the checklist were researched by conducting a literature review, and a quality assessment tool was developed. It was found that patient details, observations and patient management were the three areas on a PRF that could be improved, so that the PRF would be more useful in documenting the continuum of healthcare of the patient. When the checklist was implemented, it resulted in over 90% of assessed PRFs passing the quality assessment at the two ambulance services where it was implemented in Australia. Despite this improvement, the committee that developed the checklist recommended that the tool should be evaluated on an ongoing basis.

These articles show the need for, and the benefit of, using checklists to ensure quality PRFs; and the need for further and ongoing research on the topic. The intention of this research was to further this process and develop a checklist tool that is adapted to the South African environment. The intention was to improve the quality of the information recorded on PRFs, to improve the continuum of care and to avoid the problem of important information often being omitted on PRFs, as identified by Spicer and Sobuwa (2014:1).

The importance of medical documentation and PRFs has been discussed in Chapter Two. This research can help address many of the issues regarding medical documentation that were highlighted. While the aim was to develop a checklist to ensure quality PRFs, the outcomes can also be used in a broader context. The checklist and the information that was found to be important when completing a PRF can be incorporated in paramedic training at a formal and informal level. This, together with the feedback to paramedics once the checklist has been used to assess the quality of their PRFs (through self-assessment and though the QA system), will enable paramedics to gain a better understanding of what information is considered important on PRFs. This can improve practices, as the completion of PRFs is seen as the first step towards a culture of excellence (Baert *et al.,* 2018: 431).

8.3. Improvement in medical documentation

Through these processes, the intention is to improve the amount and quality of information recorded on PRFs. This is to combat several of the problems that can occur due to poor patient documentation. As patient documentation is a vital part of patient care, and everyone involved in patient care is responsible for documenting the care that they have provided to the patient, they need to have a clear understanding of patient documentation. This includes knowing what needs to be recorded, when to document and how to document the relevant aspects of patient care (Ngo *et al.,* 2016: 305).

8.3.1. Prevention of Information loss

Despite the importance of medical documentation, the documentation of patient care in critical care areas is often poor (Bergrath *et al.,* 2011: 320). Poor patient documentation is now regarded as poor patient care. Even if appropriate medical care has been provided, incomplete documentation can give the opposite impression. Apart from the increased iatrogenic risk to the patient, poor medical documentation makes it difficult to defend a clinical negligence claim or

an HPCSA disciplinary inquiry. This is because, when any questions arise (this may be from a complaint, during litigation or as a witness in court) about the treatment of a patient in and out of hospital, patient records can give answers to those questions, thus demonstrating the thought processes leading to the diagnosis and treatment options through detailing adherence to the required standard of care (Medical Protection Society, 2014: 3; van Huyssteen, 2016: 84 and 85; Ngo *et al*., 2016: 305) . According to Smith, Boyle and MacPherson (2004: 2422-2439), improved documentation on the PRF improves the usefulness of a PRF. One further reason for improving the information on the PRF is to avoid the issue of information loss which can occur during the handover process (Dawson *et al.,* 2013: 306; Makkink *et al.*, 2018:87). The loss of information can be due to several reasons, including if the information provided by paramedics in a verbal handover is not recorded in the hospital notes, or where vital information is left off the PRFs by paramedics (Dojmi Di Delupis *et al*., 2014: 579; Spicer & Sobuwa, 2014:1). This is problematic, as the documentation of pre-hospital emergency medical care (which is recorded on PRFs) is crucial for the transfer of patient information to practitioners in the emergency department (Bergrath *et al*., 2011: 260). The importance of pre-hospital medical documentation was also demonstrated by Laudermilch *et al*. (2010:6), who found that the failure of EMS personnel to document basic measurements of patient physiology at the scene was associated with a greater-than-twofold increased risk of mortality of motor crash victims in Norway. The checklist that has resulted from this study can hopefully address the deficiencies and challenges mentioned in this section, if implemented and appropriately applied by emergency services management and quality assurance staff.

8.3.2. Complaints and Litigation

In recent years there has been an increase in the number of medical legal cases in South Africa. HCPs, in both the private and public sector, are ever more frequently exposed to medicolegal complications arising from their clinical practice. Medicolegal issues may have a significant impact on a practitioner's wellbeing, as well as their career. These medical legal issues may range from internal complaints by colleagues, to complaints from patients; both of which may progress to a complaint against the practitioner at the HPCSA. In addition to complaints at the HPCSA, litigation cases, where patients are claiming compensation for alleged negligence or injury, and in rare cases criminal charges arising from clinical practice, are possible (Hitzeroth & Howarth, 2021: para 4 line1-13).

Comprehensive and detailed medical records are a critical component of safe and effective healthcare. One of the functions of medical records is to support patient care and the continuation of patient care; as medical documentation allows all staff to see the patient's history and prior medical care, and understand the patient's diagnosis and response to treatment. It also allows for practitioners to synthesise the patients' information in preparation for further evaluation and treatment options (Ngo *et al.,* 2016: 305). Since medical practitioners treat thousands of patients in their careers, they will not be able to remember the relevant clinical details of all the patients they have treated. The practitioner will have to refer to the medical documentation they recorded at the time of treating the patient, to be able to provide written evidence that the patient was treated according to best practice, by showing how the patient was treated, interventions and tests conducted, and the patient's progress and response to treatment (Dehghan *et al*., 2013: 441).

The checklist developed as a result of this study will enable practitioners to determine early in the audit process where PRFs are 'at risk' of recording insufficient detail, giving the original treating practitioner an opportunity to update the missing details as an additional annotated and dated recording.

8.3.3. HPCSA requirement

Medical documentation is a requirement stipulated by the HPCSA, who define a medical record "as a relevant record made by a healthcare practitioner at the time of, or subsequent to, a consultation and/or examination, or the application of health management". The record should contain information about the health of an identifiable individual, recorded by a health care professional, either personally or at his or her direction. The HPCSA cites several reasons for healthcare practitioners to document patient care, including for use as direct evidence in litigation; for occupational disease or injury compensation purposes; for further diagnosis or ongoing clinical management of the patient; for the conduct of clinical audits; and to promote teaching and research (HPCSA, 2016b: 5& 6).

Use of a checklist by clinical managers and quality assurance staff may lead to the identification of areas for staff education to ensure that complete and contemporaneous completion of PRFs is performed as part of good patient care, thereby reducing the risk of disciplinary action.

8.3.4. Quality assurance and research

The measurement of the quality of clinical care, through performance indicators, is key in modern health services (Baert *et al.,* 2018: 432) As mentioned by the HPCSA (2916: 6), both quality assurance and research justify the need for medical documentation. Traditionally in South Africa, response times (how long it takes from when EMS services are called, until they arrive at the scene) have been used as a quality indicator (QI) to reflect the performance of the ambulance service. Recently there have been great advances in developing patient-related QIs that have a direct relation to improving patient management, instead of using response times, which are now seen as an outdated quality indicator. These modern QIs are often based on the patient's condition and vital signs, and are assessed retrospectively, requiring that accurate patient parameters are recorded (Howard *et al.,* 2019b: 185).

Similarly, when conducting research, the collection of data for research purposes requires accurate and reliable information, which is retrieved from the patient documentation. (Kruger *et al.*, 2011:2). When data is being collected from PRFs for research, if the information is incomplete, illegible or inaccurate, it may result in the information being excluded from the research (Brice, Friend & Delbridge, 2008: 187).

Using a checklist, such as the one this study has developed, to educate practitioners to contemporaneously complete their PRFs, will potentially enable better data collection during pre-hospital research and improve the outputs in this rapidly developing field.

8.4. The clinical relevance of the data elements identified in the Delphi survey

8.4.1. Patient demographics

In this section patient identification data is recorded. This is the core of patient-related data and should be collected every time a patient has contact with a health and care organisation. This data allows for not only the identification of the patient, but also for categorisation for the purpose of statistical analysis. This information may include personal information to identify the patient, contact and emergency contact information, and insurance provider information (Medical Technologies, 2011: para1 line 1)

8.4.2. Case/ambulance/crew details

In this section the administrative details of the treating practitioners and the EMS vehicles are recorded. This provides an easy reference to the practitioners who treated the patient. In this section a unique identifying number, often called the ‘case number’, is recorded. This number is used to identify the case and patient.

‘Times and mileages’ detail the times and correlating ambulance odometer readings for when the ambulance crew were dispatched, arrived on the scene, left the scene and arrived at the hospital. These are referred to when there is a question of delay. Also, important in South Africa, the billing structure is calculated based on distance travelled or time spent with the patient (Council for Medical Schemes, 2006: 3-6).

8.4.3. Patient background /history

This refers to information gathered during an interview with the patient, which focuses on the patient’s health status (Sanders & McKenna, 2002: 433). A patient’s medical history is one critical aspect of diagnosis. It is estimated that between 70% to 90% of medical diagnoses can be determined by the history alone. While the patient’s history alone is not adequate to make a final diagnosis, it will guide the physical examination and the types of tests that many be required. The patient’s history needs to be recorded to avoid information loss, especially if the patient has several complaints, or is treated by several different healthcare practitioners. The patient’s medical history may also limit unnecessary tests and investigations (Muhrer, 2014: 31 & 32).

8.4.4. Injuries/illness/MOI and MOI from a motor vehicle crash

The mechanism of injury (MOI) describes how, with what force, and on which part of the body, the patient was injured. This may indicate the type and severity of the patient’s injuries, which can guide the examination and treatment of the patient (Fraizer, 2019: para 17 line 1-5).

8.4.5. Vital signs

These are objective assessments of the physiological functions of the body. They are often one of the first assessments performed on the patient and can be used to guide patient triage and treatment. Traditionally, the vital signs consist of temperature, pulse rate, blood pressure, and respiratory rate. However, there are a variety of parameters that may be useful to assess the patient. A patient’s condition is monitored through their vital signs and changes in the patient’s

vital signs and the various monitored parameters could indicate a change in the patient's condition (Lockwood, Conroy-Hiller & Page, 2004: 1-38).

8.4.6. Patient handover

This is when responsibility for patient diagnosis, treatment, or ongoing care is transferred from one healthcare professional to another (Goldberg *et al*., 2017: 14). In this section the paramedics confirm the patient care detailed on the PRF by signing the PRF. The receiving HCP signs as acknowledgment of taking over responsibility for all aspects of patient care. This official transfer of responsibility of patient care is an HPCSA requirement and the person taking over responsibility for the patient must assume full responsibility for the patient (HPCSA, 2016a: 27).

8.4.7. Airway management

A compromised airway places a patient at significant risk of hypoxia and hypercapnia. Patients in the pre-hospital environment may require procedures to maintain the patency of their airways to ensure oxygenation. These procedures are not without their risk and documentation of airway procedures and assessments is required (HPCSA, 2018: 122- 135).

8.4.8. Cardiopulmonary resuscitation

Documentation of the resuscitation process or any medical treatment is an important part of medical care, as already discussed. There are, however, several additional benefits of recording details of a resuscitation. Resuscitation is a complex process: the outcome of cardiac arrest and cardiopulmonary resuscitation (CPR) is dependent on critical interventions, particularly early defibrillation, effective chest compressions, and assisted ventilation. Being able to assess that these interventions (and others) were provided correctly during patient care, and being able to provide feedback on the management of the resuscitation to the practitioners involved, can improve the skills of the providers and identify problems or gaps that require intervention, possibly though additional training. Resuscitation is the focus of many research studies, aimed at improving survival rates from cardiac arrest. These studies require consistent reporting and terminology and specific data parameters from resuscitations, which contribute towards the research. These parameters are collected retrospectively and need to have been recorded on the patient's medical notes. An example is the data elements described on the

Utstein consensus document, which is internationally validated and WHO approved (Idris *et al.,* 1996:2324-2436).

8.4.9. Ventilator settings

There have been significant developments with regard to the design, manufacture and use of ventilators. Ventilators are now small, portable, complex devices, with multiple different ventilation functions and settings. Based on the need for ventilation, basic settings such as the respiratory rate and concentration of oxygen, need to be set and monitored, together with more advanced settings, including the mode of ventilation. Monitoring the patient (and the associated documentation) is vital, as the settings for the ventilator are dynamic and need to be adjusted, based on the patient's condition and response to treatment. There are also side effects to mechanical ventilation which need to be monitored for and avoided. Parameters can be set on the ventilator which, if exceeded, results in an audible alarm to alert the HCP of a potential problem. All of these aspects require documentation over-and-above routine patient monitoring and assessment (Miller, 2013: 1- 9).

8.5. Development of a checklist

While the common goal of most checklists is similar, the design and methodology used to design the checklist needs to taken into account during the design phase. Although checklists many seem simple, they incorporate a vast amount of specific knowledge which is relevant to the topic being evaluated. Due to there being different types of checklists, which have different features, purposes and objectives, a systematic design process is necessary to avoid poorly designed and misapplied checklists (Martz, 2010: 215).

8.5.1. What is a checklist and how are they used?

A checklist is defined by Scriven (2005: 1) as "a list of factors, properties, aspects, components, criteria, tasks, or dimensions; the presence, or reference, or amount of which are to be considered separately, in order to perform a certain task". Checklists are an organised tool that are used as a cognitive aid to guide users through a process by outlining criteria that need to be considered during a process. They simplify conceptualisation and recall of information by categorising and delineating items as a list. The list of action items is arranged in a consistent manner which allows the evaluator to record the presence or absence of the individual items listed (which are important information or data elements that need to be considered during the

process been undertaken), in a constant and repeatable manner. They also help achieve standardisation of the process (outcomes can be reproduced, with different operators, despite their individual and collective weakness) and enhance the objectivity of the assessment (Kramer & Drews, 2017: S6). The use of checklists can also contribute to an improvement in the validity, reliability and credibility of an evaluation (Martz, 2010: 215).

Checklists have a wide range of applications. This has resulted in them being used in both the medical and nonmedical industries (the airline industry and the military) where there is a high-stress environment (resulting in human error and errors of omission), and where reliable, repeatable and objective outcomes are required. (Hales *et al.,* 2008: 22; Stufflebeam, 2016: 72). Checklists reduce the chances of forgetting something important and reduce the need to rely on memory to complete a task, especially in rare, highly dynamic and unpredictable situations (Turkelson *et al.,* 2020: 149; Scriven, 2005:1-11; Hales *et al*., 2008: 22). Checklists have been shown to be effective in various aspects of performance improvement and error prevention by guiding users though accurate task completion. In the medical field, checklists are important tools, having been shown to decrease morbidity and mortality; improving the quality of medical care by ensuring a consistent standard of care; improving patient and provider safety; and improving adherence to evidence-based best practice in many clinical areas (Hales *et al*., 2008: 22; Krammer & Drews, 2017: S6). The use of checklists reduces the influence of the 'halo effect', which is the tendency of a highly valued feature to influence the judgement of merit. This is avoided with the use of a checklist as it forces the evaluator to consider each item separately (Scriven, 2005: 4).

Checklists are commonly used as either mnemonic devices or evaluative tools. Mnemonic checklists serve as a reminder system by providing an organisational framework for the quick recall of critical information, items, tasks or behaviours, typically omitted in periods of stress and crisis. Evaluative checklists, used for performance measurement, are used for assessment or evaluation, and provide standard guidelines for the evaluators, who are conducting an assessment. The standardisation of the guidelines increases credibility and consistency among evaluators (Hales *et al.,* 2008: 22).

The different tasks that a checklist guides a user through have led to the development of several kinds of checklist, each with the intention of guiding the user through a process, but with a different direct purpose. There are four broad types of checklists:

- Checklists that group items, tasks, or certain criteria into related categories, with no importance placed on the order of the items, are termed ‘laundry checklists’. These checklists are often mnemonic in nature, with the focus on the criteria in the checklist. The validity is not affected by the order in which the items are found. It is, however, important that each point is checked and each point on the checklist is seen as equally important.

- When the order, grouping and overall flow of the items is required to obtain a valid outcome, the checklist is called a ‘sequential checklist’. With sequential checklists, the order of the items on the checklist is important, with one item on the list needing to be checked before the next item can be assessed.

- ‘Diagnostic checklists’ have criteria formatted as a ‘flow chart’. These checklists serve as decision aids for the user and are used to draw broad conclusions. With flowchart/ diagnostic checklists, each step includes a decision point, where the user must make a decision based on the situation on hand, which leads to a different branch of checklist items based on the decision of the assessment and/or task status.

- ‘Criteria of merit checklists’ (COMlist) are commonly used for evaluative purposes as they include a rating and ranking of attributes (data elements). The order, categorisation and flow of information is important on these checklists for the objectivity and reliability of the conclusions drawn. The importance of each criterion is weighted and users give scores using a standard scale to evaluate each criterion. The sum of scores is used to measure merit (Hales *et al*., 2008: 22; Krammer & Drews, 2017: S8; Scriven, 2005: 1).

8.5.2. Adverse or negative effects of checklist use

While a standard protocol for checklist development has not been developed and validated, the development of checklists requires a comprehensive and systematic approach. This is because ineffective or non-standardised methodologies for checklist design, development and implementation can led to inconsistent checklist use, where the use of the checklist, instead of being a tool to assist the user, becomes a hindrance to the user by adding complexity to the task. Another problem contributing to inconsistent use, is ‘checklist fatigue’, which is when a checklist is too long or difficult to read and so it is not used, or not used correctly. On the other hand, if a checklist is too short or does not include the required detail, it may have no value at

all. A clear strategy is therefore required when designing a checklist. Despite the potential hazards that could result from the use of checklists, there is no published data indicating adverse or negative effects from using checklists (Hales *et al*., 2008: 22; Krammer & Drews, 2017:S8; Verdaasdonk *et al.,* 2009: 716).

8.5.3. Development and formatting of a checklist.

Regardless of the type, focus, purpose or complexity of a checklist, what they all have in common is they remind the user what needs to be assessed (Rousey & Sharma, 2016: 2582). Checklists need to incorporate a large amount of specific knowledge about a particular event in a clear manner, which facilitates the evaluation of a task (Martz, 2010: 215) Thus, checklists need to have a logical structure with data elements that apply to a wide range of assessment approaches (Stufflebeam, 2004: 1-6). The following points need to be considered when designing a checklist:

- Context
    - When will the checklist be used?
    - directions for using the checklist
    - where to get help for using the checklist
- Content
    - Checklist content must be complete
        - reflecting institutional policies
        - having all the necessary information to address the topic
    - Content should be technically correct
    - Language should be used consistently
    - Acronyms should be spelled out on first reference
    - Each item on the list should only include one activity
- Structure
    - Similar items should be grouped together and have a logical and functional order.

    - Items should be numbered.
    - There should be visual breaks.
        - There should be spaces between different sections, making it clear where one items starts and ends
    - Important information should be highlighted.
- Images
    - If images are used, they should be to the left of the page.
    - Explanatory text should be on the right or under the image.
    - The image must serve an obvious purpose and only contain essential information.
- Usability
    - Checklists should not be onerous and time consuming.
    - Checklists should only include points of major importance.
    - Validation of the checklist should occur where possible (Hales *et al*., 2008: 25; Bichelmeyer, 2003: 1).

Although the formatting requirements and the general process that needs to be followed when developing checklists can be guided by the literature and expert consensus, there are certain aspects that need to be considered when developing checklists for use in the medical field. These may include considering the time available for using the checklist, the conditions or environment where the checklist is being used, and still enabling clinical judgment while using the checklist. The environment in which a checklist will be used also needs to be considered as this may affect the way in which it is used, or its design. If checklists are used in an environment where they were not designed for use, their use may become inappropriate. If the environment has changed and the use of the whole checklist is not ideal, the key points or items, which are prone to error, should be given priority (Hales *et al.,* 2008: 28).

8.5.4. COMlists

Checklists are designed for a clearly defined action or purpose and the goal of a checklist will change and define its structure and content (Hales *et al.,* 2008: 25). The checklist design that

has been used to fulfil the purpose of this research is the COMlist type checklist. While all checklists are used to remind and guide users, a key feature of COMlists is that they can be used to evaluate by assessing the overall merit, worth or importance of something, as they use a scoring scale, which is given to each criterion; which, when totalled, is used as a measure of merit. Data elements can also be given weightings, based on the importance of the criteria. Checklists in general, and particularly COMlists, reduce the influence of the 'halo effect', which is the tendency to allow the presence of a highly valued feature to influence judgement. The reduction of the halo effect when using a checklist is achieved (but may not be completely reduced) by forcing the evaluator to consider each criterion separately. The Rorschach effect, the tendency to see what one wants to see in mass data, is also reduced with the use of a COMlist. The reason for this is similar to the reason for the reduction of the halo effect, and is because the users are forced to judge each criterion separately (Scriven, 2005: 4).

When developing evaluative checklists, it must be remembered that these checklists are aimed at both the evaluators and persons served by the evaluators. This is because the evaluation checklist will result in clearer understandings of evaluation needs and planned processes and better agreement on evaluation matters; and are a reliable way of recording assessments and agreements (Stufflebeam, 2016: 74).

As discussed, all checklist development requires a systematic and logical approach. However, COMlists can be difficult to develop and validate because they must meet requirements that do not apply to the design of other types of checklists. There are several additional attributes that COMlists are required to have. These include:

- The list must be complete, with no omissions that will affect evaluation or completion of the task.
- The items on the list must be continuous and flow from one point to the next.
- Data elements should be commensurable (common items must be grouped together).
- The list must be clear and concise, with no superfluous or duplicated data elements.
- It must be measurable (Scriven, 2005: 3-5).

One of the most important aspects of evaluation checklists, like COMlists, is being able to assess the overall merit or importance of something. This is achieved by the rating or score

which is associated with each item of assessment on the COMlist. While all items on the checklists are there to ensure that the designed effect is achieved, certain items or steps may be deemed to be more important than others, yet they have the same score value. This is where weighting of items comes into effect. Items that are deemed to have greater importance on the checklist can be given a factor, or weighting, of 1.5 or 2 greater than other items, which have a weighting of one. The use of equal rating is preferred, and should only be abandoned if there is overwhelming evidence validating the change. Justifying the different weightings may be difficult; and if weighting is applied, it is recommended that a rating of 1.5 be used, as a weighting of 2 is difficult to justify. It can have a huge effect on the scoring as large differences in weighting can result in inconsistent evaluation. If weighting is used, it must be discussed with the key stakeholders; it must be determined if it will be used throughout the checklist or just at certain intervals; and it must be tested (by applying the checklist) to assess the effect of different weightings (Scriven, 2005: 10-11).

8.6. Development of a checklist to ensure quality PRFs

The development of checklists needs to be guided by the literature and expert consensus (Hales *et al.,* 2008: 28). This is the reason for conducting the scoping review and the Delphi survey. This means that the questions on this checklist have the necessary information to address the topic, are important, and are technically correct.

Hales *et al.'s* (2008:25) and Bichelmeyer's (2003:1) recommendations for designing and formatting a checklist, as discussed earlier in this chapter, were used to guide the development of this checklist:

- Context
    - The checklist can be used to assess already completed PRFs.
    - The checklist has a guideline for users, explaining the intended use of the checklist.
- Content
    - This checklist is not designed to be used by a specific ambulance service. Its focus is on assessing the medical information recorded on a PRF, regardless of the ambulance service that is using it. Therefore, it doesn't specifically reflect any

particular ambulance service's policy, but includes all the necessary items to address the topic of assessing medical documentation on a PRF.

  - The content was based on the results of the Delphi survey.
  - The grammar and acronyms are used consistently.
  - Each item/ question only assesses one point.

- Structure
  - Items assessing a similar topic are grouped together.
  - The Items are numbered, to help with a logical and structured order and flow.
  - The different sections of the checklist have visual breaks.

- Images
  - This checklist does not include any pictures or images.

- Usability
  - The design and flow of the checklist guides the user through the points of assessment, to avoid the checklist being onerous and time consuming.
  - Some of the points on the checklist are not routinely assessed, but will only be assessed 'if applicable'.

8.7. Use of the checklist to ensure quality PRFs

8.7.1. Explanation of each element on checklist:

Each element of the checklist explains what the element is assessing and how it should be assessed. This guides the checklist user and standardises the way the checklist is used by avoiding inter-user variability and personal opinion. The users must familiarise themselves with the explanations (Appendix E) before using the checklist and must refer to the explanations if needed.

8.7.2. When and how to use the checklist

The intended users of a checklist, and when it must be used, need to be specified (Bichelmeyer, 2003:1). The general directions on how to use a checklist are also required. This checklist is

not designed to be used by the paramedic completing the PRF. The intended users of the checklist are personnel involved in the quality assurance of PRFs. This includes staff supervisors and dedicated quality assurance personnel.

The checklist is divided in to eleven separate assessment sections, based on the topics being assessed. Each element being assessed is allocated one point if the criterion being assessed is present. If the point that the criterion is assessing is not present on the PRF, or is inadequately recorded, a score of zero for that criterion should be recorded. The scores from each section of the checklist are totalled, and at the end of the checklist all the scores from the different sections are totalled.

8.7.3. Instructions for use of checklist

A new checklist must be used for every PRF that is audited. The user will use the checklist to assess the criteria under each section, allocating one or zero, based on the assessment of the data elements. The score for each section will be totalled at the end of each section. Once the checklist has been completed the scores from each section will be totalled.

Criteria and sections, which are marked with ‘if applicable’ are only to be assessed if they are applicable to the patient. These criteria do not apply to all patients, as they focus on the specific management of certain patients. For example, not all patients require intubation, but if they are intubated there is a section for assessment specifically relevant to airway management. If these sections are assessed, the total score for that section will increase proportionally, and the total score for the checklist will increase.

The checklist can be used to assess how much information has been recorded on a PRF. To determine the figure which indicates that a PRF has been adequately completed, and thus passes the quality assessment, is a subject for further research.

8.8. Conclusion

The importance of medical documentation and the subsequent need for a checklist to ensure the quality of PRFs has been discussed. The function of checklists, and how the different types of checklists may be used, has been discussed. The details of how the checklist for this research was developed have also been described and an example is presented here to complete this aspect of the research project.

CHAPTER NINE – SUMMARY, RECOMMENDATIONS AND LIMITATIONS

9.1. Summary

Patient treatment information is often lost during the patient handover process. This poses a significant risk to patient care and safety. The completion of medical documentation is now seen as part of patient care and its purpose is to limit the information that can be lost during patient handover by creating a permanent record of this information. However, medical records are often not completed during critical situations (Bergrath *et al.,* 2011: 320).

This research sought to develop a checklist to ensure the quality of PRFs. This has been achieved by using several methods to identity important data elements, to form part of this checklist to be used in the quality assessment process when reviewing PRFs. First, a scoping review was undertaken to identify data elements that, according to the literature, are seen as important for the completion of a PRF. Then a three-round Delphi survey was conducted to identify the data elements that may be important and specific to the South African context. The importance of the identified data elements was then rated by the participants in the Delphi survey. The data elements that were rated as important were then used to develop a checklist which can be used to ensure quality PRFs by assessing the quality of the information that has been recorded on the PRF.

9.2. Recommendations

- Further research is required to determine when to use the checklist to ensure quality PRFs, and what scores would indicate whether the PRF has been adequately completed.
- Further testing and validation of the checklist by a focus group is required.
- Implementation of the checklist at an operational level is necessary, to assess whether the checklist feedback to practitioners, via quality assurance systems, improves the amount and quality of information that is recorded on a PRF.

9.3. Limitations

There are several limitations to this research that have been identified. In general there are inherent limitations when using scoping reviews, including using studies with the risk of bias, or

other short-comings; as there is more focus on how broad the study search is, rather than the depth/methodology of the studies (University of Texas Libraries, 2021: para 6 lines 1and 2).

While there has been an increase in the use of Delphi surveys, there is still uncertainty in determining when an exact level of consensus has been reached in a Delphi survey (Holey *et al*., 2007; 2). The number of rounds needed to run a Delphi survey and what constitutes an 'expert' to participate in the survey are issues which are not well defined and subject to change, based on the research being conducted (McMillan, King & Tully, 2016: 658-662).

Most of the respondents in the Delphi survey were pre-hospital practitioners, and the opinions of hospital-based receiving providers may not have been adequately captured. While the majority of the participants who participated in the Delphi survey are currently based in KZN, the participants have experience from all the provinces in South Africa, as well as international experience.

There has been no validation of the checklist, as mentioned in the recommendations. The checklist has not been tested by a focus group or implemented operationally.

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Appendix A

DUT
DURBAN UNIVERSITY OF TECHNOLOGY

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http://www.dut.ac.za/research/institutional_research_ethics

www.dut.ac.za

28 November 2019

Mr R B McKenzie
40 Frederick Avenue
Bluff
Durban

Dear Mr McKenzie

Development of a checklist for assessing completion of Patient Report Forms by paramedics in South Africa

I am pleased to inform you that Full Approval has been granted to your proposal.

The Proposal has been allocated the following Ethical Clearance number **IREC 172/19**. Please use this number in all communication with this office.

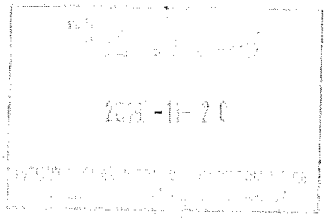
Approval has been granted for a period of **ONE YEAR**, before the expiry of which you are required to apply for safety monitoring and annual recertification. Please use the Safety Monitoring and Annual Recertification Report form which can be found in the Standard Operating Procedures [SOP's] of the IREC. This form must be submitted to the IREC at least 3 months before the ethics approval for the study expires.

Any adverse events [serious or minor] which occur in connection with this study and/or which may alter its ethical consideration must be reported to the IREC according to the IREC SOP's.

Please note that any deviations from the approved proposal require the approval of the IREC as outlined in the IREC SOP's.

Yours Sincerely

Professor J K Adam
Chairperson: IREC



Appendix B Letter of information and consent form

Appendix B

LETTER OF INFORMATION

Title of the Research Study:
Development of a checklist for assessing completion of Patient Report Forms by paramedics in South Africa

Principal Investigator/s/researcher:
Robert Mckenzie. BTech: Emergency Medical Care

Co-Investigator/s/supervisor/s:

Robin Pap. MScMed
Professor Hardcastle. M.B., Ch.B. (Stell); M. Med. (Chir) (Stell), FCS (SA), Trauma (HPCSA), PhD (UKZN)

Brief Introduction and Purpose of the Study:

Currently there is limited Emergency Medical Services (EMS) specific documented advice for the completing of a PRF and the majority of information and advice that is available is aimed at Doctors and nurses. There is limited information to specifically guide paramedics, (together with a lack of training) as to what is optimally recorded on a PRF. It's currently at the paramedic's discretion as how and what is recorded on the PRF. Due to limited knowledge and there is currently there is no standardized manner of assessing how efficiently the PRF has been filled in.

This research intends to develop a checklist that will indicate what information needs to be recorded on the PRF and can then be used to assess how well it has been recorded. The check list can be used to evaluate PRFs for errors and collectedly to determine trends or common problems encountered on the PRFs. These trends can be corrected through the training of paramedics, where the checklist can be used as a training rubric.

Outline of the Procedures:

A three-round Delphi study will be conducted. In round one you will give input as to what information in addition to the information sourced during a scoping review, should be recorded on a PRF. In rounds two and three, consensus will be sought from you and the other participants as to what is the most important information that is required to be recorded on a PRF. you will then use a nominal Likert scale to indicate how importance the identified information is. The information that is agreed upon by you and the other participants will form criterion for assessment on the checklist.

Risks or Discomforts to the Participant:
There is no risk to you during the completion of the study.

Benefits:
Your participation in this study is an essential component towards developing a system of assessing the quality of care delivered by paramedics. The study will assist in developing a framework for further research into clinical governance as well as for patients, through the receipt of effective care

Reason/s why the Participant May Be Withdrawn from the Study: You have the right to withdraw from the study at any time. Should you wish to with draw, please notify the researcher following which all evidence of your participation will be destroyed, if you so desire, alternatively you can elect to allow the use of any already submitted data, but withdraw from further participation.

Remuneration: Participation in the study is free and will involve no payment for participation.

Costs of the Study: The costs of the study are borne by the researcher.

Confidentiality:
The study has received ethical approval from the Durban University of Technology's Ethics Committee (172/19)

The details of your participation will be known only to the researcher and supervisors and all information will be kept confidential. Your participation cannot be traced back to you as the documents are submitted anonymously.

Research-related Injury:
There is no risk to you during the completion of the study.

Persons to Contact in the Event of Any Problems or Queries:

If you have any queries or require further information, please contact the researcher Robert Mckenzie
Email: robertmckenzie.masters@gmail.com (tel no. 0763218238),

Or my research Supervisors can be contacted on:
Robin Pap: R.Pap@westernsydney.edu.au
Dr Hardcastle hardcastle@ukzn.ac.za

or

The Institutional Research Ethics Administrator on 031 373 2375. Complaints can be reported to the DVC: Research, Innovation and Engagement Prof S Moyo on 031 373 2577 or moyos@dut.ac.za

CONSENT

Statement of Agreement to Participate in the Research Study:

- I hereby confirm that I have been informed by the researcher, R. Mckenzie, about the nature, conduct, benefits and risks of this study - Research Ethics Clearance Number: 172/19
- I have also received, read and understood the above written information (Participant Letter of Information) regarding the study.
- I am aware that the results of the study, including personal details regarding my sex, age, date of birth, initials and diagnosis will be anonymously processed into a study report.
- In view of the requirements of research, I agree that the data collected during this study can be processed in a computerized system by the researcher.
- I may, at any stage, without prejudice, withdraw my consent and participation in the study.
- I have had sufficient opportunity to ask questions and (of my own free will) declare myself prepared to participate in the study.
- I understand that significant new findings developed during the course of this research which may relate to my participation will be made available to me.

_____	_____	_____	_____
Full Name of Participant	**Date**	**Time**	**Signature / Right Thumbprint**

I, _____ (name of researcher) herewith confirm that the above participant has been fully informed about the nature, conduct and risks of the above study.

_____	_____	_____
Full Name of Researcher	**Date**	**Signature**
_____	_____	_____
Full Name of Witness (If applicable)	**Date**	**Signature**
_____	_____	_____
Full Name of Legal Guardian (If applicable)	**Date**	**Signature**

Appendix C- comments from participants from the first round of the Delphi
Patient Demographics
Hospital or clinic file number
Nationality
Patient's contact information
Patients postal address.
Two different family contact numbers must be provided.
Medical aid details
Family contact details should be specific such as family cell phone number and/or address
District or Region
Case/ Ambulance / Crew details
Call completion reasons (patient transported to hospital/ no patient found patient / refuses treatment etc)
Ambulance dispatch time
Location of patient/ scene address
Signature of pre-hospital providers
Time Available for Next Case / time ambulance complete and available
HPCSA number
Time of first patient contact
Case type - primary call or IFT;
Reason for delay eg, rerouted, came across an accident, breakdown, ect
ambulance mobile to scene time
if call cancelled - reason for cancellation
Patient background /history
severity of pre-existing conditions
Social living circumstances
Time the ambulance was called
Any change in recent behaviour (meds. food activity etc)
traditional and homeopathic medicine
Surgical history
Incorporate AVPU, &
Family history
living will/DNAR orders
Disability
SAMPLE with each letter in the acronym detailed
serial pain scores
Pain score
Type of pain
Injuries/illness/MOI
There appears to be a large focus around trauma and recording of details surrounding an MVA. Perhaps that needs to be it's own sort of AR form including emergency vehicles and destined hospitals. I feel this is generally to capture the essence of the chief

complaint/MOI rather than provide specific details. Perhaps my understanding of your heading and reflection of past PRFs aren't aligned with what you're asking
FAST test positive or negative & onset time of injury/illness
Various types of injuries. Eg. Falls (same level or from height) etc
? Ejection, blunt injury/ GSW / stabbing Etc
Location of patient found in compartment eg. Rear Passenger Seat / Front Driver Seat etc.
Was patient ejected or did patient self-extricate and was there other vehicles involved
Position of patient in vehicle during impact
Velocity/calibre of bullet type/length of knife
Location of patient in vehicle, i.e.: driver
Type of Assessment tool and score e.g., qSOFA score
Patient movement. Did they walk, by stretcher, stair chair and so forth
Vital signs
Respiratory effort,
pulse characteristics,
ART
Lung sounds. air entry
fluid input and output
Level of sensation in case of paralysis or neurological deficit
Respiration rhythm
Skin turgor pitting oedema subcutaneous emphysema
new born-APGAR, weight, temperature of incubator,
Hb
Pre-hospital arterial blood gas analysis
GCS broken down further,
Vitals should be repeated every 5min for critical patients with continuous monitoring.
Three sets of vitals, on scene, en route to hospital, before handover, witness of patient refusal
timing of vitals
Treatments/ procedures / investigations
Physical examination findings
thrombolytic checklist
Any treatment received by anther practitioner
location in the hospital?
Abdominal assessment including peristaltic sounds and assessment stability etc. of pelvis
Time of treatment, would leave out lung sounds assessment and include a secondary survey, also consider neuroprotective interventions done, what about disability procedures done and exposure and environmental control procedures done
Secondary survey,
Devices or manoeuvres used
POCUS/ eFAST
vital 5- 10 mins

if patient was paced what the pacing rate and voltage was
Patient hand over
Qualification of person handing over and qualification of receiving practitioner including HPCSA number or nursing council registration
How would we include an alert for the hospital team if we suspect abuse? Perhaps it's something that could be added here in order to discreetly alert the receiving practitioner?
Level of qualification of both parties and possibly Corp numbers or HPCSA numbers
Time of handover. Free time.
Position of person receiving patient
clarifications raised during handover or any concerns
Ward and or bed no
Refusal of services, witnesses.
Maybe add practice number of Doctor receiving patient
list of Personal belongings (e.g., cell phones, wallets, watch etc) & meds brought with patient
Receiving unit within the facility
equipment left behind to be collected later
Airway management
details of airway management and airway procedures preformed
RSI/Intubation check sheet (from preparation to confirmation)
ETT Depth secured/ ETT placement at teeth before and after transport.
No of intubation attempts
Plan for the airway prior to induction
Successful/Not successful
RSI facilitated (yes/no)
Patient's response to airway management
Suction requirements
In general, on the PRF
Patient refusal may also not be via patient but via guardian etc
Legalities around PRF writing and patient rights. We somehow need to show students the relatability of vital sign changes to the conditions (I would call it pattern recognition and interpretation). Systems and support structures we can activate for the patient (abuse, death counselling, etc)
Ensure patient is comfortable and calm. Cover patient’s dignity.
Time and millage annotations are accurate and true reflection of the actual case times and mileages
What about in situations where PUTS the PRF, repeating vitals every 20 minutes is questionable (are red code patients only ever having vitals every 20 minutes)
If applicable: CPR
Witnessed/unwitnessed arrest,
rhythm during transportation and rhythm at handover. Was ROSC achieved? What was post ROSC management?
Ambient weather conditions around the patient at time of cpr.
FiO2

was Bystander CPR was being provided before EMS arrival on scene (duration of bystander CPR),
Rhythm changes documented
Estimation how long patient was unresponsive before CPR
Rhythm changes documented
suspected cause of arrest (H's and T's),
First presenting rhythm
Use of Autopulse
Medication administered
timelines for initiation, CPR milestone and duration of CPR
Was a AED or defibrillation Monitor used
One rescuer CPR or Two rescuer CPR
Was the cardiac arrest witnessed or not, manual or device compression, time of commencement/termination of CPR
Patient's response to CPR
ECG analysis before defibrillation (VF/PEA etc)
Time CPR was initiated; Time CPR was stopped
Maybe "Time of ROSC" instead of "Occurrence of ROSC"
ECG rhythm during CPR (If available)
times (for all evaluations and treatments) during CPR
airway manoeuvres and oxygenation, airway adjuncts, procedures done
if E.T. Tube was placed detail time that CPR became Asynchronous
ETCO2 reading during CPR
If applicable: Ventilator settings
Respiratory rate.
pPlat pressures (measured)
Insp time and exp time /I:E ratio
ETCO2 readings (and morphologies if possible),
Percentage FiO2
re-assessment of patient/ventilator (DOPES)
Tidal volume
CPAP / another thing needs to include is if patient was paced what the pacing rate and voltage was
Mode of ventilation cmv/simv etc
PEEP
Mode of ventilation cmv/simv/cpap etc
I:E ratio, plateau pressure , control method, trigger , exp tidal volume vs insp tidal volume, autopeep
NIV/invasive ventilation?
Ventilation graphs observed
modality dependant, PS above PEEP, alarm pressure etc
trigger flow
Respiratory rate

Appendix D - Results from rounds two and three of Delphi survey								
	Scoring for round two of Delphi				**Scoring for round three of Delphi**			
	level of agreement				level of agreement			
	agree	neutral	disagree	action	agree	neutral	disagree	action
Patient Name	96,5	3,6	0	Incl on checklist	not for reassessment			incl on checklist
Patient Surname	100	0	0	incl on checklist	not for reassessment			incl on checklist
Patient Age	96,4	3,6	0	incl on checklist	not for reassessment			incl on checklist
Patient Sex	100	0	0	incl on checklist	not for reassessment			incl on checklist
Patient's date of birth (DOB)	89,3	10,7	0	incl on checklist	not for reassessment			incl on checklist
Patients Identity number	67,9	28,6	3,6	incl in 3rd round	80	15	5	incl on checklist
Patients Race	71,4	17,9	10,7	incl in 3rd round	75	10	15	remove
Patient Nationality	60,7	21,4	17,9	incl in 3rd round	50	30	20	remove
Patients Address	82,2	17,9	0	incl on checklist	not for reassessment			incl on checklist
Patient's contact information	92,9	7,1	0	incl on checklist	not for reassessment			incl on checklist
Patients postal address	50	28,6	21,4	incl in 3rd round	65	10	25	remove
Family contact details	89,3	3,6	7,1	incl on checklist	not for reassessment			incl on checklist
Two different family members contact details	50	17,9	32,1	incl in 3rd round	50	30	20	remove
Patients GP's address	35,7	25	39,3	incl in 3rd round	30	40	30	remove
Hospital or clinic file number	60,7	17,9	21,4	incl in 3rd round	65	20	15	remove
Medical aid details	78,6	14,3	7,2	incl on checklist	not for reassessment			incl on checklist
District or Region	85,7	7,1	7,2	incl on checklist	not for reassessment			incl on checklist
Date	100	0	0	incl on checklist	not for reassessment			incl on checklist
Case number	100	0	0	incl on checklist	not for reassessment			incl on checklist
Names of Pre-hospital providers	100	0	0	incl on checklist	not for reassessment			incl on checklist

Qualification of Pre-hospital providers	89,3	7,1	3,6	incl on checklist	not for reassessment			incl on checklist
HPCSA numbers of Pre-hospital providers	96,4	3,6	0	incl on checklist	not for reassessment			incl on checklist
Ambulance call sign or registration number	100	0	0	incl on checklist	not for reassessment			incl on checklist
Type of dispatch/Case type - primary call or IFT;	100	0	0	incl on checklist	not for reassessment			incl on checklist
Time the call was received at the Communication Centre	85,7	10,7	3,6	incl on checklist	not for reassessment			incl on checklist
Time Ambulance was dispatched	100	0	0	incl on checklist	not for reassessment			incl on checklist
Time ambulance arrived on scene	100	0	0	incl on checklist	not for reassessment			incl on checklist
Time of first patient contact (on scene time might not be the same as first patient contact)	82,1	14,3	3,6	incl on checklist	not for reassessment			incl on checklist
Time leaving scene	100	0	0	incl on checklist	not for reassessment			incl on checklist
Time patient arrived at hospital	100	0	0	incl on checklist	not for reassessment			incl on checklist
Type of transportation	89,3	10,7	0	incl on checklist	not for reassessment			incl on checklist
Reason for delay eg, rerouted, came across an accident, breakdown, etc	96,4	3,6	0	incl on checklist	not for reassessment			incl on checklist
Location of patient/ scene address	100	0	0	incl on checklist	not for reassessment			incl on checklist
Receiving hospital	100	0	0	incl on checklist	not for reassessment			incl on checklist
Mileage mobile to scene	89,3	7,1	3,6	incl on checklist	not for reassessment			incl on checklist
Mileage at scene	89,3	7,1	3,6	incl on checklist	not for reassessment			incl on checklist

If call cancelled - reason for cancellation	92,9	3,6	3,6	incl on checklist	not for reassessment			incl on checklist
Call completion reasons (patient transported to hospital/ no patient found patient / refuses treatment etc)	96,5	3,6	0	incl on checklist	not for reassessment			incl on checklist
Sympatientoms/ Chief complaints	100	0	0	incl on checklist	not for reassessment			incl on checklist
Allergies	100	0	0	incl on checklist	not for reassessment			incl on checklist
Past and present patient history (medical/ surgical history/disability/co morbidity/ severity of pre-existing conditions/family history)	100	0	0	incl on checklist	not for reassessment			incl on checklist
Medications patient is taking	96,4	3,6	0	incl on checklist	not for reassessment			incl on checklist
Patients last meal/drink consumpatiention	89,3	7,1	3,6	incl on checklist	not for reassessment			incl on checklist
Events prior to calling ambulance.	100	0	0	incl on checklist	not for reassessment			incl on checklist
Any change in recent behavior (meds/ food/ activity etc)	89,3	10,7	0	incl on checklist	not for reassessment			incl on checklist
Time of onset of sympatientoms	100	0	0	incl on checklist	not for reassessment			incl on checklist
Patient priority/ condition	100	0	0	incl on checklist	not for reassessment			incl on checklist
Time the ambulance was called	78,5	17,9	3,6	incl in 3rd round	95	5	0	incl on checklist
Conditions where patient was found/ Social living circumstances	78,6	14,3	7,2	incl in 3rd round	95	5	0	incl on checklist
Incorporate AVPU	92,9	3,6	3,6	incl on checklist	not for reassessment			incl on checklist

Living will/DNAR orders (if applicable)	75	17,9	7,2	incl in 3rd round	80	20	0	incl on checklist
Pain score	96,4	0	3,6	incl on checklist	not for reassessment			incl on checklist
Serial pain scores	89,3	7,1	3,6	incl on checklist	not for reassessment			incl on checklist
Type of pain	82,1	14,3	3,6	incl on checklist	not for reassessment			incl on checklist
Mechanism of injury/ nature of Illness	100	0	0	incl on checklist	not for reassessment			incl on checklist
Injuries sustained and anatomical location (if applicable)	100	0	0	incl on checklist	not for reassessment			incl on checklist
Patient mobility/ Patient movement. is the patient walking? Did they require, stretcher, stair chair etc?	96,4	3,6	0	incl on checklist	not for reassessment			incl on checklist
Blood loss in the field (quantity)(if applicable)	92,9	3,6	3,6	incl on checklist	not for reassessment			incl on checklist
Death of an occupant in the same vehicle	89,3	7,1	3,6	incl on checklist	not for reassessment			incl on checklist
Was patient was Restrained/ Unrestrained	92,8	3,6	3,6	incl on checklist	not for reassessment			incl on checklist
Estimated impact speed	57,1	35,7	7,2	incl in 3rd round	70	20	10	remove
Airbag deployment?	96,4	0	3,6	incl on checklist	not for reassessment			incl on checklist
Damage to car/ intrusion	85,7	10,7	3,6	incl on checklist	not for reassessment			incl on checklist
Extrication time (if applicable)	85,7	7,1	7,1	incl on checklist	not for reassessment			incl on checklist
Was patient ejected or did patient self extricate	89,3	7,1	3,6	incl on checklist	not for reassessment			incl on checklist
Other vehicles involved	82,1	14,3	3,6	incl on checklist	not for reassessment			incl on checklist
Position of patient in vehicle during impact	85,7	7,1	7,1	incl on checklist	not for reassessment			incl on checklist
Blood pressure	100	0	0	incl on checklist	not for reassessment			incl on checklist

Pulse rate	100	0	0	incl on checklist	not for reassessment			incl on checklist
Pulse characteristics	82,1	17,9	0	incl on checklist	not for reassessment			incl on checklist
Respiration rate	100	0	0	incl on checklist	not for reassessment			incl on checklist
Respiratory effort	89,2	10,7	0	incl on checklist	not for reassessment			incl on checklist
Respiratory rhythm	85,8	14,3	0	incl on checklist	not for reassessment			incl on checklist
Lung sounds/ air entry	96,4	3,6	0	incl on checklist	not for reassessment			incl on checklist
Glasgow Coma Score (including break down of score)	92,8	7,1	0	incl on checklist	not for reassessment			incl on checklist
SpO2	100	0	0	incl on checklist	not for reassessment			incl on checklist
ECG analysis (if applicable)	92,9	7,1	0	incl on checklist	not for reassessment			incl on checklist
End tidal CO2 (if applicable)	96,4	3,6	0	incl on checklist	not for reassessment			incl on checklist
Capillary refill	92,8	7,1	0	incl on checklist	not for reassessment			incl on checklist
Temperature	92,9	7,1	0	incl on checklist	not for reassessment			incl on checklist
TEWS score	71,4	17,9	10,7	incl in 3rd round	65	25	10	remove
HGT	100	0	0	incl on checklist	not for reassessment			incl on checklist
AVPU/ LOC	92,8	7,1	0	incl on checklist	not for reassessment			incl on checklist
Skin colour	89,3	10,7	0	incl on checklist	not for reassessment			incl on checklist
Pupil reaction and size	100	0	0	incl on checklist	not for reassessment			incl on checklist
Revised Trauma Score (if applicable)	64,3	21,4	14,3	incl in 3rd round	75	15	10	remove
MAP	75	17,9	7,2	incl in 3rd round	100	0	0	incl on checklist
CVP (if applicable)	53,6	35,7	10,7	incl in 3rd round	45	45	10	remove
Skin (turgor pitting oedema subcutaneous emphysema)	82,2	14,3	3,6	incl on checklist	not for reassessment			incl on checklist
New borns-APGAR, weight, temperature of incubator,	92,9	0	7,1	incl on checklist	not for reassessment			incl on checklist
Pre-hospital arterial blood gas analysis	71,4	10,7	17,9	incl in 3rd round	80	10	10	incl on checklist

Three sets of vitals, (on scene, en-route to hospital, before handover)	92,8	7,1	0	incl on checklist	not for reassessment			incl on checklist
Regular recording of vital signs, based on patients condition	89,2	10,7	0	incl on checklist	not for reassessment			incl on checklist
qSOFA score	53,5	35,7	10,7	incl in 3rd round	65	25	10	remove
Summary of primary assessment (ABCDE)	100	0	0	incl on checklist	not for reassessment			incl on checklist
Treatment and response to treatment	100	0	0	incl on checklist	not for reassessment			incl on checklist
Oxygen therapy administered	100	0	0	incl on checklist	not for reassessment			incl on checklist
Fluid therapy administered	100	0	0	incl on checklist	not for reassessment			incl on checklist
Diagnostic procedures performed	96,4	3,6	0	incl on checklist	not for reassessment			incl on checklist
Breathing procedures	100	0	0	incl on checklist	not for reassessment			incl on checklist
Circulation procedures	100	0	0	incl on checklist	not for reassessment			incl on checklist
Details of medications administered (name of medication, time, route and dose)	100	0	0	incl on checklist	not for reassessment			incl on checklist
Immobilization (if applicable)	96,4	0	3,6	incl on checklist	not for reassessment			incl on checklist
Fluid input and output	85,7	7,1	7,1	incl on checklist	not for reassessment			incl on checklist
Level of sensation	96,4	3,6	0	incl on checklist	not for reassessment			incl on checklist
Physical examination findings	100	0	0	incl on checklist	not for reassessment			incl on checklist
Thrombolytic checklist (if applicable)	89,3	7,1	3,6	incl on checklist	not for reassessment			incl on checklist
Any treatment already administered by anther practitioner (if applicable)	89,3	3,6	7,1	incl on checklist	not for reassessment			incl on checklist

Peristaltic sounds	53,6	32,1	14,3	incl in 3rd round	45	40	15	remove
Assessment of pelvis stability (if applicable)	85,7	10,7	3,6	incl on checklist	not for reassessment			incl on checklist
Neuroprotective interventions (if applicable)	100	0	0	incl on checklist	not for reassessment			incl on checklist
Disability procedures done	89,2	7,1	3,6	incl on checklist	not for reassessment			incl on checklist
Exposure and environmental control procedures done	89,3	7,1	3,6	incl on checklist	not for reassessment			incl on checklist
Secondary survey	92,9	3,6	3,6	incl on checklist	not for reassessment			incl on checklist
Devices or manoeuvres used	100	0	0	incl on checklist	not for reassessment			incl on checklist
Results of POCUS/ eFAST (if applicable)	78,6	14,3	7,1	incl in 3rd round	90	5	5	incl on checklist
If patient was paced what the pacing rate and voltage	100	0	0	incl on checklist	not for reassessment			incl on checklist
Name and signature of person handing patient over	92,8	3,6	3,6	incl on checklist	not for reassessment			incl on checklist
Name and signature of person receiving patient	100	0	0	incl on checklist	not for reassessment			incl on checklist
Time of hand over	100	0	0	incl on checklist	not for reassessment			incl on checklist
Qualification of person handing over and qualification of receiving practitioner including HPCSA number or nursing council registration	96,5	3,6	0	incl on checklist	not for reassessment			incl on checklist
Practice number of Doctor receiving patient (if being received by a Doctor)	64,3	21,4	14,3	incl in 3rd round	85	10	5	incl on checklist
Position of person receiving patient	71,5	21,4	7,2	incl in 3rd round	95	0	5	incl on checklist

Clarifications raised during handover or any concerns	67,9	21,4	10,7	incl in 3rd round	95	0	5	incl on checklist
Patient signed for refusal of services on the PRF (if applicable)	96,4	3,6	0	incl on checklist	not for reassessment			incl on checklist
If the patient refused services, there is a witness signature	96,4	3,6	0	incl on checklist	not for reassessment			incl on checklist
List of personal belongings (eg, cellphones, wallets, watch etc) & meds brought with patient and handed over (if applicable)	85,7	7,1	7,2	incl on checklist	not for reassessment			incl on checklist
Receiving facility	100	0	0	incl on checklist	not for reassessment			incl on checklist
Unit within the facility	96,4	3,6	0	incl on checklist	not for reassessment			incl on checklist
Bed number within the facility	32,2	35,7	32,1	incl in 3rd round	20	60	20	remove
List of equipment left behind to be collected later (if applicable)	78,6	10,7	10,7	incl in 3rd round	85	15	0	incl on checklist
Recommendations regarding further treatment	57,1	28,6	14,3	incl in 3rd round	75	25	0	remove
Assessment of the airway	96,4	3,6	0	incl on checklist	not for reassessment			incl on checklist
Indication for intubation	82,1	10,7	7,2	incl on checklist	not for reassessment			incl on checklist
RSI/Intubation check sheet (from preparation to confirmation) (if applicable)	82,2	3,6	14,3	incl on checklist	not for reassessment			incl on checklist
Devices used in airway management (if applicable)	100	0	0	incl on checklist	not for reassessment			incl on checklist

Details of airway management and airway procedures preformed (including if RSI facilitated)	96,4	3,6	0	incl on checklist	not for reassessment			incl on checklist
ETT Depatienth secured/ ETT placement at teeth before and after transport.	100	0	0	incl on checklist	not for reassessment			incl on checklist
Number of intubation attempatients	96,4	3,6	0	incl on checklist	not for reassessment			incl on checklist
Intubation Successful/Not successful	96,4	3,6	0	incl on checklist	not for reassessment			incl on checklist
Patient's response to airway management	92,9	7,1	0	incl on checklist	not for reassessment			incl on checklist
Suction requirements	92,8	7,1	0	incl on checklist	not for reassessment			incl on checklist
Legibility of writing on PRF	92,9	7,1	0	incl on checklist	not for reassessment			incl on checklist
Is patient diagram clearly labelled	82,2	17,9	0	incl on checklist	not for reassessment			incl on checklist
Recording if patient is comfortable and calm?	64,3	35,7	0	incl in 3rd round	85	15	0	incl on checklist
Recording if patient was covered?	67,8	28,6	3,6	incl in 3rd round	95	5	0	incl on checklist
Time and millage annotations are accurate and true reflection of the actual case times and mileages	92,9	3,6	3,6	incl on checklist	not for reassessment			incl on checklist
Witnessed/unwitnessed arrest	96,4	0	3,6	incl on checklist	not for reassessment			incl on checklist
Estimation how long patient was unresponsive before CPR was started	96,4	0	3,6	incl on checklist	not for reassessment			incl on checklist

Was Bystander CPR was being provided before EMS arrival on scene (duration of bystander CPR)	89,3	7,1	3,6	incl on checklist	not for reassessment			incl on checklist
One rescuer CPR or Two rescuer CPR	85,7	10,7	3,6	incl on checklist	not for reassessment			incl on checklist
Manual or device (Autopulse/Lucas) compressions	85,8	10,7	3,6	incl on checklist	not for reassessment			incl on checklist
Was an AED or defibrillation monitor used	92,9	7,1	0	incl on checklist	not for reassessment			incl on checklist
Duration of CPR	100	0	0	incl on checklist	not for reassessment			incl on checklist
ECG Rhythms present and change of rhythms documented	96,4	3,6	0	incl on checklist	not for reassessment			incl on checklist
Suspected cause of arrest (H's and T's)	92,9	7,1	0	incl on checklist	not for reassessment			incl on checklist
Number of Shocks delivered	100	0	0	incl on checklist	not for reassessment			incl on checklist
Times for all evaluations and treatments during CPR	96,4	3,6	0	incl on checklist	not for reassessment			incl on checklist
Was ROSC achieved? (include time)	100	0	0	incl on checklist	not for reassessment			incl on checklist
Post ROSC management? (if applicable)	100	0	0	incl on checklist	not for reassessment			incl on checklist
Medications administered (times, dose, route) during CPR	100	0	0	incl on checklist	not for reassessment			incl on checklist
Patient's response to CPR	96,4	3,6	0	incl on checklist	not for reassessment			incl on checklist
FiO2 used during CPR	89,3	10,7	0	incl on checklist	not for reassessment			incl on checklist

Airway manoeuvres and oxygenation, airway adjuncts, procedures done	100	0	0	incl on checklist	not for reassessment			incl on checklist
If E.T. Tube was placed detail time that CPR became Asynchronous	75	17,9	7,2	incl in 3rd round	85	5	10	incl on checklist
ETCO2 reading during CPR	85,7	10,7	3,6	incl on checklist	not for reassessment			incl on checklist
Ambient weather conditions around the patient at time of CPR.	67,8	14,3	17,9	incl in 3rd round	65	20	15	remove
Peak Airway Pressure (or plateau depending on mode)	92,8	3,6	3,6	incl on checklist	not for reassessment			incl on checklist
Respiratory rate	100	0	0	incl on checklist	not for reassessment			incl on checklist
Mode of ventilation SIMV/CPAP etc	100	0	0	incl on checklist	not for reassessment			incl on checklist
PEEP	100	0	0	incl on checklist	not for reassessment			incl on checklist
Tidal volume	92,9	0	7,2	incl on checklist	not for reassessment			incl on checklist
Minute volume	96,4	0	3,6	incl on checklist	not for reassessment			incl on checklist
Plateau pressures (if using Volume ventilation mode)	85,8	7,1	7,2	incl on checklist	not for reassessment			incl on checklist
Insp time and exp time	92,9	3,6	3,6	incl on checklist	not for reassessment			incl on checklist
ETCO2 readings	96,4	3,6	0	incl on checklist	not for reassessment			incl on checklist
Morphology of ETCO2 waveform	82,3	10,7	7,2	incl on checklist	not for reassessment			incl on checklist
Re-assessment of patient/ventilator (DOPES)	89,3	3,6	7,2	incl on checklist	not for reassessment			incl on checklist
Trigger flow	78,5	14,3	7,2	incl in 3rd round	95	0	5	incl on checklist
Expiratory tidal volume & inspiratory tidal volume	78,5	14,3	7,2	incl in 3rd round	95	0	5	incl on checklist
NIV/invasive ventilation?	96,4	3,6	0	incl on checklist	not for reassessment			incl on checklist

Ventilation graphs observed	75	17,9	7,2	incl in 3rd round	70	25	5	remove
Alarm settings	78,6	14,3	7,1	incl in 3rd round	90	5	5	incl on checklist

Appendix E- Complete list of variables included in the development of the checklist, with explanation	
Patient Demographics:	Explanation
Patient's name and surname	Patient's first name (given name) and surname (family name) as per their ID document
Patient's age	Patient's age in years; if less than a year, in months; if less than a month, in days
Patient's sex	The sex of the patient, male or female
ID number	Patient's RSA identity number or passport number (international)
Patient's residential Address	The residential address where the patient lives
Patient's telephone number	The patient's telephone number -- either cell phone or land line where they can be contacted
Family's telephone number	The family's or next-of-kin's telephone number, either cell phone or land line, where they can be contacted
Medical aid details (medical aid and number)	The name of the medical aid (medical insurance) that the patient is a member of and the policy number of the medical aid
Case/ambulance/crew details	
District or region	The municipal district or geographical area in which the ambulance is operating
Date	The day, month and year on which the case was undertaken
Case number	A code which uniquely identifies the case, normally issued by the call centre
Names of pre-hospital providers	The ambulance crew members: first names (given names)/initial and surnames (family names) as per their ID documents
HPCSA numbers of pre-hospital providers	The full HPCSA registration numbers of the ambulance crews
Ambulance call sign or registration number	The combination of unique identifying letters, letters and numbers, or words, assigned to an ambulance / the number plate of the ambulance
Type of dispatch/case type – primary call or IFT	The type of case the ambulance is being sent on and the urgency of the case
Time the call was received at the communication centre	The time that the details of the case to which the ambulance was dispatched were received by the call centre
Time ambulance was dispatched	The time the ambulance crew was given the details of the case and dispatched to the location of the patient
Time ambulance arrived on scene	Time the ambulance arrived at the scene where the patient is located
Time of first patient contact	The time the ambulance crew made first contact with the patient
Time leaving scene	The time the ambulance left the scene
Time patient arrived at hospital	The time that the ambulance arrived at hospital

Type of transportation	The type of transportation that was used to transport the patient to hospital: ambulance, patient transport vehicle, helicopter, etc.
Location of patient/scene address	The address or place where the patient was located by the ambulance crew
Receiving hospital	The hospital that the patient was transported to for continued medical care
Mileage mobile to scene	Odometer mileage of the ambulance immediately before beginning the trip to the patient
Mileage at scene	Odometer mileage of the ambulance when arriving at the scene where the patient is
If call cancelled - reason for cancellation	If the case was cancelled once crew on scene to which dispatched. For example: no patient could be found, hoax call
Call completion reasons, other than patient transported to hospital (no patient found patient / refuses treatment etc)	The reason the case is completed (other than the patient was transported to hospital). This could be for several reasons (excluding patient was transported to hospital):no patient found/patient refuses treatment etc
Reason for delay: rerouted, came across an accident, breakdown, etc	If there was a delay in responding to the scene the reason for this delay must be recorded
Patient background /history	
Symptoms/chief complaints	A statement describing the symptoms (complaints which indicate disease); problems noticed by the patient
Allergies	Damaging immune response of the body by a substance, to which the patient has become hypersensitive.
Past and present patient history (medical/ surgical history/disability/co-morbidity/ severity of pre-existing conditions/family history)	An account of all medical events and problems a person has experienced that are important to consider in the management of the patient
Medication patient is taking	A list of any medication that the patient has been taking
Patient's last meal/drink	The last time that the patient had something to drink or eat
Events prior to calling ambulance.	The events that occurred before calling for medical assistance
Conditions where patient was found/social living circumstances	The environment in which the patient was found
Patient priority/ condition	
Documentation of pain	A description of the patient's pain, including the pain score and type of pain
Mechanism of injury/nature of Illness	The method by which damage (trauma) occurred / principal physical characteristic(s) of the injury or illness.

Documentation of injuries	Establishes the existence of an injury as well as its type and severity, giving an accurate written description of injuries
Patient mobility/patient movement.	The extent to which the patient has independent, purposeful physical movement of the body, or of one or more extremities
Blood loss. And quantity	Does the patient have any blood loss and if so, how much?
MOI from MVA	
Death of an occupant in the same vehicle	Was there another person in the vehicle who sustained fatal injuries?
Was patient restrained/unrestrained	Was the patient restrained with a seatbelt, or not?
Airbag deployment?	If the vehicle has an airbag, did the airbag deploy during the crash?
Damage to car/intrusion	What is the extent of the damage to the vehicle, which may be related to mechanism of injury?
Extrication time (if applicable)	If the patient was trapped, for how long was the patient trapped?
Was patient ejected or did patient self-extricate	If the patient is found outside of the vehicle, was the patient ejected from the vehicle or did they manage to exit the vehicle by themselves?
Other vehicles involved	Were there any other vehicles involved in the crash?
Position of patient in vehicle during impact	The position the patient was occupying in the vehicle at the time of the crash
Vital Signs	
Blood pressure	The patients systolic and diastolic blood pressure
Pulse rate	The patient's heart rate, recorded in beats per minute
Pulse characteristics	The rhythm and force of the pulse
Respiration rate	The patient's respiratory rate measured in breaths per minute
Respiratory effort	Assessments of the patient respiratory effort (how easy or difficult it is to breathe)
Respiratory rhythm	The patient's breathing pattern
Lung sounds/air entry	An assessment, using a stethoscope, of the sound of the air moving through the lower airways and upper airways.
Glasgow Coma Score (including break down of score)	The Glasgow Coma Score of the patient, including the scores for each component of the Glasgow Coma Score: voice, movement, eye response
Spo2	The oxygen saturation level of the patient, measured using a pulse oximeter
Capillary refill	The time it takes for the capillary bead to turn pink, after it has been squeezed
HGT	The patient's blood sugar level, measured in mmol
Pupil reaction and size	The way each pupil of the eye reacts when light is shone into it; and the diameter to which the pupil contracts once the light is shone at the eye

MAP	The mean arterial pressure of the patient
Skin (turgor pitting oedema subcutaneous emphysema)	Any abnormal characteristics of the patient's skin
Regular recording of vital signs, based on patient's condition	A periodic repeat of the patient's vital signs, based on the patient's condition and or agency policy
Oxygen therapy administered	If the patient was administered supplemental oxygen therapy, which type of oxygen mask was used and what was the oxygen flow rate
Fluid therapy administered	If the patient had any fluids administered, what fluid was administered and how was it administered
Diagnostic procedures performed	A list of any diagnostic procedures that were performed on the patient
Breathing procedures	Any treatment administered to the patient, which is specific to the respiratory system
Circulation procedures	Any treatment administered to the patient, which is specific to the cardiovascular system
Details of medications administered	A description of any medication that was administered to the patient and should include: name of medication, time it was administered, route of administration and the dose of the medication
Fluid input and output	The amount of fluid that was administered to the patient and the fluid output of the patient
Level of sensation	The lowest area on the patient's body with normal sensory and motor functions
Physical examination findings/ secondary survey	Any abnormal findings or injuries found when examining the patient
Exposure and environmental control procedures done	Detail of how the patient was covered and or warmed if needed
Devices or manoeuvres used	Describe any manoeuvres that were used to treat the patient or list any devices used to treat the patient
Immobilisation (if applicable)	If the patient was immobilised, describe how the patient was immobilised and the equipment used
ECG analysis (if applicable)	If the patient's ECG was checked, record analysis of the ECG pattern
End tidal CO2 (if applicable)	If the patient's end tidal carbon dioxide levels were assessed what was the level of carbon dioxide
New-born's-APGAR, weight, temperature of incubator,	If the patient is a new-born, what was the new-born's APGAR, weight and the temperature setting on the incubator
Pre-hospital arterial blood gas analysis	Analysis of the blood gas, if available
Thrombolytic checklist (if applicable)	If applicable (if the patient had signs of ACS and the patient was being treated by an ALS practitioner), was a thrombolytic checklist completed?
Any treatment already administered by anther practitioner (if applicable)	If the patient was being treated by another practitioner, what treatment had been performed by this practitioner, prior to the patient handover?

Assessment of pelvis stability (if applicable)	If the patient's pelvis was assessed for a possible pelvic fracture, what were the findings of the assessment of the pelvis?
Neuroprotective interventions (if applicable)	If the patient has a possible head injury, the strategies that were employed to limit secondary tissue loss and/or improve functional outcomes
Results of POCUS/efast (if applicable)	The results of an ultrasound scan of the patient's abdomen, heart and lungs
If patient was paced what the pacing rate and voltage	If the patient was paced, what rate and voltage was the pacer set at
Patient handover	
Name and signature of person handing patient over	The name and signature of the person who was responsible for patient care
Name and signature of person receiving patient	The name and signature of the patient who is taking responsibility of further management of the patient
Time of handover	The time the patient was handed over to another medically qualified person, to continue medical care for the patient
Qualification and position of person handing over and qualification of receiving practitioner, including HPCSA number/nursing council registration/practice number	The qualification and the professional body registration number of the person receiving the patient
Clarifications raised during handover or any concerns	Details of any problems or additional explanations that were required during the hand over
Patient signed for refusal of services on the PRF (if applicable)	If the patient refused medical care, did the patient sign the PRF, refusing medical care?
If the patient refused services, is there a witness signature	If the patient refused medical care, did a witness also sign that the patient was refusing medical care?
List of personal belongings (cell phones, wallets, watch etc) and meds brought with patient and handed over (if applicable)	If any of the patient's belongings were transported with the patient to hospital, have these items been listed on the PRF (cell phones, wallets, watch etc)
List of equipment left behind to be collected later (if applicable)	If any medical equipment was left at the hospital. as it was required for continued medical care at the time, is there a list of this equipment recorded on the PRF?
Airway management	
Assessment of the airway	A description of how the airway was assessed to determine any abnormalities with regard to the airway
Indication for intubation	The conditions which were present, which required that the patient be intubated: apnoea, airway protection etc
RSI/intubation check sheet (from preparation to confirmation) (if applicable)	Confirmation of the steps listed on standard intubation checklists

Devices used in airway management (if applicable)	The devices that were used in management of the patient's airway
Details of airway management and airway procedures performed (including if RSI facilitated)	Details of the procedures that were used during management of the patient's airway
ETT depth secured/ ETT placement at teeth before and after transport.	The depth of the endotracheal tube at the patient's teeth
Number of intubation attempts	The number of intubation attempts that were required to intubate the patient
Intubation successful/not successful	Was the intubation process successful or not?
Patient's response to airway management	The patient's response to airway management procedures and treatment
Suction requirements	Details if the patient needed to be suctioned as part of the airway management process
If applicable: CPR	
Witnessed/unwitnessed arrest	Did someone see the person go into cardiac arrest or was the patient found, already in cardiac arrest
Estimation of how long patient was unresponsive before CPR was started	An estimation of how long the patient was in cardiac arrest before resuscitation efforts were commenced
Was bystander CPR being provided before EMS arrival on scene (duration of bystander CPR)	Did a bystander perform CPR, prior to EMS arrival on scene?
One-rescuer CPR or two-rescuer CPR	Was CPR performed by one person or two people?
Manual or device (autopulse/Lucas) compressions	Was a mechanical device (autopulse/Lucas) used to perform chest compressions?
Was an AED or defibrillation monitor used	What type of defibrillator was used during CPR?
Duration of CPR	How long was CPR performed on the patient?
ECG rhythms present and change of rhythms documented	Description of the ECG rhythms present during the resuscitation
Suspected cause of arrest (h's and t's)	The suspected cause of cardiac arrest (h's and t's)
Number of shocks delivered	If the patient was defibrillated, how many times was the patient defibrillated
Times for all evaluations and treatments during CPR	A record of times of evaluations and treatment steps that were initiated during the resuscitation
Post ROSC management? (if applicable)	Details of management if there was a return of spontaneous circulation
Medication administered (times, dose, route) during CPR	Details of medication administered during the resuscitation and the time the medications were administered
Patient's response to CPR	How did the patient respond to resuscitation efforts?

Fio2 used during CPR	The percentage of oxygen administered when ventilating the patient, during the resuscitation
Living will/DNAR orders (if applicable)	Were there any 'do not resuscitate' orders for the patient and how were they effected?
ETCO2 reading during CPR	The levels of end tidal carbon dioxide measured during the resuscitation
If applicable: ventilator settings	
Peak airway pressure (or plateau depending on mode)	The highest level of pressure applied to the lungs during inhalation.
Respiratory rate	The ventilation rate the ventilator was set to
Mode of ventilation SIMV/CPAP etc	The method of inspiratory support provided by the ventilator to the patient
PEEP	Peck end expiratory pressure
Tidal volume	The set volume of air moved into or out of the lungs during ventilation
Minute volume	The set volume of air that the ventilator ventilates in 1 minute
Plateau pressures (if using volume ventilation mode)	The pressure that alveoli and small airways of the lung are exposed to during mechanical ventilation
Insp time and exp time	The ventilator setting the determines much of that total cycle time is inspiration and how much is expiration
Morphology of ETCO2 waveform	The shape of the ETCO2 waveform
Trigger flow	The setting to the sensor to detect the change in the flow velocity of the basic airflow in the airway when the patient inhales spontaneously
Alarm settings	The alarm settings that were set on the ventilator