'A randomised controlled trial pilot study assessing use of clinical digital photography for specialist referral process: Can its use reduce length of stay of patients with minor burns within an Emergency Department.'

Kate Jane McLeay
Emergency Nurse Practitioner Candidate
(CNRN, GDip Emerg)

Supervisor:
Dr David Foley

The University of Adelaide
School of Nursing
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SIGNED STATEMENT

'I declare that this thesis contains no material which has been accepted for the award of any other degree or diploma in any university or other tertiary institution and, to the best of my knowledge and belief, contains no material previously published or written by another person, except where due reference has been made in the text.

I give consent to this copy of my thesis, when deposited in the School of Nursing Library being available for loan and photocopying.'

Kate Jane McLeay
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ABSTRACT

Emergency departments around Australia are facing increasing demands. Significant contributing factors for growing emergency department (ED) attendances are an aging population, increased occurrence of chronic disease and insufficient hospital, aged care and rehabilitation beds. Other factors include a lack of access to community services and low socio-economic conditions. The increasing demand on ED resources primarily because of increasing presentations increases patient length of stay and leads to overcrowding, this has a negative effect on patient outcomes and decrease in the quality of care. Despite a national focus on improving all Australian EDs, there continues to be limited interventional research that highlights successful strategies to reduce length of stay and thereby reduce overcrowding. There is a wealth of literature on the positive outcomes resulting from clinical photography being utilised within healthcare settings and in remote specialist referrals. Limited research exists on referral practices of ED practitioners and the use of clinical photography within an ED setting. By identifying the research gaps, reviewing findings and analysing current health care demands, the aim of this study was to trial an alternative referral method - clinical photography. The study was conducted by an emergency nurse practitioner candidate, who used clinical photographs of burn injuries as part of the referral process to the burns specialist. This study hoped to assist with decreasing length of stay in ED and therefore adds a plausible way to reduce overcrowding. Additionally, it piloted a study in preparation for a randomised control trial. To the researcher's knowledge, there has been no study to date trialling the effectiveness of this intervention.

1. INTRODUCTION

1.1. Introduction

Increased demand placed on emergency departments (EDs) has led to longer patient waiting times, increased length of stay and overcrowding. Overcrowding in Australian EDs is a common phenomenon and a national concern (Australasian College for Emergency Medicine 2004). A direct link has been associated with ED overcrowding and increased mortality (Sprivulis et al. 2006). The nurse practitioner model of care was introduced into Australian EDs to assist with meeting the growing demand for health care through providing safe and timely patient care (Jennings et al. 2009). Further strategies are being sought by the Australian Federal Government to improve the functioning of all EDs in an attempt to decrease ED patient length of stay, overcrowding and improve access to health care. Research that attempts to find interventions that might decrease ED length of stay and overcrowding is limited and urgently needed. This was a primary motivation for this study.

There has been little research on the referral processes from ED practitioners to specialists. Notably, there has been no research that considers how ED referral processes impact ED workload, overcrowding or length of stay. There is however a growing body of research supporting the use of clinical photography in remote referral practices (Buckley, Adelson & Agazio 2009; Santamaria et al. 2004). No evidence was found suggesting that any ED has used clinical digital photography in the referral process to in house specialists, and very few research articles have found clinical photography to be used within ED. Clinical digital photography is a modern interventional tool that EDs are not currently using to improve patient care outcomes, particularly within the ED referral process. This study combined the intervention of clinical digital photography with the referral processes from an ED practitioner to a specialist. It was hoped this study would highlight whether this proposed intervention could assist to decrease ED patients' length of stay, and whether it was a feasible study plan for a randomised controlled trial.

1.2. Purpose of the study

In response to the overcrowding crisis that EDs are currently facing, this study was developed to trial an alternative intervention to decrease patient length of stay. The purpose for the study was to prepare for a randomised controlled trial and test viability of the proposed intervention.

Patients with non-life threatening injuries wait in the ED for extended periods for specialist review. Many of the specialists at the tertiary hospital in which the study was conducted must perform surgery, conduct outpatient clinics and attend meetings, whilst also attending the ED for patient consultations. The significant delays in specialist reviews for ED patients led the researcher to question whether using clinical digital photography teamed with a verbal handover could reduce delays through remote consultation from the ED. Many specialist units already successfully use this consultation concept when receiving referral from external parties, so using this same concept from the ED appeared to be a logical progression.

This study was designed to allow after hours burn referrals to be received by the Burns Registrar. At the time of the study the Plastic Registrar on-call received burn referrals after hours from the ED. This study piloted the use of clinical digital photography in the specialist referral process from an ED practitioner to a burns specialist in order to negate the need for the specialist to attend the ED and speed up decision making. In order to trial this interventional process of referral a pilot study was appropriate in preparation for a larger randomised controlled trial. A pilot study is a smaller version a randomised control trial. Undertaking a pilot study allows the study design and methods to be tested (Lancaster, Dodd & Williamson 2002).

1.3. Hypothesis

The hypothesis for this study was, 'The use of digital images in the specialist referral process will reduce length of stay for minor burns patients in the ED.'

1.4. Research question

The question investigated by the study was: 'A randomised controlled trial pilot study assessing use of clinical digital photography for specialist referral process: Can its use reduce length of stay of patients with minor burns within an Emergency Department.'

1.5. Aims of the study

The aims of this study were to:

- Determine the sample size required to detect an effect of 30 minutes reduced length of stay.
- To check the integrity of the study protocol.
- To trial the use of clinical photographs as a method of improving referrals to a burns specialist.
- To trial the use of secure email as a way to deliver the clinical photographs.
- To determine the reliability of measuring time to discharge as an outcome measurement and to test data collection methods

1.6. Significance of the study

This pilot study will underpin a larger randomised controlled trial that aims to test the effectiveness of clinical digital photographs taken by an ED nurse practitioner candidate, when referring patients with burn injuries for specialist opinion. It was hoped that this method of referral would reduce the length of stay some burns patients experienced when they attended the ED. If the research demonstrated this to be an effective intervention other patients could be referred via a similar process with clinical photography. Common ED presentations such as fractures, rashes, wounds or tendon injuries could be referred using this methodology. Reduced time in the ED and prompt specialist consultation should result in better outcomes for patients, assist emergency departments reduced overcrowding and provide better access to health care to more patients.

The role of the ED nurse practitioner and candidate is a new model of care within Australia and therefore referral practices specific to this group have not been explored through research. In fact, referral processes from any ED practitioner have limited research (Lee et al. 2008). This is an important aspect of work for all ED practitioners. This study contributes to the limited literature on the referral practices of ED practitioners, adding insight to areas for future investigation and current shortcomings.

As a result of current technology, clinical digital photography is no longer complex and delayed. Digital photography has removed time and quality restrictions once experienced by those using film based clinical photography. This researcher argues the need for greater research on the use of clinical photography within the ED as a visual clinical record. To date, there is much research suggesting the quality of digital photography is of a sufficiently high standard and useful in the management of wound care (Buckley, Adelson & Agazio 2009; Santamaria et al. 2004) however there is little research on its benefits as a record within the ED. With such dramatic technological advances comes the burden of ethically managing how health care practitioners use clinical digital photography in a clinical setting. Recent research highlights the use of clinical photography with mobile phones (Shokrollahi et al. 2007). The ethical responsibilities of health care practitioners when obtaining and using clinical photographs, via camera or mobile phone, have yet to be thoroughly explored. This study has addressed ethical behaviour and methodology when using clinical digital photography. This is a relevant area of concern in today's society and there is limited research that discusses and trials ethical pathways that ensure privacy when using digital electronically distributed images.

1.7. Assumptions

This study was based on the assumptions that gender and age are likely to be independent variables. It was also assumed that length of stay is calculated from the time a patient attended the emergency department to the time they physically left the department. It was further assumed that the time of year when the study was undertaken would not affect the results.

1.8. Definition of Terms

Registrar - A doctor who has over three years experience post graduating from university, is training within a specialty program and reports to a consultant.

Plastics Registrar - A doctor in training to be a plastic specialist surgeon.

Burns Registrar - A doctor in training to be a burns specialist surgeon.

Nurse Practitioner – A registered nurse who is educated and endorsed to function autonomously and collaboratively in an advanced and extended clinical role.

Nurse Practitioner Candidate – A registered nurse in training to be an endorsed nurse practitioner.

Digital photography - A photographic method that stores the image digitally for later reproduction.

1.9. Conclusion

This initial introduction chapter provided the reader with the purpose of this study and problem that is seeks to explore. The second chapter is a literature review on the relevant background and topics that this research relates to allowing the reader to understand its importance. Chapter three outlines a descriptive explanation of the methodology of the research so that it can be replicated if required. The fourth chapter reports the research results. The final chapter five is a discussion of the findings and study outcomes. Appendices and references follow this chapter.

2. LITERATURE REVIEW

2.1. Introduction

This literature search reviewed current, scholarly and relevant full-text research articles and books. The purpose of this review was to summarise and critique the literature that related to the study question, *'Does use of digital images in the specialist referral process reduce length of stay for minor burns patients in the ED.'* This was completed in order to highlight the importance of this study and how it contributes to the literature and clinical practice. The researcher undertaking this project was an emergency nurse practitioner candidate, therefore this role has been researched to provide in-sight as it is a new model of care. Literature on the current demands emergency departments are facing, emergency practitioner referral practices, use of clinical photography within health care and management of minor burns has also been reviewed. Particular emphasis was placed on how clinical photography and referral practices related to minor burn injuries. Headings were used to highlight areas of research in order to take the reader on a logical journey of how the researcher came to undertake this pilot study, and highlight where research gaps were evident.

2.2. Search methods

Searches were conducted using Google Scholar, Cumulative Index of Nursing and Allied Health Literature (CINAHL) with Full Text, and PubMed. Google Scholar is a free service for searching scholarly literature. It includes peer-reviewed papers, theses, books, preprints, abstracts and technical reports (Google 2012). CINAHL with Full Text is a comprehensive source of over 610 full-text journals for nursing and allied health that date back to 1981 (EBSCO Publishing 2012). PubMed is the National Library of Medicine's search service that provides access to over 22 million citations for biomedical literature from MEDLINE, and other related databases, with links to online journals (U.S National Library of Medicine, 2010). Relevant books were used as recommended by specialists involved within the study.

In order to find current and relevant literature, limits had to be applied to the database searches. Limits included full text and publication date no greater than 10 years. Medical Subject Headings (MeSH) were used to refine searches when using PubMed to allow for specificity when searching (U.S National Library of Medicine, 2012). Articles were sourced using phrases that included Emergency Department, Overcrowding, Length of stay, Waiting times, Nurse Practitioner, Referral Process, Consultations, Burns, Clinical photography, Digital photography, Wound photography, Wounds and Mobile phones. Articles were examined and reflected upon, critiqued and reread. Key words, themes and reference lists were investigated further, which included articles greater than 10 years old, in order to highlight research gaps that validate this pilot study.

2.3. Overcrowding in Emergency Departments

The Australian population is aging rapidly. People are living longer, with more co-morbidities (George, Jell & Todd 2006). Access to community and primary health care is difficult and costly, which increases demand placed on ED (Downey 2010; Jennings et al. 2008). It has been predicted that attendances to the ED will continue to grow (South Australian Government 2011). Increased attendances to EDs cause overcrowding (Drummond 2002). Overcrowding is argued to occur when the demand placed on the ED exceeds the physical or staffing capacity of the department (Geelhoed & Kierk 2012) and demand exceeds supply (Hoot & Aronsky 2008). In 2006 a retrospective analysis found that overcrowding was directly linked to an increase in patient mortality rates (Sprivulis et al. 2006). In one Australian ED overcrowding was estimated to have caused 13 patient deaths per year (Richardson 2006). Negative patient outcomes, increased length of stay and decreased quality of care are a result of ED overcrowding (Geelhoed & Kierk 2012; Holroyd et al. 2007; Jennings et al. 2008;).

A recent media release by the Australasian College for Emergency Medicine (ACEM 2012) highlighted that South Australian EDs have one of the longest patient length of stays in Australia. The ACEM suggest a primary cause being 'access block', described as waiting within the ED for greater than 8 hours (ACEM 2012). One study found that hospital occupancy exceeding 90 percent was the major factor in increased ED patient length of stay (Forster et al. 2003). In 2004 the ACEM produced a summary document titled 'Access Block and Overcrowding in Emergency Departments', highlighting the need for urgent solutions and a national focus to improve ED overcrowding. Eight years on, the same issues remain a national focus (ACEM 2012).

There is currently governmental emphasis on decreasing overcrowding in EDs across Australia. Decreasing ED overcrowding poses a significant challenge for local government and health care providers. In 2001 McCabe described overcrowding as a '...wide-spread, chronic and debilitating situation' (p. 672). Despite wide spread awareness of overcrowding it continues to be a poorly understood worldwide issue that EDs need to overcome (Drummand 2002). Holroyd et al. state 'ED overcrowding is one of the most complex and challenging issues currently facing health care systems' (2007, p. 702) and argue that reliable interventional research attempting to improve flow through the ED is limited, of poor quality, and urgently needed.

In 2008 a systematic review was undertaken to review causes, effects and solutions to ED overcrowding (Hoot & Aronsky). It was argued that no previous systematic literature review had been undertaken that considered areas that effect ED overcrowding. This statement is supported by this literature review. There is a large body of literature on causes, effects and solutions into ED overcrowding, however there are very few randomised control trials surrounding all areas of research (Hoot & Aronsky 2008). Hoot and Aronsky's (2008) literature review corroborated what Holroyd et al. (2007) suggested, that interventional research is required to improve ED overcrowding and that despite the ongoing efforts to reduce the problem, a resolution has yet to been found. '...the crowding literature would benefit from

studies that apply standard management research techniques to ED operations and investigate ways to alter resource availability dynamically according to demand.'(Hoot & Aronksy 2008, p.133). It was again raised in 2011 that ED overcrowding is an issue that is hospital wide and is the '...single most important factor affecting ED performance' (Crane & Noon p. 3). Certainly, there is an overwhelming amount of literature and evidence to support interventional research that hopes to assist in reducing ED overcrowding as the issue continues to escalate (ACEM 2012).

2.4. National Emergency Access Target

A Federal Government patient flow target program for emergency departments is being phased into all Australian public hospitals, known as *'National Emergency Access Target'*. The program aims to improve access to care. All patients attending an ED need to either be discharged or admitted to a ward within four hours (Australian Government 2011). This strategy aims to encourage the whole hospital to the share responsibility of getting patients out of the ED within four hours (Geelhoed & Kierk 2012). Making ED overcrowding a hospital wide problem has been suggested throughout literature (Crane & Noon 2011; Hoot & Aronsky 2008). A Western Australian study found that the introduction of the 'four-hour rule' caused a reduction in ED overcrowding, which directly contributed to a decrease in mortality rates (Geelhoed & Kierk 2012). Whilst the 'four-hour rule' provides positive evidence for its implementation, the evidence for this time frame choice is based on the United Kingdom (UK) National Health Service (NHS) four-hour model (WA Health 2008) and is an arbitrary number based on UK public opinion rather than evidence. The UK NHS introduced this strategy in the early 2000s (George, Jell & Todd 2006) to assist with ED overcrowding and the rapidly aging population. The four-hour ED target is no longer a primary focus within the UK in an attempt to maintain good quality health care treatment (Topping & Campbell 2010). Despite this, strategies are being sought and trialled within Australian EDs to meet the four-hour target.

Strategies to reduce ED overcrowding have been diverse. The three major themes for solutions are; *Increasing Resources*, which includes increased ED staff, short stay units and greater access to hospital beds. *Managing Demand* placed on the ED, through ambulance diversion and reducing non-urgent referrals to the ED and *Operational Research,* which looks at solutions through theory (Holroyd et al. 2007; Hoot & Aronsky 2008; Pickard, Buldeck & Woolmore 2004). This pilot study was designed to trial an alternative intervention that could decrease patient length-of-stay within the ED, and therefore directly impact overcrowding. Whilst this study is aimed at reducing ED overcrowding, it has not been designed to improve compliance with the four-hour target, as the patients that meet the participation criteria are generally already being discharged from the ED within this time frame.

2.5. Nurse Practitioners

The nurse practitioner role was developed as an alternative model of care to ensure accessible health care to more (Jennings et al. 2008). The role was recommended throughout the literature found as a way to assist with ED overcrowding through increasing ED resources (Pickard, Buldeck & Woolmore 2004; Tye & Ross 2000). The term nurse practitioner (NP) within Australia refers to a highly educated and experienced nurse with an extended skill set who has been endorsed by the Nursing and Midwifery Board under section 95 of the National Law (Nursing and Midwifery Board of Australia 2010). According to the Australian Nursing and Midwifery Council (ANMC) a nurse practitioner is defined as:

> *... a registered nurse educated and endorsed to function autonomously and collaboratively in an advanced and extended clinical role. The nurse practitioner role includes assessment and management of clients using nursing knowledge and skills and may include but is not limited to the direct referral of patients to other health care professionals, prescribing medications and ordering diagnostic investigations. The nurse practitioner role is grounded in the nursing profession's values, knowledge, theories and practice and provides innovative and flexible health care delivery that complements other health care providers. The scope of practice of the nurse practitioner is determined by the context in which the nurse practitioner is endorsed to practice.*

A nurse practitioner candidate (NPC) is a nurse working towards endorsement as an NP. All NPs and NPCs must follow the national competency standards for the nurse practitioner (Nursing and Midwifery Board of Australia 2010). These are core standards for practice and common to all models of NP practice. NPs and NPCs adhere to a Scope of Practice (SOP). The SOP is a legal document that the NP/NPC must work within and is specific to their area of practice (See Appendix 3). A good example of the SOP document can be seen with patients that attend the ED with a burn. Minor burns are a common presentation to the ED at the tertiary hospital that this study was conducted and therefore something emergency NP/NPCs manage frequently. The NP/NPC must follow a strict exclusion criteria set by the SOP when attending to a patient with a burn. Exclusions include, burns are greater than 10% of the total body surface area, airway burns, facial burns, eye burns and perineum burns.

The role of the NP was introduced into Australian health care approximately ten years ago (Jennings et al. 2009), although it was first developed in United States of America forty years ago and then embraced by the United Kingdom and Canada soon after (Tye & Ross 2000). Worldwide, the demand for emergency care could not be met, and as nursing progressed as a profession, highly skilled and experienced emergency nurses embarked on the journey of becoming emergency nurse practitioners. Need was the driving force for the NP role (Tye & Ross 2000). The role has been widely accepted within EDs around Australia (Jennings et al. 2009; Sackett 2009). The literature examining the NP role within Australian EDs indicates it assists in decreasing patient waiting times, improves patient satisfaction and health care outcomes (Jennings et al. 2009). It is a cost effective alternative to a supply and demand shortage in the health care system (Jennings et al. 2008).

With evidence highlighting such support for the NP role within EDs around Australia, it is important that this new group of ED practitioners contribute to decreasing overcrowding through research. Smith (2009) an ED NP from South Australia undertook a quantitative, retrospective service evaluation comparing methods of shoulder relocation performed in his ED. Although his study's primary outcome was to compare methods, a secondary outcome highlighted that a particular method was able to be completed using no sedation that requiring reduced nursing and medical

resources and therefore reduced the patients time spent in the ED, all of which provided the patient a faster service and better outcome (Smith 2009). No other interventional evidence could be found from this literature review that was produced by ED NPs to improve patient care and outcomes, whilst reducing their length of stay.

2.6. Referral processes

Primary factors that influence ED overcrowding include: increased population, increased ED attendance, reduced number of inpatient beds, delayed specialist consultations in the ED, and staff shortages (McCabe 2001; Geelhoed & Klerk 2012). Secondary causes found to contribute to ED overcrowding include reduced aged care and community beds. Whilst the reasons for overcrowding are many, delayed specialist consultation is arguably a leading cause (Lee et al. 2008). The process of referring from the ED to an inpatient specialty is required for all patient admissions within the tertiary hospital this study was conducted in, and is a fundamental element in providing the best health care to patients that attend the ED (Lee et al. 2008). It is argued that appropriate use of the referral and consultation process will '...improve ED throughput and patient care' (Woods et al. 2008, p. 26) and reduce overcrowding (Lee et al. 2008). It has been found that greater than one third of ED patients are referred to an inpatient specialist, and of this number, half are admitted (Woods et al. 2008). Currently within the tertiary hospital this study was conducted in approximately 59% of patients attending the ED are referred to a specialty, and 32% of these patients are admitted to the hospital (Trimboli 2012).

There are a multitude of reasons for specialty referrals. Most commonly, patients attend the ED for emergency management and the treating practitioner requests an inpatient specialist consultation. This results in either an admission or discharge, with or without follow up (Cho et al. 2011; Woods et al. 2008). It is also common to refer to an inpatient specialist to discuss emergency cases for outpatient appointments and discharge planning advice. Patients also attend the ED as directed by an inpatient specialist for urgent review or admission, in which case the ED practitioner will notify them of the patient arrival and work collaboratively in treatment of the patient. In other situations, patients are referred to the ED by general practitioners for

specialist review, which in some cases may not occur based on the emergency practitioner's findings.

The referral process from one practitioner to another requires appropriate and timely communication in order to ensure safe care for patients (Reid, Moorthy & Forshaw 2003). No formal referral guidelines were found when a literature search was undertaken in 2003 in preparation for a study into referral practices among doctors in emergency medicine (Reid, Moorthy & Forshaw 2003). Despite finding a research gap the study only focused on emergency practitioner referring practices, rather than the referral processes. Lee et al. (2008) undertook a systematic review of the literature on ED consultation and referrals. They found that there was limited research on interventions that could be used to improve ED referrals and the consultation process. Woods et al. (2008) undertook a study that measured the frequency of consultation and the admission rates of referred patients from the ED, 'There are very few studies targeting consultation outcomes relevant to current ED practice' (Woods et al. 2008, p.26). It can be concluded that further research is required in understanding referral processes of emergency practitioners to both inter-hospital specialists.

The tertiary hospital this study was conducted in had no formal documents on referral standards or guidelines at the time of this study. It is expected, however, that all junior doctors and nurse practitioner candidates discuss their cases with an ED Consultant or Registrar prior to making a referral. Specialties within the tertiary hospital have documents that they provide to the ED as referral guidelines or patient pathway guidelines. The Burns Unit specifically has criteria for referral (See Appendix 1), which are based on current Australian and New Zealand Burn Association (ANZBA 2004) evidence-based recommendations. Guidelines are updated and maintained by the Burns Unit specialists and the ED practitioners receive education when this occurs. There has been limited research found from this literature review on the consultation and referral practices from ED practitioners to burns specialists. Further more, no research has been identified regarding patient outcomes and satisfaction from those who attend the ED with a minor burn.

According to McCabe (2001, p.673) specialists '...must be available to emergency departments in a manner that expedites patient care and meets the expectations of emergency physicians and their patients.' In conjunction to this, submissions have been made that EDs need to be able to hasten the discharge process and decision making surrounding patient plans (Cardin et al. 2003). In 1997 suggestions were made that emailing x-rays and clinical photographs was the future for remote emergency department referrals for specialist opinions (Buntic et al. 1997). This literature review has produced no research that trials photography as a referral tool for ED patients with a minor burn. It is the intension of this literature review to investigate the use of clinical photography in the referral and consultation process to specialists.

Currently after hours within the tertiary hospital this study was conducted in, plastics Registrars on-call for burn injuries can receive emails of burn injuries from the rural and remote setting. This practice allows for appropriate treatment and transfer advice (Monstrey et al. 2008). In addition, this allows the burns unit to obtain an initial photograph of the burn for their records. After hours there is currently no photographic documentation taken of a patient's burn on arrival. There is no current practice within the hospital that encourages photographic documentation for patients despite an up to date hospital wide protocol and consent paperwork available (See Appendix 2).

2.7. Clinical photography

Clinical photography is not a new concept within health care (Nelson et al. 2006). Wound care often relies on photography as an objective record, as it can '...clearly and consistently demonstrate clinical progression over time' (Cheadle 2008, p. 12). Wound photography is also valid in a medico-legal respect, as evidence (Nelson et al. 2006) and to aid teaching and diagnosis (Burns & Belton 2012). A study undertaken by Houghton et al. (2000) reported a high correlation between the assessment of wound appearance through photography and during bedside examination. Whilst the study supported in-person assessment, it was suggested that assessing wound healing using photographic images to be an important treatment strategy for the future.

Riley and Manias (2004) undertook a literature review on the use of photography in clinical nursing. They highlighted the varied uses of photography in nursing practice. Uses were grouped under the following headings: Documentation and surveillance; Therapeutic intervention; Teaching, learning and evaluating performance; and as a Research Method. The researchers commented on the need for appropriate ethical considerations and obtaining consent for use of clinical photographs for public examination. They also encouraged the use of photography to improve patient care and professional development, in new and creative ways, as its use to date '...has facilitated certain styles of research that would have otherwise been difficult.' (Riley 2004, p. 403).

In 1997 Buntic et al. published a paper titled 'Using the Internet for Rapid Exchange of Photographs and X-Ray Images to Evaluate Potential Extremity Replantation Candidates'. This article did not provide any details on the research techniques or outcome measures and therefore has limited scientific rigour. It did give specific detail on the methods used to transfer digital images to a remote specialist, using a case study approach to highlight how patients benefitted. The article provided ideas on ethical ways to transfer images, such as removing any patient identifiable details from images, only providing the receiving specialist with patient details over the telephone, using encryption software or private phone line connections when transferring data. The authors highlight these precautions are likely to add time and cost to the process (Buntic et al. 1997). This article's main focus was transferring clinical photographs in order to get an emergency patient the best possible care outcomes, although it did not give any evidence as to how this was achieved. Whilst the article has limitations, and it is over 16 years old, the desired outcome remains relevant to current research.

In 2002 Santamaria, Austin and Clayton reported on the Alfred/Medseed Wound Imaging System (AMWIS), a software program developed to accurately measure wound size and wound characteristics, in order to assist in determining the effectiveness of interventions. The AMWIS was later used in a prospective randomised controlled trial (RCT) that tested the effectiveness of digital imaging and remote wound consultation (Santamaria et al. 2004). This trial was undertaken across

four different sites within remote Western Australia where wound healing in patients was extremely poor. Control patients in this RCT received wound care treatment from local health professionals; the intervention group had their wounds digitally photographed and the photographs transferred to wound care specialists in Perth for review and treatment advice. Results found positive healing rates of 6.8% for the intervention group, while the control group had no evidence of healing, rather the wound increased in size by 4.9%. The evidence from this trial demonstrated how digital imaging combined with remote expert wound consultation could improve patient wound healing and health care outcomes. It further demonstrated the cost effectiveness of its use (Santamaria et al. 2004).

Since 2006 the Western Australian Department of Health, local nursing agencies and Curtin University have been working collaboratively to improve the management of patients with wounds and their outcomes. Their aim is to decrease the burden of wounds on public hospitals in the state of WA (Prentice et al. 2009). Three significant problems at the commencement of the project were:

1. Fragmented wound management due to poor continuity of wound care
2. Variations in clinical practice when treating wounds
3. Wound healing rates not being accurately tracked, benchmarked or costed.

A major strategy implemented to overcome these issues was a digital wound imaging and documentation system. Digital images of patient wounds can now be electronically stored using this system. Comparison over time and progression of the wound can be easily monitored. The referral and consultation process between health care providers has improved, demonstrating the positive effect of clinical photography in health care (Prentice et al. 2009).

Buckley, Adelson and Agazio (2009) report on a study undertaken to examine the usefulness of digital wound images in the referral and consultation process from a home-care nurse to a Wound Ostomy Continence specialist nurse (WOC). The trial involved a verbal handover from the home-care nurse to the WOC nurse, who would then make recommendations on wound treatments. Following this the WOC nurse was then given access to a digital image of the wound. Rationales for changes were then noted. Additionally, comparisons were drawn between the home-care nurse's

assessment and the WOC nurse's assessment. The study highlighted that the home-care nurses were often under-treating wounds, using inappropriate dressings or inaccurately describing them. This transfer of inaccurate information to the specialist therefore resulted in incorrect treatment advice. The use of the digital image prevented inappropriate specialist referrals, and resulted in appropriate referrals. Furthermore, it allowed education to be provided to home-care nurses so that best practice could be provided. The outcomes of this study highlighted that the use of a digital photograph improved wound management and patient outcomes in addition to ongoing education by experienced and specialised practitioners (Buckley, Adelson & Agazio 2009).

The quality of digital images has improved significantly over the last ten years (Sinard & Mattie 2005). A digital photograph can be viewed immediately, which is a benefit of this technology. If the image is found unsuitable for any reason, it can be retaken at no cost or harm. The ease with which digital images are obtained and how they are stored creates issues with consent and privacy (Burns & Belton 2012). A 2010 survey conducted in Central Australia found that of the 170 health professionals surveyed, 48% had taken medical photographs within the past 12 months, and of this one-fifth had taken the image using a personal phone (Burns & Belton 2012). Clinical photography '...evokes an invasion of privacy...' (Berle 2012, p.90) and it is therefore vital that strict protocol is followed when obtaining such images. The use of personal devices are in breach of the clinical photography policy and protocol at the tertiary hospital this study was conducted and is unethical and against basic human rights, regardless of whether a patient verbally consents or if good will is intended (Berle 2012).

2.8. Clinical photography in burns

Burn injuries have been described as being one of the most devastating injuries among people of all ages (Mashreky et al. 2008). According to the World Health Organisation (2008) even minor burns can affect an individual for a life-time if not treated appropriately. The severity of burns can be extremely variable (Williams 2009). Accurate assessment of all burns is therefore essential in order to provide a patient with the most appropriate care to promote recovery (Williams 2009).

According to Cancio, Lundy and Sheridan (2012) specific wound care management for burns can vary. A Cochrane review identified that there is a need for well designed studies evaluating the wound care management of burns (Cancio, Lundy & Sheridan 2012). Monstrey et al. (2008) highlight that because burns are usually varying in depth, it can be difficult to determine between conservative or surgical treatment, particularly as clinical evaluation is subjective.

In many cases, prompt referral to a burns specialist for opinion and management is the first step in the treatment process (Monstrey et al. 2008). This allows for early and appropriate intervention in order to improve patient outcomes (Rowley-Conwy 2012). Burns referral guidelines used in this study were based on current up-to-date evidence-based practice (ANZBA 2004) (Appendix 1) and encourage early referral. Research suggests that burn depth cannot be truly assessed until 48 hours post the injury (Cancio, Lundy & Sheridan 2012; Rowley-Conwy 2012). For this reason it is the practice of the Burns specialists to follow up any patient of concern within this time frame. Patients that are discharged from the ED are given burns unit follow up appointments no later than two days post initial burn. These appointments can only be obtained via plastic surgeon or burns registrar consent.

Burns have been documented using photography as early as the Second World War (Nelson et al. 2006). It was not until digital photography technology became accessible in the early 2000's that documenting burns and their progression became useful as delays in obtaining the images were reduced (Nelson et al. 2006). Jones et al. (2003) found the use of digital images to assess a burn is a reliable technique for assessing depth and differentiating burn injuries. To date, the Burns Unit uses digital photography for inpatient progress documentation, rural and metropolitan hospital referrals and teaching purposes. This mode of referral however, has not been used between the ED and the Burns Unit. As previously described, this ED has no processes for using digital photography to either refer to specialists or document patient conditions.

A burns unit within the UK established a means of taking digital photographs of patient burns at regular intervals and went onto undertake research to evaluate the

usefulness of this practice (Nelson et al. 2006). This study used questionnaires for nursing and multidisciplinary staff that worked in the burns unit. The results found that 93% of staff found photographs useful, particularly for patient management and improving patient outcomes. The study used a Likert scale to provide a quantitative method of analysing a subjective topic. Although this was opinion based and the outcomes of assessment using digital photographs were not measured it provides positive feedback from those who use the intervention.

Roa et al. (1999) undertook a study that highlighted the advantages of using digital photography in health care. The authors made the suggestion that advancing technology has many varied benefits to health care, '...it becomes important to establish communication among the different areas of the hospital that generate the information on the patients.' (Roa at al. 1999, p. 623). In addition to improving communication within and between hospitals, it was suggested that costs would be reduced through a paper-less system. The results of this study found a 90% success rate of assessments when using different file types to transfer the digital images. They suggest that using new technology that compresses files, such as JPEG format, will not affect the accessibility of the image being reviewed. Jones, Wilson and Andrews (2003) undertook a similar study that compared burn depth assessment from photographs with file sizes of 2.25, 5.5, and 9 MB per image. They concluded there was no significant advantage in using larger file sizes to safely assess burn wounds.

Monstrey et al. (2008) wrote an article reviewing current modalities used to assess burn wound depth. This article suggested that for initial burn assessment within the ED '...telemedicine is an effective technique to get expert advice with the simple transmission of burn images and information...' (p. 766). It was recommended that because burn depth is difficult to access in the first 24 hours, an image with an accurate history given to a burn specialist will lead to appropriate treatment decision making. The authors further argue that the best tool ED clinicians have for this purpose would be using mobile phone with digital photograph capabilities (Monstrey et al. 2008).

A retrospective study by Boccara et al. (2011) found the use of photographic evaluation of burns via digital photography to be clinically useful in early evaluation and diagnosis. The study found depth assessment of burns via digital photography to be 76% exact, with errors more likely to overestimate the burn depth. Although it is highlighted that photography cannot replace clinical evaluation '...it is complementary and irreplaceable given the fact that it is easy to perform, consult, stock and communicate' (Boccara et al. 2011, p. 72). The researchers discuss that any early evaluation of burn depth, prognosis and treatment can be difficult, and reassessment is important no matter what medium of assessment is used (Boccara et al. 2011). From a retrospective analysis, it was concluded that clinical burn photography needs to be standardised. It was stated that as technology improves, the quality of image for examination is also likely to improve (Boccara et al. 2011).

In 2007 Shokrollahi et al. undertook a study to investigate the accuracy of evaluating the surface area and depth of minor burns using a mobile phone with digital camera capabilities. They highlighted the significant time delay and infrastructure required to send a burn photograph via a computer compared with a mobile phone. They used two burns surgeons in their study of burns unit patients: one would assess the burn in person, the other would receive the image on a mobile phone to access; the outcomes were compared. Their study found mobile phones could be a reliable tool in the assessment of minor burn depth and size (Shokrollahi et al. 2007). The researchers argued that using mobile phones using different transmission modalities, for example email, are important in the treatment and evaluation of burns patients in modern society. They highlighted issues of consent, photograph storage, anonymity, and the need for 'unit' supplied mobile phones rather than personal phones. At the time this study was being designed, the ED that this study took place, had no mobile phones with this capability, however the Burns Unit had 'unit' mobile phones capable of receiving photographs. The ED does not have a secure confidential database in which patient images are stored, however the Burns Unit does maintain one. Certainly the article by Shokrollahi et al. (2007) is informative and thought provoking in regards to potential future studies relating to the use of ED mobile phones or tablets with digital photography capabilities. If research continues to prove that mobile phone photography is of a satisfactory standard to maintain best patient care, then research is

urgently needed that explores issues of consent, confidentiality and ethical behaviour by health care practitioners using such technology.

2.9. Clinical photography in the ED

There was little research to be found on the use on the use of clinical photography within emergency departments. Cheadle (2008), a UK emergency nurse practitioner, described her frustration with the lack of guidelines for obtaining informed consent within the ED when obtaining clinical photographs. She explains how she implemented policies and procedures for the ethical process of ED clinical photography. Significant points Cheadle (2008) highlights as necessary to address were:

1. Having appropriate guidelines for taking and storing clinical images in line with organisational, state and federal policies and Privacy Acts.
2. The need for written, informed consent if images are to be viewed publicly.

Cheadle (2008) briefly discusses the creation of an image database that will be introduced to ensure privacy of patient images, however gives no indication if this is for the ED only or hospital-wide, nor does she provide further details on the processes involved. Whilst her article is interesting and informative in providing examples of written consent forms, staff guidelines to follow to obtain consent, and patient information leaflets, the paper lacks references and research specific to the implementation.

Through the literature search there is evidence of digital photographs being used in the referral process from hospital to hospital. There is however no evidence of its use for intra-hospital referrals within this literature search. Furthermore, there has been limited evidence found relating to the use of digital photographs from the ED to burns specialist in referrals or consultations. This highlights a research gap for future studies.

2.10. Major Findings

This literature search highlights that a large amount of research has been undertaken which establishes that emergency department overcrowding contributes to negative patient outcomes (Sprivulis et al. 2006). One significant cause for overcrowding in

the ED is the number of patients awaiting specialist review (Lee et al. 2008). Little research has been conducted in the referral process and delays in obtaining specialist review for emergency patients and, therefore, few interventions to overcome this issue have been suggested or discussed within literature.

The nurse practitioner role is a relatively recent initiative to improve ED efficiency and meet patient care demand (Jennings et al. 2008). Research supports the continuation of the role within emergency departments (Jennings et al. 2009). As this is a new role there is little research undertaken by emergency nurse practitioners to contribute to interventions that will assist in reducing emergency department overcrowding. In particular, no research has been identified describing or examining the referral processes or practices of the emergency nurse practitioner to specialist doctors. This consolidates the need for research on emergency nurse practitioner, and medical practitioner, referral processes and practices.

Wound photography is common in healthcare (Nelson et al. 2006). Technology is advancing rapidly. In order to keep up with growing healthcare demands, technology must be used and managed appropriately. Much research has been undertaken over the last ten years that highlights the quality and benefits of using photography in healthcare (Buckley, Adelson & Agazio 2009; Santamaria et al. 2004). Current research shows that due to the quality of digital photographs, specialists are in fact able to remotely assess wounds safely via images and improve patient health care outcomes. There have been two significant studies, Shokrollahi et al. (2007) and Boccara at el. (2011) that support the sending of images via mobile phones. With this in mind, the concept of sending emergency patients' images to specialists for review is not an unreasonable desire however further research is required to validate this method. There also needs to be more research on ethical issues surrounding the use of this new technology.

2.11. Conclusion

This literature review highlights that more interventional research is required in order find ways to reduced overcrowding and length of stay for patients within the ED. The referral process of ED practitioners lacks research, specifically between the ED and

burns specialists. Further research is required on the use of clinical photography within the ED and ethically within a referral process. These gaps in research highlight why trialling clinical photography in the referral process to a burns specialist from an ED nurse practitioner in order to reduce a patients' length of stay in the ED is beneficial.

3. METHODS

3.1. Introduction

The review of the literature uncovered limited research describing or assessing the referral processes from emergency practitioners to burns specialists in house. There is a strong body of evidence that has found remote consultation and referral using a digital photograph to be effective (Buckley, Adelson & Agazio 2009; Santamaria et al. 2004), however this process has not been trialed within a hospital. The following chapter describing the methods used, will examine the steps in which the researcher went through in order to address this knowledge gap. The aim of this study is to investigate an approach for decreasing burn patients length of stay. The approach was to use an alternative referral process; in particular this was a pilot study testing the process in preparation for a randomised control trial.

3.2. Description of research design

In order to trial this interventional process of referral, a pilot study was appropriate in preparation for a randomised control trial (RCT). Lancaster, Dodd and Williamson (2002) identify that pilot studies are important in the planning and integrity of a randomised control trial in order to test study processes, protocol, randomisation procedures and data collection forms, allowing for any adjustments prior to the commencement of the subsequent RCT. A pilot study is much like a 'mini replica' of the randomised control trial proposed. This allows the study design and methods to be tested to determine if it is: feasible, can be accomplished in the time available, cost effective, produces any adverse events, and to estimate the effect size of the intervention. With this information an appropriate sample size can be predicted and the study design improved before beginning a complete and extensive trial (Richardson-Trench et al. 2011). In particular un-anticipated variables will be exposed in the pilot. It was also important to find out what the true recruitment rate of participants would be, rather than the number available or predicted for the study (Kendall 2003). Whether instruments or study procedures were appropriate and effective for the RCT can be tested, and if they are not, finding alternatives that will

be effective is necessary. The amount of time required to recruit and run the study can be evaluated, together with the number of recruits required to establish statistical significance. Essentially, this pilot study was undertaken as a 'practice run' for the RCT so that when the time comes to do that research project, all the issues and problems will have been resolved.

This is a single blinded randomised trial, in which participants were blinded to the intervention. The researcher was aware of which participants received the intervention. In order to blind all participants from knowing which group they were allocated, a photograph was taken of all. They were not told whether their photograph was emailed to the burns registrar or not, nor were they told what the normal referral process was. The researcher, Plastics Registrar and Burns Registrars were unable to be blinded to the study. If the Burns Registrar received a referral, he was aware that he was involved in trialing the new referral process. The Plastics Registrars were informed of the study plan prior to its commencement, however they were not informed of the study at each referral.

3.2.1. Study setting

This study took place in South Australia, within a large tertiary hospital Emergency Department (ED). It is an adult hospital, treating all patients over the age of 18 years within a 650 bed facility in the centre of Adelaide city. It is the major trauma centre for the centre of Australia, having the only adult Burns Unit. It receives patients not only from within South Australia, but also services Northern Territory, remote Queensland, Western Australia, New South Wales and Victoria. Patients can be flown into the hospital via Royal Flying Doctors Service, the South Australian Retrieval or Ambulance Service, or present via foot for treatment. The majority of all patients admitted will be admitted via the ED. The hospital is located in a convenient central business district position. This means the ED treats many overseas travellers, homeless and non-emergency patients who find the location accessible. The hospital is unable to turn patients away, although alternatives can be suggested, the hospital is required to provide a health service to all who seek it.

The study took place within the minor injuries area of the ED, called Area B. Minor injuries refers to all non-life threatening and low acuity illness. The trial was commenced in mid July 2012 and continued until early September over a seven-week period.

3.2.2. Participants

Selection for the study was based on eligibility for inclusion. The criteria were based on the researcher's legal scope of practice, the burns specialist availability and participant ability to consent. The following criteria were used when recruiting participants. The participant had to meet the ED nurse practitioner/candidate Scope of Practice (See Appendix 3). The participant had to be able to provide informed consent. The participant needed to be over the age of 18 years. The participant needed to have a minor burn that met the Burns Referral criteria (See Appendix 1). The participant had to present to the ED during the hours of 1700 – 2300 Monday to Friday and 0800 – 2300 Saturday and Sundays or any time the Burns Registrar was not on the hospital grounds.

Exclusion criteria were created to prevent ineligible or inappropriate participants being enrolled into the study. The following exclusion conditions were applied to potential participants. If they were under the age of 18 years. The burn injury was beyond the scope of practice of the ED nurse practitioner/candidate which meant that it included one of the following:

- Burns are greater than 10% total body surface area
- Airway burns
- Facial burns
- Eye burns
- Perineum burns

Potential participants were also excluded if they were unable to provide informed consent or if they declined to take part in the study. If the patient did not require a burns referral according to the criteria set by the Burns Unit they were also excluded from the study.

When informed consent was being sought, all participants were given information regarding their ability to withdraw from the study at anytime. They were informed that withdrawing from the study would not affect their health care however withdrawing may increase their length of stay in the ED. If a participant decided to withdraw at any time, all data collection was ceased, photographs deleted and document reasons for withdrawing if supplied. The participant's care then returned to current ED practice immediately if withdrawal from the study was chosen.

Possible reasons for a participant withdrawing include:

- If the participant changed their mind, and decided not to consent and participate for any reason.
- If the participant choose to leave the emergency department before treatment was complete.
- If the participant absconded from the emergency department.
- If the participants health status deteriorated for any reason, and the nurse practitioner/ candidate was no longer able to treat them.

Circumstances causing withdrawal from the study for other reasons included:

- If the Burns Registrar was unable to view the emailed image.
- If the image sent was inadequate for the Burns Registrar to make a decision.
- If the Burns Registrar was unable to be contacted.
- Any equipment error - camera/transfer of image/email.
- If the on-call plastics registrar was contacted regarding the patient and requested to review the patient.

A record of participants that chose to withdraw from the study was collected. If any participants chose to withdraw from the study they were asked to comment on reasons why, in an attempt to find out ways to improve recruitment for the future RCT. Participants did not have to comment if they chose not to. A record of participants who were forced to withdraw from the study due to other reasons was also noted throughout the study. Again, reasons for withdrawal were documented in an attempt to improve the research process for the future RCT.

3.2.3. Sample size

A power calculation was performed using patients who attended the ED from January to June 2012 that fit the study enrolment criteria. This was done in preparation for the RCT in order to identify the number of participants required. It was found that a sample size of 130 in each group will have 80% power to detect a difference in means of 30 minutes in length of stay assuming that the common standard deviation is 86 minutes using a two group t-test with a 0.05 two-sided significance level.

Based on the pilot study results, a revised power calculation was performed. A sample size of 10 in each group would have 80% power to detect a difference in means of 65.730 minutes between groups assuming that the common standard deviation is 49 minutes using a two group t-test with a 0.050 two-sided significance level. Allowing for a non-parametric test, we add approximately 18% to the required sample size. The new sample size would therefore be 12 per group.

3.2.4. Interventions

All paperwork and equipment was stored in a portable file in a locked cupboard in a treatment area of the ED. Each participant was allocated an envelope, containing the *Research Participant Information Handout* (See Appendix 4), *Study Consent Form* (See Appendix 5) and a *Documentation Sheet* (See Appendix 6).

The *Research Participant Information Handout* provided to the patient contained the study title, the purpose of the study, a brief description of the research procedure, confidentiality assurances, possible risks or discomfort of participation, approval assurances and details and relevant contact numbers for complaints or questions. It was recommended that the patient retain this information sheet.

The *Study Consent Form* listed the study title, researchers' names and roles. The patient was asked if the nature and purpose of the research project had been explained and if so, did they understand this and still agreed to take part in the study. They were asked if they received a research study information handout and if they understood that they would not benefit from taking part in the study. They were told that while information gained during the study may be published, they would not be

identified and personal results would remain confidential. They were asked if they understood that they did not have to take part in this research study and could withdraw from the study at any stage and that this would not affect their medical care, now or in the future. It was asked if they had taken the opportunity to discuss taking part in this investigation with a family member or friend and were given time to think about their decision to take part in the study and if they had the opportunity to ask questions, for which satisfactory answers were provided. They were required to agree to photographs of their burn injury being taken and emailed to the burns specialist for opinion, including personal details within the photograph. They were required to agree to their burn injury photographs to be stored within my paper records or on the Burn Unit secure hard drive. The name, date and signature of both the participant and the researcher were recorded at the bottom of the sheet.

The *Documentation Sheet* had the following documented on it for the researcher to fill out:

- Time participant booked into the ED
- Time the researcher attended to the participant
- Control group or trial group?
- Time of referral to Burns or Plastics Registrar
- Time Burns/Plastics provided a treatment plan
- Time the participant was discharged from the ED
- Participant descriptions – triage category, gender and age
- Any comments, ie: withdrawal reasons, delays

3.2.5. Randomisation

In order to find out the sequence of recruitment into the study, randomisation was required. Randomisation was generated prior to the start of the trial using the True Random Number Service (http://www.random.org) providing sequence of allocation into the control or intervention group. The results were generated in the form of pictures of randomly allocated coins, heads and tails. An independent colleague, who was not involved in the study and not shown the randomisation chart, was asked to allocate the intervention and control groups to either heads or tails. It was decided that 'tails' represented the intervention group and 'heads' represented the control group.

Each participant envelope was then labeled with either 'control' or 'intervention' and numbered accordingly from 1 to 20 and placed in the file.

3.2.6. Informing the participant

All patients who fitted the study inclusion criteria were introduced to the trial by the researcher after their injuries were assessment and early treatment provided. Early treatment interventions included first aid treatment, providing analgesics, education and reassurance. The researcher discussed the reasons for the study, its aims, the processes involved and how consent would be sought. This was discussed with the patient, and their family or friends. If the patient indicated they would be interested in participating in the study, the *Research Participant Information Handout* was provided to them to read and time given to make an informed decision to participate or not. If the patient agreed to participate they were then provided the *Study Consent Form* to read. They were encouraged to ask questions of the researcher prior to signing the consent form. Once consent was gained a copy of the form was made and placed in the research file. The original was placed within the participant's case notes and documentation was made within the case notes and also in a discharge letter that notified the reader of the person's consented involvement in the study. Participants were given or mailed a discharge letter.

3.2.7. Obtaining participant photographs

Regardless of the group allocated, all participants had their burn photographed in order to blind the control group. Within each photograph a ruler was included to provide an accurate scale, together with an identification sticker to link the image with the patient. Identification stickers are generated for all patients on booking into the emergency department, they include the patients' full name, date of birth, arrival time, address and unit record number. All participants were made aware of this identification process verbally, via the handout and consent form. Between three and six photographs were taken of each participant burn injuries. This allowed for the best images to be selected for review. A minimum of two images were emailed to the Burns Registrar. The number varied depending on the researcher's clinical judgement

as to provide the burns registrar with sufficient detail, particularly if there were multiple locations of the burn injuries.

The quality of the photograph was standardised in the following ways, as recommended by the Burns Registrar:

- No flashes were used, the only light used was the overhead fluorescent light in the treatment room.
- Patients were all photographed in the same location of the ED
- The same overhead light source was used
- Images were be taken at approximately 30cm distance from the burn
- A sterile green sheet was placed under all burns
- The same 5 megapixel digital camera was used to take all photographs
- Nil zoom was used

The camera used in this research project had a 5-megapixel iSight camera with an image size of 2592 pixels x 1936 pixels. The lens had an f 2.8 aperture. Post capturing the image, its size was reduced in order to accommodate the email size limit, this was done in an application on the camera. When the photograph was reduced by half, this resulted in both dimensions being reduced by half to have a new image size of 1296 x 968. This meant the photograph contained ¼ of the pixels of the original.

3.2.8. Referral process

If the participant was allocated to the intervention group their photograph was emailed to the burns registrar using the hospital secure email network. The Burns Registrar was first called on his speed dial to see if he was able to take the referral. If they were unable to access their work email for any reason or was unable to take the referral the participant was with-drawn and the Plastics Registrar was called. If he was happy to accept the referral the image was then emailed to him.

In order to attach the photographs to an email message, the digital camera was connected to the ED computer with a USB cable. The researcher's email account was then opened and a new email was opened. In order to attach the photographs the insert file icon was 'clicked' which automatically opened the 'My Documents gallery'. My

computer option was 'clicked' and the camera connected to the computer could be visualised. This was 'clicked' on, opening all photograph files. The appropriate file was chosen and attached to the email. This process was repeated until all the photographs were attached. The email was then addressed to the burns registrar with the subject title 'ED Burn for review'. A brief email was written with the following relevant referral information:

- Time and location were burn was sustained
- Location of burn
- First aid
- Burn size
- Description of burn – including approximate size and depth
- Past medical history
- Medications and allergies
- Profession
- Hand dominance
- Contact number to recall the ED.

The Burns Registrar using a desktop computer or an iPad tablet, viewed the images. Given the security restrictions the hospital email has in place, it is not possible to have emails streamed onto an iPhone or into a private email. The Burns Registrar accessed the hospital website via the website. He selected *Resources*, which opened a vertical list of options. Of these, he scrolled down to *Outlook Web Access (EMS)* and selected this option. A new page then opened. A username and password was required to be entered, in order to access the email account. Once the account opened post entering username and private password, the appropriate email was selected and opened. This was identifiable to the Burns Registrar by the research sender name *'McLeay Kate (Health)'* and title of the email, which consistently read *'RAH ED Burn for review'*. It is important to note that after a five minute period of inactivity the email would automatically be logged out and access denied. The images were opened and viewed. They were not saved until the Burns Registrar was at the hospital and the images could be saved onto the P Drive in the Burns Unit. The Burns Registrar would recall the ED and receive a verbal hand over from the researcher.

If the patient was allocated to the control group, the Plastic Registrar on call was contacted to review the patient in the ED as per usual practice. The photographs taken were not used in the referral process. The photographs were emailed with relevant information, to the burns registrar at the end of the researchers shift. This was done so he could comment on what his plan and interpretation were. This was then compared to that of the Plastic Registrar. This also provided the Burns Registrar with an initial image that could be referred to when the patient attended the follow up patient appointment.

3.2.9. Specialist management

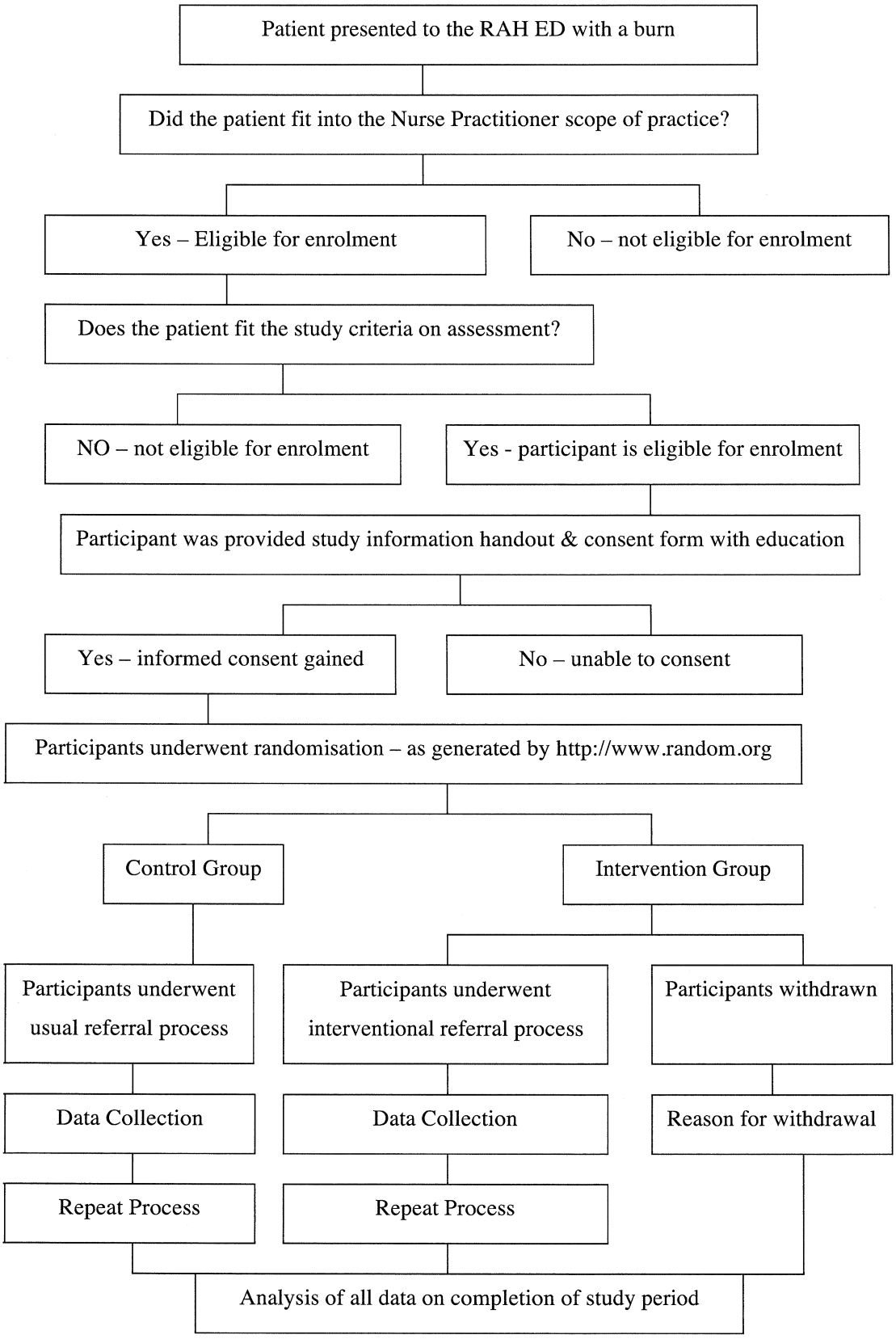
At this point, either the Burns Registrar or the on-call Plastic Registrar then directed interventions for management of the burn. The Burns Registrar would provide a treatment plan over the telephone, whilst the Plastics Registrar would provide one in person. Interventions included removing blisters, referred to as 'deroofing', scrubbing or cleaning the burn, applying specific dressings with education on care, providing antibiotics and analgesics with education and in some cases instruction not to attend work until further review. The participant was referred to either the Burns Unit, or their General Practitioner for follow up depending on severity of the burn. If the specialist requested follow-up in the Burns Unit, the participant was given an appointment card with location, contact number, time and date on it. The researcher called the Burns Unit nurses to arrange this appointment. Burns unit out patient appointments would only be granted on approval by the Burns Registrar, or Plastic Registrar. All participants received education on signs and symptoms of deterioration, reasons to rest and or elevate limbs and were reassured. Sick certificates or work cover forms were provided if required. Dressing information hand-outs were provided.

3.2.10. Data collection

Throughout the above processes the researcher filled out the *Documentation Sheet*, in order to obtain accurate data collection. Once a patient was found to meet recruitment criteria, randomised into a group and informed consent was gained the documentation sheet was commenced. The time the participant booked into the ED was first documented. This data was gained from the EDIS – HASS computer system. This

cannot be altered in any way by the researcher or another external party. The time in which the researcher first attended the patient was obtained from the EDIS – HASS screen and documented. In order to change this time a password must be entered and this information can be traced. Control group or study group allocation was documented as indicated on the envelope. This could be cross checked with the randomisation sheet that was obtained by the researcher and numbered, which was kept in the front of the researcher's portable file. Time of referral to the Burns or Plastics Registrar was documented as the time noted at the end of the referral telephone call. This was also documented on the EDIS – HASS screen, which is usual practice for all referrals made. The time that the Burns or Plastics Registrar provided a treatment plan was then documented. This time refers to when the telephone conversation ceased with the Burns Registrar and when the Plastics Registrar either verbally notified the researcher of a treatment plan or post documentation. Time the participant was discharged from the ED was documented as to the time they physically left the ED, this was also documented on the EDIS - HASS screen. Once the participant had been discharged, participant descriptions were documented, triage category, gender and age, as were any comments of interest. This information was then filed into the participant envelope with a copy of their consent form and placed at the back of the file.

3.2.11. Flow Chart



3.2.12. Outcome measures

The hypothesis for this study was, 'The use of clinical digital images in the specialist referral process will reduce length of stay for minor burn patients in the ED.' The primary outcome for this study was therefore length of stay in the ED. Length of stay was measured from the time the researcher first attended the participant, to the time they physically left the ED. Throughout the study, length of stay measurements were recorded as described above.

3.2.13. Ethical Issues

The data collection and process outlined within this study adheres to the National Health and Medical Research Council's (NHMRC) National Statement on Ethical Conduct in Human research (2009). The main ethical issue in this research project was maintaining all participants' private information, as guided by Federal privacy legislation, Privacy Act (1988) and Privacy Regulations (2001). Participant clinical photographs were collected under the Government of South Australia Information Privacy Principles Instruction (IPPS) 2009. These guidelines were introduced to regulate how personal information is collected, stored, used and disclosed (Government of South Australia 2009) and are based on the National Privacy Principles. The use of clinical photography for clinical records for the primary purpose of assisting in the patients' clinical care does not require written consent, verbal is sufficient. These images must remain confidential, like all patient notes and are only to be used for their verbally consented purpose relating to treatment. Written consent is required for all research or educational requirements. For the purpose of this study, patient information and consent documents were made (See Appendix 4 & 5). Informed written consent was gained from all participants. Patients unable to provide informed consent were excluded.

Obtaining informed consent requires the transfer of information from a practitioner to a patient to explain a procedure, its complications and outcomes (Alexander 2005). The presence of stress affects this transfer as it alters a person's ability to think clearly and process information due to fear or confusion. The presence of these stressors stop

a person from granting permission whereby preventing true informed consent (Alexander 2005). Patients that attend the ED are generally experiencing pain, fear, confusing and heightened emotions. The ED may address such issues with narcotic analgesics or other medication. Examples such as these highlight the nature of stressors that can affect a patient as to prevent informed consent being gained. If the stressful ED environment affected a patient and their mental state prevented them from providing informed consent, they were excluded from the trial. Patients were given the opportunity to withdraw from the study at any time without judgment and without their care being affected. Patients were given the opportunity to ask the researcher questions and discuss concerns with family and friends.

The patient's hospital identification number label was included within all photographs taken, providing multiple patient identifiers. Patients were made aware of this via the information sheet and verbally by the researcher. Participant privacy and confidentiality was maintained by ensuring that all photographs were transferred via the secure email network. It would have been time effective to send images to the burns registrar work iPhone however the researcher did not have a work iPhone and a personal iPhone could not guarantee participant confidentiality. The photographs were emailed only to the Burns Registrar using his work email. All photographs were taken using the same digital camera, which was stored within the locked ED nurse practitioner filing cabinet. Only the two nurse practitioners or three candidates had access to the filing cabinet. All photographs were deleted from the digital camera post emailing the image to the Burns Registrar. The photographs sent to the Burns Registrar were only stored within the Burns Unit secure P Hard Drive as necessary by the Burns Registrar.

The hospital research and ethics committee, and the University of Adelaide ethics committee, prior to proceeding with data collection, approved this study. Written approval was provided from the Burns Nurse Manager (See Appendix 8) and Critical Care Director of Nursing (See Appendix 7). Verbal approval was provided from the Emergency Department Medical Director. All Plastics Registrars were informed of the study prior to commencement. The Burns Registrar consented to participate in the study as an investigator.

3.2.14. Data Gathering Instruments

The *Documentation Sheet* (See Appendix 6) was the primary tool used for collecting data during the collection phase. The primary research outcome was measured, participant length of stay within the ED based on the time that participant attended the ED and the time they were discharged from the ED. Secondary data was also recorded. This included the time the nurse practitioner candidate attended to the patient, the time that the specialist received the referral and the time that the specialist provided a treatment plan for the participant. Participant demographics were recorded for comparison, age, gender and triage category. Any delays, issues, withdrawal reasons or researcher comments were also documented on this sheet.

3.2.15. Issues of Validity & Reliability

It was anticipated that specific biases existed within the study and therefore may influence the results. Bias has been described as '...the deviation of results from the truth, due to systematic error in the research methodology' (Kendall 2003, p 164). Both the researcher and the referring specialists were not blinded to the randomisation process. The researcher prepared the participant envelopes prior to commencing the study. The Burns Registrar was made aware prior to the study commencing that when he received a referral that participant was within the interventional group. The Plastics Registrar was not informed of the trial at any time of referral however were informed of the study prior to its commencement. This gives opportunity to skew results and affect the study outcome. It was not possible to arrange this study in a way that blinded the researcher or specialists involved in the study.

A pilot study in preparation for a randomised control trial was chosen because this was the best way to test the safety and efficacy of the new intervention being trialled (Hartman et al. 2002). Randomisation was generated prior to the start of the trial using the True Random Number Service (http://www.random.org), this organised the random allocation of participants into the control or intervention group. Strict inclusion and exclusion criteria were adhered to in order to prevent selection bias. Integrity of the randomisation process was tested through statistical analysis of confounding variables to compare the control and intervention groups. In particular, groups were checked to confirm that they were statistically similar in age, gender and triage category therefore selection or susceptibility biases did not occur (Hartman et al. 2002).

The participants recruited into the study were always blinded. This was achieved through making the intervention and control appear similar. Each participant had their burn photographed. The participants were not informed how their photograph would be used specifically in the referral process, or what the current process of referral was, therefore remaining blinded to which study group they were allocated. In order to prevent withdrawal bias, a detailed account of any participant withdrawals were recorded and reported. An independent statistician was used to assist with the analysis and reporting of results so that appropriate statistical methods could be employed, removing bias from this process. Primary outcomes were based on the hypothesis predetermined prior to commencing the study as to prevent bias in any conclusions drawn when interpreting the results (Hartman et al. 2002).

The data collection tool was not tested for reliability. A panel of experts should have been used to consider the data collection tool and ensure its validity and give advice regarding any other data that should have been collected. This is recommended for the future RCT.

3.3. Statistical Analysis

Data collected were analysed with SPSS 19 for Windows. Descriptive statistics (counts, percentages, means and standard deviations) were calculated to compare participants in the control and intervention group. Comparison of primary results was

undertaken through a Mann-Whitney U-test, an independent t-test based on rank. For skewed data, medians and inter quartile ranges were provided.

3.4. Conclusion

This chapter describes the methodology used to conduct this pilot study. A detailed description has been provided of the study design, the study setting, the potential participants and the interventions used. Ethical, validity and reliability issues were explained. Data gathering instruments were summarised. A concise description of the statistical analysis used has been given in preparation for the next chapter that will provide the study results. Despite the primary outcome being to compare length of stay of the control and intervention group, it is the aim of this study that it can be effectively replicated for a randomised controlled trial.

4. RESULTS

4.1. Introduction

The methods for undertaking this research study were discussed in chapter three. It was the purpose of this chapter to report the results from this pilot study. Descriptive statistics will be presented to compare participants in the control and intervention groups. A Mann-Whitney U-test has been used to report the primary outcome, length of stay within the ED. As this was a pilot study in preparation for a randomised controlled trial, problems, findings and alterations made throughout the study will also be reported as highlighted from subheadings.

4.2. Results

Over a seven-week recruitment period a total of thirteen participants were enrolled into the study. They were randomly allocated into one of two groups. Five participants were allocated into the control group, receiving standard care. Eight participants were allocated into the study group who received the alternative intervention according to the pilot protocol. Two participants were withdrawn from the intervention group and therefore excluded from the data analysis.

4.2.1. Description of two groups

Demographic characteristics of the participants were measured to determine if confounding variables were equally distributed between the control and intervention groups. On statistical analysis of the participants' age, gender and triage category, it was found that there was no statistical difference between these demographic variables.

4.2.2. Age

An independent samples t-test was performed to compare participant ages. Statistically no difference was found as shown in table 1.

Table 1: Age

		t-test for Equality of Means						
		t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
							Lower	Upper
Age	Equal variances assumed	-1.293	9	.228	-8.367	6.470	-23.004	6.270
	Equal variances not assumed	-1.332	8.908	.216	-8.367	6.280	-22.595	5.861

The mean age for the control group was approximately 28.8 years old and the mean age for the study group was 37 years old as shown in table 2. These results highlight that were was little variation between the groups which is also not clinically significant.

Table 2: Mean age

Group	**Number**	**Mean**	**Std. Deviation**	**Std. Error Mean**
Control	5	28.80	8.815	3.942
Intervention	6	37.17	11.974	4.888

4.2.3. Gender

A chi-squared test was performed to compare participant gender. Statistically no difference was found as shown in table 3.

Table 3: Gender

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	.244[a]	1	.621	1.000	.576	
Continuity Correction[b]	.000	1	1.000			
Likelihood Ratio	.249	1	.618	1.000	.576	
Fisher's Exact Test				1.000	.576	
Linear-by-Linear Association	.222[c]	1	.637	1.000	.576	.455
N of Valid Cases	11					

There were four females recruited into both the control and study groups. There was one male recruited in the control group and two in the study group. There was a total of 73 per cent females recruited compared with 27% males of the groups combined and these results are shown below in table 4.

Table 4: Gender percentages

	Control		**Intervention**		**Total**	
	Count	% within control group	Count	% within intervention group	Count	% within intervention and control
Male	1	20.0%	2	33.3%	3	27.3%
Female	4	80.0%	4	66.7%	8	72.7%
Total	5	100.0%	6	100.0%	11	100.0%

4.2.4. Triage category

A chi-squared test was performed to compare participant triage category. Statistically no difference was found as shown in table 5.

Table 5: Triage category

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	1.320[a]	2	.517	1.000		
Likelihood Ratio	1.698	2	.428	1.000		
Fisher's Exact Test	1.353			1.000		
Linear-by-Linear Association	.540[b]	1	.462	.675	.392	.271
N of Valid Cases	11					

There was only one priority 2 participant recruited throughout the study, whilst there were five priority 3's (45.5%) and five priority 4's (45.5%).

Table 6: Triage percentages

		Control group		Intervention group		Total	
		Count	% within control group	Count	% within intervention group	Count	% within control& intervention group
Triage category	**2**	1	20.0%	0	0.0%	1	9.1%
	3	2	40.0%	3	50.0%	5	45.5%
	4	2	40.0%	3	50.0%	5	45.5%
Total		5	100.0%	6	100.0%	11	100.0%

4.2.5. Outcome measure

A Mann-Whitney U-test was used to evaluate the hypothesis that the intervention group would have a decreased length of stay within the ED. This non-parametric alternative to the independent t-test was used, as the data was not normally distributed. Table 7 shows the statistical significance value of the test. From this data it can be concluded that there is no statistically significant difference between the intervention and control group's median length of stay in the ED ($U = 5, P = < 0.082$).

Table 7: Length of stay in ED

	Seen to discharge
Mann-Whitney U	5.000
Wilcoxon W	26.000
Z	-1.826
Asymp. Sig. (2-tailed)	.068
Exact Sig. [2*(1-tailed Sig.)]	.082[b]
Exact Sig. (2-tailed)	.082
Exact Sig. (1-tailed)	.041
Point Probability	.015

Table 8 describes the comparison of length of time spent within the emergency department for each group. The mean rank highlights that the intervention group has the shortest length of time.

Table 8: Discharge Ranks

Groups 1=Intervention 0=Control		N	Mean Rank	Sum of Ranks
Seen to discharge	0	5	8.00	40.00
	1	6	4.33	26.00
	Total	11		

The data was not normally distributed therefore an inter-quartile range (IQR) was calculated replacing the standard deviation. The median time for the control group was 125 minutes (2 hours and 5 minutes) and for the study group is was 68.5 minutes (1 hour and 8.5 minutes).

Table 9: Time to discharge

Group	N	Median	IQR
Control	5	125.0	121.5
Intervention	6	68.5	54.8

4.3. Findings relating to the Emergency Department

4.3.1. Technical aspects photography

The researcher discovered when first attempting to transfer the digital photographs from the first study participant to the Burns Registrar, that the hospital email would not accept files that combined with the email, were greater than 10 megabytes in file size. Unfortunately the size of the photographs could not be reduced at this time and the images could not be emailed. This resulted in the first participant being

withdrawn from the study. An alternative camera had to be used that allowed the user to change the image size in order to attach the file to the email.

The adjusted process required the image to be opened in a separate program on the camera. The camera had to be closed and the image adjustment program had to be opened, via the camera touch pad. Once opened the appropriate photograph could be chosen, via a single touch on the touch pad screen. The option to make the image half the size was selected and the image size was reduced. The image was automatically saved in the photo file of the camera and accessed via the same process as all other photographs on attaching the camera to the desktop computer.

4.3.2. Maintaining participant safety

A second study recruit was withdrawn from the study. The Burns Registrar was unable to determine if the patient's injury was sustained from a burn or was a skin reaction. The injury sustained was ten days old when he attended the ED and symptoms had developed gradually after a chemical burn to the thigh. This uncertainty led the Burns Registrar to request the Plastic Registrar review the patient in the ED, which caused the participant to be re-categorised into the study exclusion criteria. This request then required the Plastic Registrar to attend the ED to review the participant. The Plastic Registrar was also unclear on the cause of the injury mechanism even after in-person consultation and therefore he decided to admit the patient for observation and further treatment.

4.3.3. No ED clinical photograph protocols and policies

The researcher discovered the ED did not have the appropriate facilities to manage clinical photography. There was limited access to a suitable camera for the study. There were no service specific instructions on where to keep the camera, how to operate the camera, who has access to the camera or standards for taking the photographs and how the photographs can be securely stored. There was an organisational wide instruction on the appropriate use and consent required for clinical photographs and videos within the hospital, however it made reference to storing the images on either the hospital PACS system or in a secure location within

the specific department. No definition could be found as to what PACS stoods for or instructions as to how to use this method of storage. There were no ED specific instructions or locations documented on storage of patient confidential clinical photographs.

4.3.4. Extended use of photography

All Plastic Registrars were notified of this study prior to its commencement. The researcher was approached throughout the study by multiple plastics registrars as to whether this interventional process could be performed on other ED patients that they were required to consult on in the ED. Examples included simple wound reviews, possible tendon injury and a nail bed injury. On a separate discussion with a dermatology registrar he too requested a clinical photograph be sent to him, as he was unable to attend the ED. This unfortunately could not be arranged, as the ED did not have ethical clinical photography capabilities in place.

4.3.5. Photography and privacy

When consulting a participant within the control group, a Plastic Registrar called the Burns Registrar at home in order to confer regarding his proposed treatment plan. A clinical photograph was taken on his work mobile phone of the participant's burn. The Plastic Registrar was noted to gain verbal consent from the participant. The photograph was then sent to the Burns Registrars work phone and he was called. The Plastics Registrar was referring this patient to the Burns Registrar for his opinion.

4.3.6. Quality control

There was an opposing treatment opinion for one of the control group participants. All participants had their burn photographed. The intervention group had their photograph emailed to the Burns Registrar. For the control group the Plastics Registrars would consult in the ED. The photographs taken of the control group were later emailed to the Burns Registrar for his comment and the photographs could be added to the participant unit records within the Burns Unit. For one particular participant, the Burns Registrar felt the participant would have benefitted from a surgical procedure known as Biabrane™, for which he would have requested

admission, as it should be applied within the 24 hours of injury. The Plastics Registrars' treatment plan consisted of an Acticoat™, burns dressing Acticoat, and follow up review in two days in the Burns Unit. All patients from the study were followed up post their burns out patient appointment, there were no other participants that received opposing opinion for treatment given.

4.4. Conclusion

Statistical analysis of participant characteristics found demographics were equally distributed. The primary outcome measure, comparing the control and intervention participant length of stay times was not statistically significant due to a small sample size. Two participants were withdrawn from the study due to unforeseen technical issues and uncertainty from the Burns Registrar. Significant findings have been highlighted. Implications of the results and subsequent findings from the literature will be discussed in chapter five.

5. DISCUSSION

5.1. Introduction

Chapter four presented the results of this pilot study, this chapter will discuss those results and this discussion will be informed by the literature review of chapter two. The primary aim was to compare the intervention and control group length of stay within the ED. It was found that the results were not statistically significant given the small sample size. There were 13 participants enrolled into the study, however two of these were withdrawn. The groups were similar in their age, gender and triage category. Study results will be expanded on and how they impact clinical practice will be discussed within this chapter. Secondary findings relating to ethical and technical issues, photographic policies and protocols and study methods will also be discussed in order to highlight relevant limitations and recommendations for future study. As this was pilot study these were the more important findings.

5.2. Statement of the problem

As discussed in the literature review, emergency departments around Australia are over crowded. This has been found to result in negative patient outcomes, increased length of stay and decreased quality of care (Geelhoed & Kierk 2012; Holroyd et al. 2007; Jennings et al. 2008). There is limited and poor quality interventional research that evaluates strategies to improve this ever concerning issue without compromising patient care and outcomes (Holroyd et al. 2007).

This research project trialed an intervention that according to the literature reviewed has yet to be used within Emergency Departments (ED) to reduce patient length of stay. The intervention was to use digital photographs in the referral process from ED nurse practitioners and candidates to a specialist. There is minimal research on referral processes used in emergency departments, particularly from nurse practitioners to hospital specialists. There is an abundance of research that supports the use of clinical photography in health care in order to improve patient care and outcomes (Riley & Manias 2004). In recent years there has been growing research

that evaluates clinical photography used in remote consultations and referral processes, this research has demonstrated improved health care advice and treatment (Buckley, Adelson & Agazio 2009). The use of photographic evaluation of burns via digital photography has been found to be clinically useful in early evaluation and diagnosis of burns (Boccara et al. 2011). Additionally, there is emerging research on the use of mobile phone technology in transferring clinical photographs for consultation (Shokrollahi et al. 2007).

There is only one Burns Registrar within the tertiary hospital this study was conducted at. He is available to attend the ED Monday to Friday between 0800 hours and 1700 hours to review and consult on any emergency burn patients. After hours and on the weekend, the Plastics Registrars are called to review this patient group. This study was subsequently designed to allow after hours remote consultation by the Burns Registrar. This was done in order to test the hypothesis that, electronically delivered digital images in the referral of emergency burn patients from emergency nurse practitioners reduced consultation waiting time and therefore reduced length of stay in the ED, whilst providing appropriate treatment. The pilot study tested the use of digital photography in the specialist referral process. This was in order to prevent the specialist attending the ED, where an image and verbal handover was sufficient for a specialist decision to be made. Concurrently the pilot study considered the related issues of informed consent, image transmission, policy and protocols, ethical dilemmas and current ED referral practices.

5.3. Description of procedures

On approval from the ethics committees, the recruitment phase was commenced in mid July 2012 within the ED. Patients who attended the ED with a burn that fit into the study inclusion criteria were introduced to the study verbally by the researcher. On verbal consent to the study they were provided the *Research Participant Information Handout* to read. On gaining informed consent with the *Study Consent Form,* the participant was enrolled in the study. Randomisation then occurred in order to allocate participants into the intervention or control group of treatment. This was allocated via the website http://www.random.org. Each participant had a file with

relevant forms, which were filed in the order of randomisation and kept in a secure cupboard within the ED.

Multiple digital photographs were taken of all participants' burn injuries using standardised procedures, regardless of which group they were allocated. If the participant was allocated into the intervention treatment group the Burns Registrar was contacted via telephone. If he was able to receive the referral the participant's photographs were emailed to him. On receiving the email and reviewing the images he would phone the ED and receive a verbal referral. He would then provide a treatment plan for the participant. If for any reason the Burns Registrar could not take the referral or could not provide a treatment plan, the participant would be withdrawn.

If participants were allocated into the control group, they would receive usual treatment. For this reason their photograph was not emailed. The participants in the control group were referred to the Plastics Registrar for review in the ED. The Plastic Registrar attended the ED when possible, reviewing the patient and formulating a treatment plan. Once the Registrar had provided a treatment plan, the interventions requested were implemented and the patient was discharged. If any participants withdrew from the study for any reason, their care reverted to that of the control group, which was usual practice.

A *Documentation Sheet* was used to record primary and secondary outcomes through the research process. This was kept within the file for each participant with a copy of the consent forms. Original consent forms were filed into the participant's case notes. At the completion of the study period all results were collated for statistical analysis and examination.

5.4. Major findings and their significance to clinical practice

5.4.1. Confounding variables

Participants were selected using convenience sampling from the population of minor burn injury patients, achieved by the researcher who asked patients to participate. This selection process increased the chance that patients may have felt coerced, as this researcher was the only person who enrolled participants. Future study would benefit from excluding the researcher from recruiting participants. Inclusion criteria and consent were required, however no other variables were considered essential in the recruitment of participants, however specialist review was not sought which would be recommended for the future RCT as to get opinion on this. Demographic characteristics of the participants were collected to determine if confounding variables were equally distributed between the control and intervention groups (Kendall 2003). Variables compared were age, gender and triage category. Statistically it was found that there were no differences in the demographics and it was reasonable to compare the primary outcome, length of stay within the ED, of the intervention and control groups as these two groups were sufficiently homogenous. External validity was achieved due to the small sample size (Richardson-Trench et al. 2011). It was possible that there were other confounding variables that were not assessed for or controlled, these include the time of day or which day of the week the participant presented to the ED, location of burn and mechanism of burn. For the future RCT it would be suggested that these be considered and external validity be measured.

5.4.2. Primary outcome measure results

Statistically the results from this study were not significant. The revised power analysis based on the research results, suggested that the study needed to have 12 participants within each group to show significance. Effectively, this pilot study gained 50% of the recruits required to show significance. With such a small sample group it is possible that the difference in mean length of stay times are a chance occurrence and therefore further research with a larger sample size is required to evaluate this intervention.

Hayat (2010) suggests that clinical significance considers the benefits and harmful effects of the research. It is therefore important that when applying research findings that both statistical and clinical significance are identified. Specific importance should be placed on clinical significance, as these are real findings rather than statistics that are produced to validate findings. The median time for the control group was 125 minutes (2 hours and 5 minutes) and for the intervention group the median time was 68.5 minutes (1 hour and 8.5 minutes). There appears to be a difference in length of stay however a larger sample size would be required to confirm this finding. If a patient has a reduced length of stay in the ED this time saved will have a carry on effect. If a patient is discharged an hour early for example, this provides valuable ED space for another patient to be attended to, potentially reducing their length of stay and so on. Although this is unlikely to solve ED over crowding issues, it has the potential to influence improvements. These results support the study purpose, which was to prepare for an RCT and test the hypothesis that this alternative intervention could decrease a patient's length of stay in the ED.

5.4.3. Primary outcome measure adjustment

The primary outcome measured was participant length of stay within the ED. Originally this measurement was to be based on the time the participant arrived within the ED and the time they were discharged, which was when they physically left the ED. Throughout the study recruitment period these were the measurement parameters, although the researcher recorded several other times of significance as it was unclear if these were relevant to the study. When the results were collated, specialist opinion suggested that measuring any time prior to the researcher attending the participant could not be affected by the intervention and was therefore not relevant to include within the results. For this reason the primary outcome measure was altered. Rather than using the time the participant arrived in the ED, the measured time was taken from when the researcher first attended the participant.

Making this alteration certainly made sense. Any time prior to the researcher attending the participant, the intervention could be of no effect and it was the intervention that was being tested. It was possible to compare historical data from the

hospital computer systems using these adjusted parameters as these time measurements are collected via the ED computer system for every patient who attends the ED. It would be difficult however to compare this outcome with other facilities, as length of stay may be measured differently. This poses the question, how is length of stay measured in Australian EDs and internationally. Therefore, it is relevant to research how length of stay is measured in future studies.

5.4.4. Quality Care

As discussed, the primary outcome measurement was based on participant length of stay. This was chosen because excessive length of stay is a significant problem that many ED patients experience (ACEM 2012). Length of stay was not the sole focus of this study however. The study did not want to reduce a patients' length of stay at the cost of the care they were receiving. It was for this reason that the researcher considered assuring quality of care for all participants. This involved following up all participants post their specified follow up date and reviewing treatment provided. Whilst deceasing length of stay was the primary outcome, maintaining patient care and outcomes was a major priority and in future studies this would need to be measured.

It was found that all patients that were recruited within the study had predicted outcomes, as documented in either case notes or confirmed via verbal discussion with the unit following up the participant. There were no patients that required admission on follow up or who developed post treatment infections. The researcher was unable to find any reason to suggest that using the study referral and consultation process was inferior to the conventional referral and consultation process in place currently. It would be recommended however that for the RCT that this control process be investigated rigorously in order to maintain validity for the proposed intervention. Additionally, it would be recommended for the future RCT that the views of the participants involved in the study be collected and analysed to describe how they were affected by the intervention.

In a review of each case it was it was found that on one occasion there was one opposing treatment opinion for a control group participant. As discussed in the results

chapter, the Plastics Registrar took a conservative treatment approach to this participant's care, whilst the Burns Registrar stated if he had been consulted he would have recommended aggressive surgical treatment. It is important to note that neither option was thought to be incorrect, and the patient did not receive suboptimal care. The Burns Registrar was considering the patients social situation when formulating his treatment plan. The Burns Registrar made note that the injury was the patient's dominant hand and he was a tradesman. He felt surgical intervention would decrease the patient's length of healing time and allow him to return to work sooner. There was no research found that supported the Burns Registrar's treatment plan which suggested it would speed recovery. The researcher understood that this treatment plan was based on anecdotal experience, which supported the final choice of treatment. Although it was not discussed with the Plastics Registrar in depth, his treatment plan did not have the risks associated with a general anaesthetic which the Burns Registrars plan did. The opposing treatments highlight the subjective nature of burn treatments (Monstrey et al. 2008). In a RCT there may be more variations of treatment experiences and this may highlight important results for emergency minor burns management, which from the literature research has a research gap from the view of the ED practitioner.

5.4.5. Clinical protocols

The ED did not have the appropriate facilities or protocols in place to use clinical photography. Despite the hospital having an organisational wide policy and protocol to obtain consent when obtaining a clinical photograph, there were none specific to the ED. There were no guidelines providing detailed use instructions for staff. As highlighted in the literature search, there is growing evidence to suggest clinical photography will benefit patient care and outcomes (Prentice et al. 2009). Whilst this did not directly affect this research project, the findings suggest that the department would benefit from the development of clinical photography protocols and policies, and ongoing staff training. As technology advances, so does the need for its adaptation for health care in order to provide patients with the best available treatment.

The use of clinical photography within the ED allows for improved documentation of many external injuries such as wounds, burns and rashes. This would allow ED

practitioners the ability to directly review a particular injury via a photograph which would inform practice and treatment (Prentice et al. 2009). This would not only improve the care that patients receive, but be an excellent educational tool for ED staff (Buckley, Adelson & Agazio 2009). The overall outcome of clinical photography use would include a continual process of review leading to improved treatment and patient care outcomes.

Medical specialties resources are stretched to meet patient demand and are looking for new ways to safely provide appropriate and timely patient care, treatment and advice. Extending documentation with clinical photography and by using it in the referral process would assist many specialists. While this research project trialled it on burns patients, there is no reason it could not be trialled on other ED patient groups with minor external injuries and conditions, such as wounds.

5.4.6. Photography and privacy

Using a mobile phone to transmit clinical images for specialist opinion and review does not require lengthy procedures. It does however create an ethical dilemma. This researcher found that this is a practice that health care practitioners are using, and it appears often without the understanding of how it may be in breach of relevant privacy laws that govern practice. It is the understanding of the researcher that this practice is being done without malice, and in an attempt to provide patients with the best possible health care. Although the reasons for its use are not without merit, they may not be sufficient to justify a breach of privacy. Certainly a limitation of the study was the requirement to use secure email to transfer images. This process was time consuming and complex in comparison to the simple process that could have been used with a mobile phone. It is therefore worth considering why the secure wireless system generated by the hospital could not be accessed to benefit patient care, reduce ED overcrowding and improve health care outcomes. If a work mobile phone was available, and it had access to a secure server, could a patient's confidentiality be maintained? These are important questions that need to be investigated if health care is going to keep up with demands.

5.5. Study Limitations

5.5.1. Technical issues

The first participant in this pilot study had to be withdrawn due to technical error. The researcher was not aware that all email attachments sent via the hospital secure system must be less than 10 megabytes in size. When the photographs were being uploaded for the first participant, a warning appeared on the computer screen stating the attachment files were too large and unable to be attached. The researcher was unable to locate a program on the computer that would reduce the photograph size without a loss of image quality. It was later discovered that the hospital had no such program available within the ED. The required photographs could not be attached to the email and therefore the participant was withdrawn from the study. In order to over come the email restriction, photographs were reduced on the camera prior to transfer to the computer email. This imposed an additional step in the study intervention. This increased complexity and resulted in no colleague assistance in participant recruitment which effected the sample size.

5.5.2. Research Assistance

The researcher had anticipated there would be colleague assistance in the recruitment phase and had expected a greater sample size would have been recruited within the time frame. Technological literacy was taken for granted by the researcher; a relevant issue to overcome for the future recruitment of the subsequent RCT. The technical processes involved in this intervention overwhelmed colleagues. Development of a streamlined and simplified process of transferring the photographs from the camera into the email account is required in order to make it 'user friendly'. It must be assumed that a percentage of the population are not familiar with technology and if this intervention is to be considered for primary referral in a large tertiary hospital it must be a clear process that can be easily taught and understood. It must also be a process that can be used on a range of computer systems.

The other participant withdrawn from the study was because the Burns Registrar was unable to provide a treatment plan via the referral process. The Burns Registrar was not satisfied that he could provide a safe treatment plan for the participant. The participant was therefore withdrawn. The participant was referred to the Plastic Registrar as usual procedure. The Plastics Registrar had the same concern as the Burns registrar; she was uncertain of the mechanism of injury and therefore uncertain on how to treat the injury. The injury sustained by this patient was ten days old. His symptoms had developed gradually post chemical burn to his thigh. For this reason both the Burns and Plastics Registrars were unclear if the patient had a burn or a skin allergy, which have different treatments. This participant withdrawal highlighted that the Burns Registrar was not willing to compromise a patient's care for the purpose of the study, nor was he concerned with saying he wanted a second opinion. Interestingly, both specialists came to the same conclusion and the patient was admitted for observation and further treatment. Providing all patients with the best quality health care available is always the first priority of any health care practitioner.

5.6. Recommendations for further investigation

There were multiple recommendations as a result of this research project.

- It is recommended that within the future RCT that mixed research methods be used to collect the views and experiences of the participants involved in the study and be analysed to describe how they were affected by the intervention.
- There needs to be an allocation of adequate time and resources to achieve the desired sample size to realise statistical significance for the RCT.
- The process of collecting clinical digital photographs and transmitting these images must be clearly described, easily taught and understood by all data collectors. It must also be a process that can be used on a range of computer systems.
- Provide colleagues with support, education and incentive to participant in the future study.
- The future study will research and consensus on how length of stay is measured or what the primary measurement is.
- The confounding variables identified here, will be researched in order to assure that the effect can be attributed to the clinical photography referral intervention.

- Further research into how minor burns are managed in the ED by emergency nurse practitioners is recommended.
- RAH ED clinical photography policies and protocols will be developed with adequate staff education and support to maintain privacy, confidentiality as part of good ethical practice in order to adopt clinical photography as routine documentation practice.
- Investigation into ED staff access to the hospital wireless network and an assessment made of its ability to maintain patient privacy when sending images of patient wounds.
- An investigation into the ethical use of mobile phones within the ED and in the subsequent referral process needs to occur.

5.7. Conclusion

There was no statistically significance difference in participant length of stay. The small sample size of this study meant that statistical significance was not achieved with the primary outcome measure; length of stay within the ED. The results do suggest a shorter length of stay for the intervention group in comparison to the control group. A decrease in length of stay in the ED would be clinically significant for both a patient and the ED therefore further research with a larger sample to gain sufficient participants for statistical significance. Secondary findings highlight that the complexity of the study process negatively affected participation and needs to be addressed for future studies. An important recommendation highlighted by this study is for the development of a dedicated ED clinical photography policy with protocols. This should occur with relevant and appropriate education on using such clinical photography in an ethical manner. Referral with clinical photography is appealing for RAH specialists who receive referrals from the ED. Ethical behaviour in obtaining and using patient clinical photographs requires further investigation.

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APPENDIX 1

RAH CRITERIA FOR BURN UNIT REFERRAL

(Including telephone consultations & patient transfers for persons aged 16 years & over)

1. Burns greater than 10% total body surface area (TBSA).
2. Burns of special areas – face, hands, major joints, feet and genitalia.
3. Full thickness burns.
4. Electrical burns – to allow for full assessment.
5. Chemical burns – to allow for full assessment.
6. Circumferential burns of limbs or chest.
7. Burns at the extremes of age (children and elderly).
8. Burn injury inpatients with a pre-existing medical disorder, which could complicate management, prolong recovery or affect mortality.
9. Burns with associated inhalation injury.
10. Any burn patient with a concomitant trauma.
11. Any patient with pre-existing psychiatric disorder that may compromise management
12. Any patient with a disability that may compromise management
13. ANY OTHER BURN THAT THE REFERRING DEPARTMENT IS NOT HAPPY ABOUT OR CONFIDENT TO SEND HOME!

These criteria are based on the Australian & New Zealand Burn association guidelines for Burn Unit referral.

APPENDIX 2

CLINICAL PHOTOGRAPHS AND VIDEO RECORDINGS

INSTRUCTION NO: OWI00223

ROYAL ADELAIDE HOSPITAL: *e*CENTRAHL SYSTEM

CLINICAL / PATIENT CARE / ASSESSMENT & CARE PLANNING

ORGANISATIONAL WIDE INSTRUCTION

1. RATIONALE

To ensure compliance with the Department of Health's Code of Fair Information Practice, South Australian Health Commission Act and the Freedom of Information Act.

2. SCOPE

All Staff

3. INSTRUCTION

3.1 Introduction

Patient clinical photographs/video recordings are regarded as personal health information and their collection, storage, use and disclosure must be in accordance with the Department of Health's Code of Fair Information Practice, South Australian Health Commission Act and the Freedom of Information Act.

3.2 Collection (taking) and use of Patient Clinical Photographs/Video Recordings

3.2.1 Patient clinical photographs/video recordings can be appropriately collected (taken) by Hospital staff in 2 specific situations;

- where the purpose of the visual record is to be part of the clinical record of a patient.
- where the purpose of the visual record is for teaching and or publication. (Prior written patient consent must be obtained).

3.2.2 Patient clinical photographs/video recordings as part of the clinical record of a patient

The collection of clinical photographs/video recordings where the purpose of the visual record is to be part of the clinical record and assist in the provision of clinical care to a patient is consistent with the primary purpose for which the Hospital collects information from patients ie to assist in providing clinical care. In such situations it is generally sufficient to obtain a patient's verbal consent before taking clinical photographs/video recordings and to document in the clinical record that such consent has been obtained. If the patient is unable to give verbal consent the fact that clinical photographs/video recordings has been taken should be explained to the patient when they are able to understand the information (or to the patient's next of kin). If clinical photographs/video recordings are planned to be taken while a patient is having an operative procedure then the patient should be advised of this situation in advance and consent should be obtained and recorded on the Hospital's consent form.

Clinical photographs/video recordings collected for routine care should be considered at least as confidential as other elements of the patient's medical record and must not be disseminated without specific patient consent.

3.2.3 Patient clinical photographs/video recordings used for teaching and/or publication

The Hospital or Hospital staff may want to collect a visual record of a patient for the purpose of using the visual record for teaching (in lectures/talks) and or publication (in journals/books etc). In such situation this is not the primary purpose for which the Hospital collects information from patients and the specific consent of the patient must therefore be obtained before the clinical photographs/video recordings are taken (using the form *Patient Consent/Release – Clinical Photographs/Video Recordings (MR 60.8 / A 85.0).* In such situations the collection of a visual record should first be approved by a senior member of staff responsible for the patient ie Consultant, CNC, Allied Heath Senior.

Clinical photographs/video recordings to be used for teaching and/or publication should have features, which identify the patient and which do not pertain to the condition, blacked out.

A patient's clinical photographs/video recordings collected initially to assist in clinical care may sometimes subsequently be considered desirable to be used for teaching and or publication. In this situation the patient must be approached to give specific consent for this use (again using the form *Patient Consent/Release – Clinical Photographs/Video Recordings (MR 60.8 / A 85.0)*).

3.2.4 Listing of Clinical Photographs/Video Recording Taken of Patients

To ensure that there is an available complete list of clinical photographs/video recordings taken of individual patients the staff member taking the clinical photographs/video recordings must enter details of these clinical photographs/video recordings in the form *List of Patient Clinical Photographs/Video Recordings (D 97.20)* which must be kept in the patient's medical record.

3.2.5 Storage of Patient Clinical Photographs/Video Recordings

All patient clinical photographs/video recordings must either be stored on the Hospital PACS or in a secure location within individual departments. The location where patient clinical photographs/video recordings are stored must be recorded in the form *List of Patient Clinical Photographs/Video Recordings (D 97.20)* and filed in the patient's medical record. Where images are saved within individual departments there must be a system to readily find images of individual patients – this could be done by the file name of digital images containing the patient's UR Number.

3.2.6 Inappropriate Collection (Taking) and use of Patient Photographs/Video Recordings

The collection (taking) and use of patient photographs/video recordings in a clinical setting by a staff member (including by mobile phones) other than in accordance with this Instruction (and other than approved by the Manager, Marketing & Public Relations), would constitute a breach of the Code of Fair Information Practice and Section 64(1) of the South Australian Health Commission Act.

3.2.7 Patient Access To Their Clinical Photographs/Videos

All patients have a right under the Freedom of Information Act to request and be provided with a copy of all photographs/videos of themselves that the Hospital and Hospital staff haves collected (taken).

3.2.8 Retention of Clinical Photographs/Video Recordings

In accordance with the South Australian Public Hospitals Retention Disposal Schedule clinical photographs (for adults) must be kept for a minimum of 15 years from the time they are collected (taken).

4. DEFINITIONS

Nil

5. APPENDICES

Nil

6. REFERENCES

JBI Evidence Summary

The Code of Fair Information Practice, Department of Human Services, February 2002
South Australian Health Commission Act, 1976
Freedom of Information Act, 1991
South Australian Public Hospitals Retention Disposal Schedule July 2000 – June 2010

7. VERSION TRACKING

Version 1: Effective March 2006

Version 2: Changed to *e*CentRAHl, 3.2.8 changed

END OF INSTRUCTION

APPENDIX 3

Government of South Australia
SA Health

ROYAL ADELAIDE HOSPITAL
ED Clockwork / Patient Pathways

FAST TRACK SCOPE OF PRACTICE

Minor Limb Injury:

- Extremity sprains/strains & soft tissue injuries;
- Fractures (upper limb including clavicle and lower limb below knee);
- Digit dislocations;
- Patella dislocations – (transferred to Resus 4 for manipulation for conscious sedation post initial assessment);
- Elbow dislocations – (transferred to Resus 4 for manipulation for conscious sedation post initial assessment).

Respiratory:

- Sore throat;
- Upper Respiratory Tract Infections;
- Common cold.

Skin Complaints:

- Cellulitis;
- <10% TBSA burns (excluding airway, face, perineum);
- Gout, pseudogout & inflammatory arthropathies;
- Stings/bites;
- Foreign bodies;
- Puncture wounds;
- Lacerations - including nerve and tendon involvement, (exclusion of injuries with significant haemorrhage);
- Rashes
- Skin tears.

Head Injuries with NO loss of consciousness.

Simple Reviews:

- POP reviews/replacement;
- Wound reviews;
- Removal of sutures/staples.

Red Eye Complaints – triaged to Fast Track and seen in Eye Cubicle Admissions Area:

- Conjunctivitis;
- Subconjunctival haemorrhage;
- Corneal abrasions/foreign bodies/corneal ulcers;
- Styes/eyelid infections;
- Pterygium.
- Exclusion – change in vision, penetrating eye injury, iritis, orbital cellulitis, chemical and thermal injuries.

Dental Presentations:

- Avulsion injuries;
- Tooth decay;
- Dental abscess.

ENT Presentations:

- Foreign body ear/foreign body nose;
- Otitis media/otitis externa.

Other:

- ADT;
- Morning after pill (MAP);
- Routine bloods;
- Expected Admissions (CPC expected and unexpected) – parallel processed and 60/60 rule application:
  - Bed available but not ready (patient still occupying, cleaning etc);
  - No bed available;
  - Requires speciality review.
- Minimal intervention discharge:
  - Test results (radiology).

Written by Emergency Nurse Practitioners Melissa Curtis, Tracey Knight, ED Consultant Dr. Julie Bunney, ED Associate Clinical Service Coordinator Deb Henrys & ED Clockwork Project Officer Craig Robinson.

APPENDIX 4

Royal Adelaide Hospital

Government of South Australia

THE UNIVERSITY of ADELAIDE

Research Participant Information handout

Project Title: *A randomised controlled trial pilot study assessing use of digital photography for specialist referral process: Can its use decrease patient length of stay within an Emergency Department?*

Dear participant

The purpose of this research pilot study is to find out whether sending a digital photograph of your burn, to the RAH Burns Specialist, could reduce your time spent within the Emergency Department. If you have been given this handout you meet the research project requirements for enrollment. Participation is voluntary. If you choose not to participate, your care will not be affected. You can with draw from the study at any time with out judgment.

Research procedure / confidentiality

The study requires a digital photograph being taken of your burn. Personal identification will be included within the photograph. It will be emailed to the RAH Burns Specialist via the secure email network. Your image will be deleted from the camera once the email has been sent. The image received by the specialist will be stored in your personal RAH patient unit record paperwork and a secure hard drive within the burns unit for no other reason that to monitor your burn. The research data obtained is potentially subject to disclosure through the processes of law.

Risks or Discomforts of Participation

- If the Burns Registrar feels you require immediate admission this may be delayed
- If the Burns Registrar can not receive or review your photograph this may cause a delay
- The photograph may misrepresent the severity of the burn and this may introduce a delay in treatment or even result in inappropriate discharge

This research study has been independently reviewed and approved by the Royal Adelaide Hospital Research Ethics Committee, approval number 120533. This research project will be conducted according to National Health and Medical Research Council (NHMRC), National Statement on Ethical Conduct in Human Research 2007.

Contact Information / complaints

If you have any questions regarding the study please contact the researcher Ms Kate McLeay, Masters Student, School of Nursing, the University of Adelaide via kate.mcleay@student.adelaide.edu.au.

If you wish to discuss any complaints or concerns about the conduct of this research study, or wish to speak to someone not directly involved in the study, please contact the Chairperson, Research Ethics Committee, Royal Adelaide Hospital on (08) 82224139 or the Secretary of the University of Adelaide Human Research Ethics Committee on (08) 83036028.

Thank you very much for taking the time to consider this research study.

APPENDIX 5

Consent Form for Research Participants

Study Name: A randomised controlled trial pilot study assessing use of digital photography for specialist referral process: Can its use decrease patient length of stay within an Emergency Department?

Researcher: Ms Kate McLeay – Emergency Nurse Practitioner Masters Student
Dr Patrick Coghlan – Royal Adelaide Hospital Burns Registrar

To be completed by the research participant.
I confirm that:

1. The nature and purpose of the research project has been explained to me. I understand it, and agree to take part in it.

2. I have received a research study information handout.

3. I understand that I may not benefit from taking part in the study.

4. I understand that, while information gained during the study may be published, I will not be identified and my personal results will remain confidential.

5. I understand I do not have to take part in this research study.

6. I understand that I can withdraw from the study at any stage and that this will not affect my medical care, now or in the future.

7. I have had the opportunity to discuss taking part in this investigation with a family member or friend.

8. I have been given time to think about my decision to take part in the study and I have had the opportunity to ask questions, for which I received satisfactory answers to all of my questions

9. I agree for a photograph of my burn injury to be taken and emailed to the burns specialist for opinion with my personal details within the photograph.

10. I agree for my burn injury photograph to be stored within my Royal Adelaide paper records and on the Burn Unit secure hard drive.

Name of participant: _____
Signature of participant: _____
Dated: _____

I certify that I have explained the study to the participant and consider that he/she understands what is involved.

Name of person obtaining consent: _____
Signature of person obtaining consent: _____
Dated: _____

APPENDIX 6

Documentation Sheet

Time participant booked into the ED

Time the researcher attended to the participant

Control group or trial group

Time of referral to burns or plastics registrar

Time burns/plastics provided a treatment plan

Time the participant was discharged from the ED

Participant descriptions – triage category, gender and age

Any comments, ie: with drawl reasons, delays

!

APPENDIX 7

Government of South Australia
SA Health

9th May 2012

Dr Andrew Thornton
Chair of RAH Research Ethics Committee
Level 3 IMVS

re: Research Study by ENPC Katie McLeay

Dear Dr Thornton,

This is to confirm my support for the proposed research study by Emergency Department Nurse Practitioner Candidate Katie McLeay.

This study is titled *A Randomised Controlled Trial Pilot Study Assessing the Use of Digital Photography for Specialised Referral Process. Can its Use Decrease Patient Length of Stay Within an Emergency Department.*

Thankyou for giving consideration of Katie's research proposal.

Yours sincerely

Ian Blight
Nursing Director
Critical Care Services and Radiology.

Royal Adelaide Hospital
North Terrace
Adelaide SA 5000
Tel: +61 8 8222 4000
Fax: +61 8 8222 5939
ABN: 9626 9526 412
www.rah.sa.gov.au

CRITICAL CARE SERVICES

Tel: +61 8 8222 2649
Fax: +61 8 8222 2230

Clinical Director
Assoc Prof Geoff Hughes
Telephone +61 8 8222 5064
Mobile +61 432 005 443
Email
Geoff.Hughes@health.sa.gov.au

Nursing Director
Mr. Ian Blight
Telephone +61 8 8222 4457
Email
Ian.Blight@health.sa.gov.au

Administrative Manager
Ms Melissa Filleti
Telephone +61 8 8222 2827
Email
Melissa.Filleti@health.sa.gov.au

Resource Accountant
Ms Tammy Moffat
Telephone +61 8 222 5562
Email
Tammy.Moffat@health.sa.gov.au

IT Account Manager
Ms Di Northey
Telephone +61 8 8222 5784
Email
Dianne.Northey@health.sa.gov.au

Senior Administrative Officer
Ms Gabriela Lipari
Telephone +61 8 8222 0032
Email
Gabriela.Lipari@health.sa.gov.au

Executive Secretary
Mrs Naddia Pinnington
Telephone +61 8 8222 2649
Email
Naddia.Pinnington@health.sa.gov.au

APPENDIX 8

Government of South Australia
SA Health

Adelaide Health Service

Royal Adelaide Hospital
North Terrace
Adelaide SA 5000
Tel: +61 8 8222 4000
Fax: +61 8 8222 5939
ABN 80 230 154 545
www.rah.sa.gov.au

Adult Burn Service
Tel: (08) 8222 4462
Fax: (08) 8222 5676
Email:
rah.burns@health.sa.gov.au

03/05/2012

Dear Sir / Madam,

This letter is to confirm the support of the Adult Burns Service, Royal Adelaide Hospital for Katie McLeay Emergency Nurse Practitioner Candidate Royal Adelaide Hospital in the undertaking of her Masters project entitled

" A randomised controlled trial pilot study assessing use of digital photography for specialist referral process: Can its use decrease patient length of stay within an Emergency Department?"

I believe that this project has the potential to improve the management of patients with a burn injury within the acute hospital setting. Please feel free to contact me if you require any further information.

Yours sincerely
Sheila Kavanagh OAM
Ad Clinical Service Coordinator
Adult Burns Service
Royal Adelaide Hospital
Sheila.kavanagh@health.sa.gov.au
0421615182