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Revision and Implementation of a Maximum Surgical Blood Ordering Schedule in a Large Acute Hospital

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Revision and Implementation of a Maximum Surgical Blood Ordering Schedule in a Large Acute Hospital

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Declaration Form

Declaration:

“I hereby certify that this material, which I now submit for assessment for the Project Dissertation Module on the MSc in Healthcare Management, is entirely my own work and has not been submitted as an exercise for assessment at this or any other University.”

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Abstract

The aim of this change management project was the implementation of a Maximum Surgical Blood Ordering Schedule (MSBOS). Institutional MSBOS's utilised in many hospitals provide a template recommendation for crossmatching of red blood cells for a broad range of surgical procedures; however, for many lower risk surgical procedures these requirements are almost negligible.

This project utilised the HSE Change model to implement a new guideline for elective procedures. Recommendations were taken from literature and stated for any elective procedure having greater than 19 cases ($N \geq 19$) the following rules would apply: transfusion rate less than 5% requires no type and screen specimen processed, transfusion rate between 5%-30% a specimen is processed and no red blood cells crossmatched, and for procedures with a transfusion rate above 30% a specimen is required and red blood cells crossmatched.

Evaluation results were successful with a reduction seen in the number of type and screen specimens proceed by the laboratory and a reduction in the number of red blood cells crossmatched. The elimination of routine type and screen specimens for these procedures and the resultant change to the hospital's MSBOS could potentially result in an estimated saving of € 47,000 per year.

In conclusion, in the absence of a preoperative indication, routine type and screen specimens should be eliminated for select lower risk surgical procedures along with a selective approach for ordering red blood cells in higher risk procedures. The benefits in workload and cost saving mean such measures should be implemented in all hospitals with a Blood Transfusion Department.

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Chapter 1 Introduction

1.1 Introduction

This Organisational Development project is carried out in a Large Acute Hospital, the second largest in Ireland and the principal teaching hospital for the Royal College of Surgeons in Ireland. It is a National Centre for Neurosurgery, Renal Transplantation, Cochlear Transplantation and Alpha 1 Antitrypsin Deficiency. It has multiple supra regional specialities as well as being a designated supra regional cancer and radiotherapy centre (Hospital Annual Report 2012). The Blood Transfusion Laboratory is ISO accredited and the first laboratory of its kind in Ireland to offer electronic crossmatch (EC). It is one of the busiest Transfusion laboratories in Ireland where in 2013 7,156 red cell units and 1,729 platelet pools were transfused.

In this chapter, the background of the organisational development project and the rationale for the change will be discussed for selecting the Organisational Dissertation along with the aims, objectives and the nature of the development. Chapter 2 relates to the literature review where the main themes will be discussed from the relevant literature searched along with its potential application to the dissertation. Chapter 3 discusses various organisational development models with an overview of the measures taken as per the selected development model through its various stages. Chapter 4 discusses the evaluation of the dissertation through quantitative analysis and outcomes achieved. Chapter 5 involves a thorough discussion of the dissertation including strengths, limitations and recommendations followed by an overall conclusion.

This project will determine the efficiency of ordering practices in the Blood Transfusion Department leading to improved efficiency and reduction in costs in relation to effective blood ordering methods. The idea for this project originates from the need for every hospital Blood Transfusion Department to have a Maximum Surgical Blood Ordering Schedule (MSBOS). An MSBOS is a table of elective surgical procedures which list the number of units of red cells routinely crossmatched for that procedure pre-operatively. The schedule was based on a retrospective study

of actual blood usage associated with the different surgical procedure. It aims to correlate as closely as possible the amount of blood crossmatched (C) to the amount of blood transfused (T). The C:T ratio can be used to monitor the efficiency of the scheme in a surgical setting

Within the Transfusion laboratory there is an MSBOS which, at present, shows limited adherence and needs revision. A revision of the MSBOS will lead to the streamlining of efficiency for this technologically advanced laboratory. While guidelines exist for a template MSBOS, it is different depending on the types of elective surgery carried out. Due to this the theatre workload is unique to this individual hospital, and any MSBOS is different to the Blood Transfusion Laboratory. As electronic crossmatch is the option of choice in transfusion medicine, any MSBOS constructed and suitable to this blood transfusion laboratory will provide a template method for other laboratories to provide guidelines for the creation of similar templates.

The change I hope to implement is to draw up a Maximum Surgical Blood Ordering Schedule (MSBOS) - a table of elective surgical procedures that lists whether a T&S was required along with the number of units of red cells routinely crossmatched for that procedure pre-operatively. There is growing thought that there is no requirement for red blood cells ordered before an elective procedure in certain instances. Substantial evidence exists for the use of transfusion probability criteria for T&S guidelines. Data suggests any procedure with more than 19 cases and a transfusion rate of $\leq 5\%$ do not need routine Type and Screen (T&S), let alone red blood cells (Prichard et al., 2011)

1.2 Background Rationale for the Change Project

The rationale behind this organisational development project is to determine the efficiency of blood ordering methods for frequently performed elective surgeries in a major Dublin teaching hospital. There is a current system in place where all patients are having a routine elective procedure in the hospital have a type and screen (T&S) followed by ordering of red blood cells. A T&S test is carried out by the Blood Transfusion Department (BTD) to identify a patient's blood group along with an

antibody screen to determine prior antibody production that may cause delays in providing red blood cells. Pre-operative crossmatching of blood for elective surgery was performed in anticipation of a potential need which may not materialise. Also, for some more serious theatre cases red blood cells are ordered that were stored in the theatre fridge. This practice increases blood wastage for Blood Transfusion Laboratories along with increases in workload.

The rationale for change is twofold. Firstly, the laboratory is looking to reduce that number of specimens being sent to the laboratory to be processed and secondly to reduce the amount of red blood cells crossmatched for certain low or medium risk procedures. A critical consideration when performing a preoperative assessment is the potential need for crossmatched blood, and it was hoped that this organisational development project will show that for a wide number of cases a T&S is not required to proceed with surgery. Feedback from all staff in the Blood Transfusion Department has suggested that the number of returned red blood cells suggests that crossmatched red blood cells were not routinely required. There are a large number of red blood cells returned to the laboratory the following day that have been unavailable for crossmatch to other patients. This will reduce the number of days until the blood product expires.

The routine requesting of T&S in these cases represents inefficient utilisation of resources and has been shown to cause significant delays in surgery. This has been shown by a previous internal study with a CT ratio of 7:1. This indicates that the number of units crossmatched far exceeds the number of units crossmatched with a transfusion rate of 12.5%. Performing a T&S in our institution costs an estimated €83. The volume of samples received by the laboratory has become a barrier to completing pre-operative T&S on time as large numbers cannot always be processed in a sufficient timeframe. It has been reported that between 23% - 75% of T&S specimens collected on the day of surgery were completed only after the surgical procedure had already commenced, and another 0.8% of cases were delayed while either awaiting the completion of a T&S or acquiring antibody compatible blood (Friedberg, Jones, & Walsh, 2003).

1.3 Aims and Objectives

The **aim** of this Organisational Development project is the Revision and Implementation of a Maximum Surgical Blood Ordering Schedule for a Large Acute Hospital.

The **objectives** are as follows;

- **Specific:** identify the most common elective surgical procedures for which red blood cells were crossmatched to evaluate blood usage on these procedures leading on to a reduction in specimens processed by the Blood Transfusion Department.
- **Measurable:** Set criteria for ordering red blood cells from the hospital blood bank for elective procedures. This will act as a standard to measure compliance to determine if clinicians are complying with the MSBOS.
- **Achievable:** To draw up an MSBOS and to inform all users of the service of the proposed change and obtain buy-in from all service users.
- **Realistic:** The dissertation requires no resources to achieve its objectives and is a priority for the Blood Transfusion Department and Theatre Admissions.
- **Time Bound:** Introduction of the system within one month from which an evaluation can be carried out.

1.4 Nature of Change

The organisation impact of this project spreads to surgical admission, elective procedure work ups and theatre admissions. It will affect the way that the laboratory currently runs and will aim to increase efficiency, reduce duplication and save money. The reality of the proposed change will see a system that is more streamlined for real emergencies in a manner that is acceptable to service users. In light of the economic and manpower burden routine specimens on the blood bank service, the aims of this study are to determine if routine T&S is justified for all surgical procedures. And also to identify procedures with a low risk of transfusion in which the omission of T&S may decrease unnecessary cost and workload without compromising patient safety.

Eliminating routine T&S means that crossmatched red blood cells will not be available for at least 45 minutes. Many of the requests are not urgent and can wait the 45 minutes needed to process a T&S specimen. Although rare, the possibility of an urgent request or major haemorrhage does exist. In such cases, uncrossmatched O negative, universal donor blood can be used. There is a constant availability of these products in the Blood Transfusion Department. This represents a more cost effective solution compared to performing a T&S on all surgical patients. There needs to be a selective approach to performing type and screen for elective surgery. The current situation sees all patients presenting to theatre requiring a T&S.

The potential threats to the project include;

- Obtaining full buy-in from all medical teams along without delaying any relevant procedures or patient appointments.
- It must be conveyed to all relevant surgical teams that in cases where a patient has an emergency bleed and no T&S is present then it will take 45 minutes to provide crossmatch compatible red blood cells. O Neg blood is available at all times to cover any possible emergency. It is the final decision of the surgical team if the patients need a T&S specimen to be processed by the laboratory on an individual patient basis.
- The taking of a T&S has become the standard pre-operative investigation of choice with the aim of preventing complications arising from donor-recipient blood group incompatibility and identification of the existence of irregular antibodies. These habits exist in all hospitals and will need a culture change.

A retrospective review will be performed of all general surgical procedures in this tertiary referral hospital from January 2011 to July 2013. Surgical procedure data will be obtained from the Hospital Inpatient Enquiry system (HIPE) and procedures matched to the MSBOS list. All procedures will be cross referenced with Blood Transfusion records. The number of T&S specimens and the number of peri-operative transfusions will be recorded for each inpatient episode. A peri-operative transfusion was defined as any patient receiving red blood cell units the same day as the scheduled operation. Procedures with a transfusion probability less than 5% are

considered to be lower risk for transfusion, while those >30% are a higher risk of transfusion.

1.5 Summary

This organisational change dissertation is concerned with increasing efficiency, reducing workload and cost saving in a large Blood Transfusion Laboratory. The success of this project will streamline the role Blood Transfusion plays in the support of elective procedures.

Chapter 2 Literature Review

2.1 Introduction

A literature review can be described as an analysis of scientific materials surrounding a subject that requires the reader to assess the study purpose, determine the appropriateness and quality of methods used, analysis of questions and answers posed in the scientific literature, and a review of the findings with an objective review of the findings (Garrard, 2014). The Literature Review carried out as part of this project drew on information from Medline, PubMed and Google Scholar. Searches of these databases were performed using key words including blood transfusion, maximum surgical blood ordering schedule, surgical blood order equation, electronic crossmatch, theatre blood usage, blood wastage and crossmatch transfusion (CT) ratio. The search period aimed to examine the literature from the past 10 years. Also included were seminal articles surrounding the topic from the 1970's when the first introduction of an MSBOS came into effect. The types of literature included were journal articles, international guidelines, and textbooks surrounding the topic.

Blood Transfusion Laboratories play an important role in modern medicine. Pre-operative assessment of blood requirements is usually an over assumption as shown by many studies. Crossmatching is time consuming, expensive and once performed reduces the lifespan along with creating an artificial shortage in blood stocks (Singh & Singh, 2011). In the absence of blood and blood donors, thousands of procedures could not be performed safely. Allogeneic red cell transfusion remains the mainstay management of patients who are, or are considered to be at risk of a surgical bleed. The continued development of surgical procedures of a complex nature has increased the need for allogeneic blood (Stanworth, Cockburn, Boralessa, & Contreras, 2002; Wallis, Wells, & Chapman, 2006). A National Blood Service Study in the UK in 1999 aimed to provide data on a medium and long term trends in transfusion. It suggests that with an ageing population, combined with lower rates of the population donating, need for red blood cells will increase by 20% by 2025.

Modern techniques for donor screening mean that blood is proven to be a safe option in developed countries. There is a growing pressure on transfusion services regarding cost, safety and blood availability. Over the past 15 years the Irish Blood Transfusion Service (IBTS) have implemented new procedures for reducing the risks associated with transfusion. These tests have included Nucleic Acid Testing for Hepatitis C and HIV along with the routine leucodepletion of all cellular products. However, these tests have increased the overall cost of red blood cells ("IBTS Website," 2014). This shows a balance is required between safety and cost.

In a similar vein strict procedures for donation as well as, an ageing population already limit potential future donors. It has been forecasted that demand will increase 20% compared to supply within 20 years in the UK (Currie, Patel, McEwan, & Dixon, 2004) This deficit is predicted to grow to 34% of total demand for red blood cells (RBC) needed by 2015 (Greinacher, Fendrich, Alpen, & Hoffmann, 2007). Yearly increases in demand have been noted since the 1980's with the increase in complex surgical procedures and the aggressive treatment of haematological and other malignancies (Thomson, Farmer, Hofmann, Isbister, & Shander, 2009). Population studies show most European countries are showing a shift from younger to older age groups. Demographic trends like these predict future demand. Estimations show an increase in population ages will result in an 11.8% to 13.9% increase in the population group being transfused (Greinacher et al., 2007)

2.2 Allogeneic Transfusion in Surgery

In 2008, there were 1.9 million blood donations in the UK and Ireland. Despite this fact, there is still a shortage in supply. It has been identified that new strategies are needed to reduce the workload of unnecessary crossmatching. The term Maximum Surgical Blood Ordering Schedule (MSBOS) has been described for over 40 years. It began as a measure to limit crossmatching. It requires constant updating to take into account new surgical procedures and local patterns of surgical allogeneic transfusion requirement. It is stated 'compatible blood should not be made available for surgery where usage is <50% of units provided.' Pre-operative crossmatching of red blood cells provides a safety measure in the event of a surgical bleed. In practice, this is rare, and over ordering is well documented in many surgical specialties (Singh &

Singh, 2011). Various studies, including an Irish study (Prichard et al., 2011) have shown patients going for elective surgery have minimal transfusion requirements. There needs to be a more targeted approach based on relevant clinical data from the particular centre, reducing associated blood transfusion costs.

Allied to a residual need for blood to be crossmatched there are hazards associated with transfusion. Other non-infectious transfusion hazards also persist including acute and delayed haemolytic transfusion reactions, transfusion related acute lung injury (TRALI), transfusion associated graft-versus-host disease (TA-GVHD), transfusion associated circulatory overload (TACO), as well as immunomodulatory effects (Tinmouth, McIntyre, & Fowler, 2008). Specific donor assays have minimised but not eliminated infectious disease transmission (Alter & Klein, 2008)

2.2.1 Alternatives to Allogeneic Transfusion in Surgical Patients

Autologous Blood Donation (ABD) is a collection of blood in a manner similar to the collection and storage of blood from volunteers in general use, except that it is collected from the intended recipient (Walsh & Prowse, 2007). This is a pre-planned for the clinical benefit of the patient where significant blood loss is anticipated. The use of autologous blood donation is not recommended unless the clinical circumstances are exceptional, for example, rare blood groups where allogeneic blood is difficult to obtain. The patients must be candidates for elective surgery, where blood transfusion is expected to be needed. The admission and operation days must be guaranteed (Voak et al., 2008). **Intra-operative and Post-operative Cell Salvage:** A recent UK study reported that the use of cell salvage in elective surgical procedures, such as orthopaedic and cardiac vascular surgeries where more than 1 litre of blood loss is could be lost, could result in saving 160,000 units of red cells; thus reducing demand on an already stretched blood supply (Seghatchian & Solheim, 2007). **Acute Normovolaemic Haemodilution** is the removal of blood from a patient prior to surgery along with simultaneous replacement with crystalloid or colloid fluids to maintain circulatory volume (Hairman et al., 1997). While the benefits of these alternatives can be seen they are specific to the surgery performed and not used to a large degree in this hospital.

2.3 Blood Stock Management

In Ireland there is a centralised blood transfusion service with two blood centres, Dublin and Cork. The Irish Blood Transfusion Service (IBTS) is the sole supplier of blood to Irish Blood Banks, delivering to approximately 60 hospitals. Transfusion laboratories have the responsibility to ensure that a Blood Stock Management System is in place, so donated blood is used to minimise wastage whilst ensuring adequate stock levels (Pereira, 2005). The optimal storage numbers can be estimated via daily/weekly usage estimates whilst allowing for emergency situations (AABB, 2011). There even exists complicated formulas that cost every step of the process and provide insights into the actual cost of transfusion to the hospital. These studies involve multidisciplinary teams and are outside the scope of transfusion studies (Shander et al., 2010).

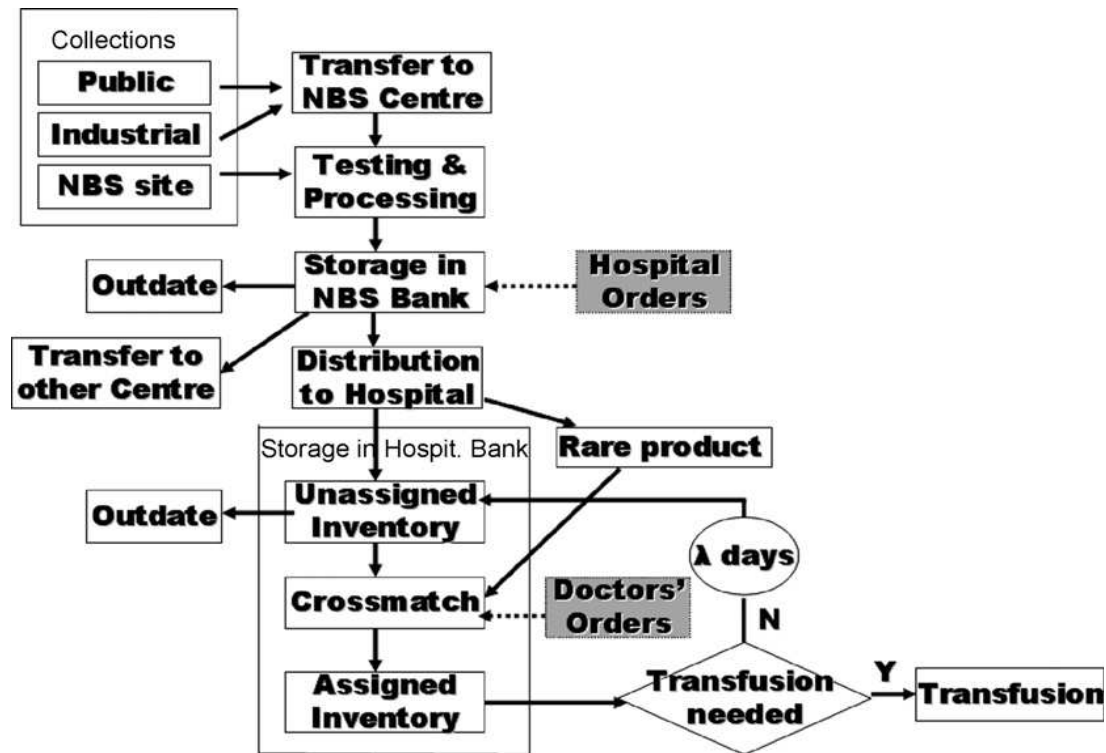
Various factors are implicit in inventory management including supply and demand, inventory levels both within the blood supplier and hospitals, stock management practices and distribution logistics and the cross-match to transfusion (C:T) ratio (J. F. Chapman, Hyam, & Hick, 2004). The blood remains in the hospital stock until it is electronically cross-matched for a named patient after a doctor's request. It is then placed in the "issued" inventory and stored in the theatre fridge for that patient until the operation. If unused, it returns to "unassigned" stock inventory and is electronically cross-matched for another patient. Blood units are usually sorted according to age, with oldest units cross-matched for patients most likely to need transfusion. In addition to this primary goal of stock management, the blood transfusion laboratory is concerned with minimising waste, the maintenance of high quality standards and the reduction of shortages. In practice, only just above half of the cross-matched blood is transfused, and on average a unit will be cross-matched around three times before it is used or outdated (Katsaliaki, 2008).

A hospital blood bank is an example of an inventory management system. It has the function of maintaining an adequate blood supply under conditions where demand is variable. It is charged with the responsibility of managing storage and distribution of red blood cells throughout the hospital in a manner where need is met. There are a number of concerns that must be addressed regarding wastage of short dated

products and the reduction of expensive emergency orders from the Irish Blood Transfusion Service (IBTS) or possible delays in medical procedures. There are recommended target wastage levels depending on the activity of the hospital. This particular hospital is a Group 1 large regional hospital with a high transfusion activity and proximity to the blood supplier. This gives the hospital a wastage target level of 0.4% by recommended benchmarking (Heddle et al., 2009). Other studies offer similar recommendations with contrasting figures for wastage levels with advised rates been below 1% for larger hospitals and up to 20% for smaller centres. The wastage rates for the IBTS were 1.4% in 2010 (Genoe et al., 2010).

As far back as 1972, Pierskalla developed an optimal policy for a perishable inventory and related this to red blood cells (Pierskalla & Roach, 1972). In 1975 techniques for management along with mathematical inventory theory were used to construct models for strategy to be employed in regional blood banks (Cohen & Pierskalla, 2003). It is still generally accepted that Pierskalla's 'First In, First Out' policy of management, issuing the oldest available unit first, is the best option when dealing with red blood cells. More recently, the Blood Stock Management Scheme (BSMS) was established in the UK in 2001, a partnership between hospitals and The National Blood Service (NBS) with the purpose of collecting from and providing data them with information on various aspects of blood inventory management (J. F. Chapman & Cook, 2002). Hospitals supply data of the daily unreserved stock, wastage rates and transfusion rates. Inventory practice surveys and matching responses to data held on stock levels are used by the BSMS has identified factors that can lead to the reduction in the number of days stock is held in the inventory. These include reductions in the CT ratio (crossmatch-transfusion), a 24 hour reservation period and the employment of electronic crossmatch (J. Chapman, 2007).

Figure 2.1: Flow chart of a unit of red blood cells (Katsaliaki, 2008)



Difficulties encountered in the management of blood stocks include:

Age and perishability

Blood is a perishable commodity, with a present lifespan of 35 days. The shorter the shelf life of a unit at entry into inventory, the more likely it is to expire unused. Transfusion services providing blood for acute-care hospitals with large surgical services or active emergency departments often receive units nearing expiration because they transfuse large volumes of blood daily. This means that units may not have sufficient days left to circulate through the unassigned/assigned loop enough times to be transfused and are eventually expired. Available shelf life decreases each time a unit is held or crossmatched for a patient who does not use it. When clinicians order more blood than needed, it is unavailable for other patients, which may increase the outdated rate. (J. F. Chapman et al., 2004).

The difference between Supply, Demand and Usage

Blood supply, demand and usage on any given day are random variables. Demand is defined as the number of units requested and placed into assigned inventory, the

usage is defined as the number of units transfused (Prastacos, 1984). Demand is difficult to predict due to a number of factors not least the very nature of healthcare. Factors which influence demand include population demographics, size of the hospital, services provided, ordering policies, advances in surgical techniques, and initiatives for more appropriate use of red cells (J. F. Chapman et al., 2004). Large hospital size, acute-care facilities and active trauma centres often put stress on blood inventories. Large amounts of blood may be ordered for trauma emergencies, elective procedures or complicated surgeries but not all the ordered units may be used. If not carefully managed, such ordering practices can inflate the inventory and lead to wastage.

Cancellation of planned surgeries

Cancellation of elective surgery wastes valuable resources, including unnecessary laboratory investigations. If the blood bank is not informed that a procedure is cancelled, units can be unnecessarily issued and stored in the theatre fridge. In the UK, 8% of scheduled elective operations are cancelled nationally within 24 hours of surgery. Shortage of operating time was the most prevalent factor for cancellation of elective operation in this study (Sanjay, Dodds, Miller, Arumugam, & Woodward, 2007).

2.4 Legislation and Guidelines

2.4.1 European regulations on blood transfusion and blood transfusion alternatives

The Directive 2002/98/EC of the European Parliament and of the Council of Europe set comprehensive binding standards of quality and safety for the collection, testing, processing, storage and distribution of human blood and blood components. Three additional directives have also been implemented: Directive 2004/33/EC regarding technical requirements for blood and blood components; Directive 2005/61/EC regarding traceability requirements and notification of serious adverse reactions and events; and Directive 2005/62/EC regarding community standards and specifications relating to a quality system for blood establishments. These directives cover the regulation of blood establishment activities, plasma facilities and certain aspects of hospital blood banking activity, but they do not cover the clinical aspects of the blood

transfusion chain (the usage of blood and blood components and good clinical blood transfusion practice). This Directive provided an update on blood safety on a 'where do we go from here basis' (Robinson, 2007).

2.4.2 Guidelines and Recommendations for Red Cell Transfusion

The Code of Ethics on Blood Donation and Transfusion (2005), elaborated by the International Society for Blood Transfusion and adopted by the World Health Organization, clearly states that “genuine clinical need should be the only basis for transfusion therapy” and that “patients should be informed of the known risks and benefits of blood transfusion and/or alternative therapies and have the right to accept or refuse the procedure”

A previous Recommendation Rec (2002) II (Muñoz, García-Erce, Villar, & Thomas, 2009) of the Committee of Ministers to member states on the hospital's and clinician's role in the optimal use of blood and red blood cells, requests the application of some principles, including the promotion of a national programme of education and training, the release of evidence-based national guidelines on the clinical use of blood and red blood cells. It also includes the implementation of a quality management system by multidisciplinary hospital transfusion committees, the promotion of clinical studies at regional and national level, and the elimination of wastage and loss of blood due to technical reasons. Recommendation Rec (2002) 11 also encourages the use of alternatives to allogeneic blood transfusion and the development of preventative strategies to reduce blood loss.

Clinical transfusion guidelines are tools used to aid clinicians in the appropriate use of blood components in the treatment of patients. These guidelines are not absolute rules but will rather guide clinician's to utilize the most appropriate blood component in the treatment of the patient where a transfusion is indicated. Each patient must be evaluated individually and if justified, the decision to transfuse is therefore based ultimately on a clinical assessment of a specific patient's condition and appropriate laboratory parameters. The World Health Organisation set out recommendations to assist countries establish transfusion guidelines (World Health Organisation). In Ireland, the National Haemovigilance Office (NHO), set up by the IBTS and launched

by the Minister for Health and Children in 1999, supports the development of clinical guidelines for hospitals in relation to the use of blood components/products.

British Committee for Standards in Haematology (BCSH) Guidelines for Perioperative transfusion state that “The objective should be to manage the patient so that transfusion is not needed” (Murphy et al., 2001). Specific measures that may be appropriate are the investigation and treatment of anaemia before elective surgery, discontinuation of antiplatelet drugs, reversal of anticoagulation, consideration of the various strategies of autologous transfusion and the use of pharmacological agents to reduce surgical bleeding. Guidelines for the management of acute blood loss during surgery recommend rapid volume replacement including red cell transfusion in cases of 40% loss of blood volume (>2000ml in an adult). Red cell transfusion are not indicated where estimates of actual and anticipated haemoglobin concentrations are >10g/dl.

2.5 Maximum Blood Ordering Schedule

Crossmatching of red blood cells is performed for elective surgery in anticipation of a potential need that may not materialise. The idea of a MSBOS was first introduced in the 1970's as a way of rationalising blood usage via limiting the number of units held out of circulation and therefore reducing the risk of wastage (Friedman, Oberman, Chadwick, & Kingdon, 1976; Friedman, 1979). Since the introduction of a MSBOS there have been repeated reports of reductions in the crossmatching workload of the Blood Transfusion Laboratories, in some cases up to 36%. There are large financial savings and more efficient use of blood stocks with a reduction in wastage due to expiring units (Jayarane, Prathiba, Vasanthi, & Lopez, 2002). Seminal studies (Friedman et al., 1976; Friedman, 1979) examine the total hospital stay of the patient while more recent studies describe the particular procedures the patient is undergoing.

A MSBOS is a table of elective surgical procedures which lists the number of units of red cells routinely crossmatched for a procedure pre-operatively. It is a schedule based on a retrospective analysis of actual blood usage associated with the individual procedure. It aims to be a correlation of the amount of blood crossmatched

and the amount of blood transfused. The crossmatch:transfusion (CT) ratio can be used to monitor the efficiency of such schemes in surgical settings (Voak et al., 2008).

Surgical procedures can normally be divided into two categories;

- a) Those that can be catered for by a type and screen. In such patients, a previous blood group and no previous reactions to transfusion or pregnancy, blood is readily accessible for crossmatching within minutes. Adoption of a T&S policy for more high risk surgeries is satisfactory. It is not designed to predict blood loss post-surgery and a requirement based blood ordering protocol will optimise blood utilisation efficiency (Al-Benna & Rajgarhia, 2010).
- b) Those for which blood is crossmatched or uncrossmatched according to the MSBOS. This system allows for flexibility.

For patients in the T&S category who have developed antibodies through transfusion or pregnancy, antigen negative blood needs to be made available. For a minority of patients undergoing elective surgery blood needs to be crossmatched in anticipation of a surgical bleed. Any use of electronic crossmatch means that routine crossmatching is not justified for elective procedures that have a blood usage <50%. The crossmatch transfusion ratio should not exceed 2.5:1 (Shaker, Wijesinghe, Farooq, & Artioukh, 2012).

A Sanguinis study examined blood usage in some common procedures in a large regional hospital in Europe. The study showed a large variation in transfusion practice for common surgical procedures (Sirchia, 1994). McClelland (2004) suggests regular comparisons between hospitals transfusion rates for standard procedures (McClelland, 1994). A 2007 Austrian Benchmark Study (Gombotz, Rehak, Shander, & Hofmann, 2007) describes variability in transfusion rates in 18 public hospitals. Some patient variables were examined and various recommendations made show the need to construct local guidelines or tariffs for red cell usage in elective surgery.

2.5.1 Electronic Crossmatch

Electronic Crossmatch refers to the computer crossmatch where no serological testing is performed, and following T&S validation ensures the correct ABO/RhD type

blood is issued. Electronic Crossmatch can only be performed for patients who have two blood groups completed and who have no historical record of clinically significant antibodies (J. F. Chapman, Milkins, & Voak, 2000). Recommendations have been aimed at improving cost effective management of the blood supply suggest reducing the crossmatch release period to less than 1.5 days. The study further stated that a reduction in wastage can be achieved by having a second routine delivery per weekday, and increasing the CT ratio to 70%. The crossmatch release period can be maximised by using the electronic crossmatch, which contributes to increases in the unassigned inventory and decrease wastage (Katsaliaki, 2008). Conversely, one reason for keeping assigned stock levels for longer lies in the use of the antiglobulin crossmatch as the method of pre-transfusion testing where patients have developed clinically significant antibodies (“IBTS Website,”)

Over the past two decades the T&S procedure has gained increasing acceptability as a safe and convenient alternative to the antiglobulin crossmatch (Georgsen & Kristensen, 1998). A T&S allows the blood bank to not assign specific red blood cells to patients, provided that the recipient has no clinically significant antibodies. If a transfusion proves necessary, the Blood Bank issues red blood cells from the ABO/RhD compatible inventory with only electronic or abbreviated serological crossmatch. The T&S allows hospital Blood Banks to meet requests for surgical reserves without, or with only a minimal, assigned inventory. This is only permissible for patients who have not developed red cell antibodies.

2.6 Summary

The literature has shown the importance of a MSBOS in a pre-operative theatre work up as a source of information for doctors. Researchers have explored compliance of doctors in various centres, which will be adopted here as a measurement and evaluation tool. The literature provided an insight that a MSBOS can be generic in template but is individual to each hospital with regular auditing and feedback required to improve blood utilisation practices (Dulara, Jangid, Jain, & Jangid, 2014). The literature review has given conviction to this proposed project.

Chapter 3 Methodology

3.1 Introduction

This chapter briefly describes the change being initiated along with a discussion of some general development models. It will outline a model of change chosen along with its application to the change project concerned and followed to the point where the change process is complete. It is seen in reviews of the literature that successful change management, leadership and selection of the right change model are crucial to all organisational change in an evolving environment as healthcare. In the management of change, it is vital to follow a defined model. For this change project, the HSE change model was chosen. The change being carried out will see a change to current blood product ordering practices in the hospital as well as a reduction in the number of specimens sent to the laboratory for testing. It will see the change processes from initiation to planning through to implementation and finally mainstreaming.

If a change is not managed, it fails (Kotter, 1996). Change management has previously been described as 'the process of continually reviewing an organisation's direction, structure, capabilities to serve the ever changing needs of external and internal customers (Moran & Brightman, 2001). As a result of its value change management is becoming a highly required as a management skill (Senior & Fleming, 2006) Although it is accepted as necessity, there have been failure rates reported of up to 70% (Balogun & Hope Hailey, 2004). Various reasons for failure have been made with the lack of a structure as a key factor due to the wide range of contradictory and confusing theories and approaches available. Its important to note that Senior and Swailes describe organisational change as understanding 'the triggers that lead people to think that change is needed, and what happens when managers try to make change, is essential given the volatile world we live in' (Senior & Swailes, 2010).

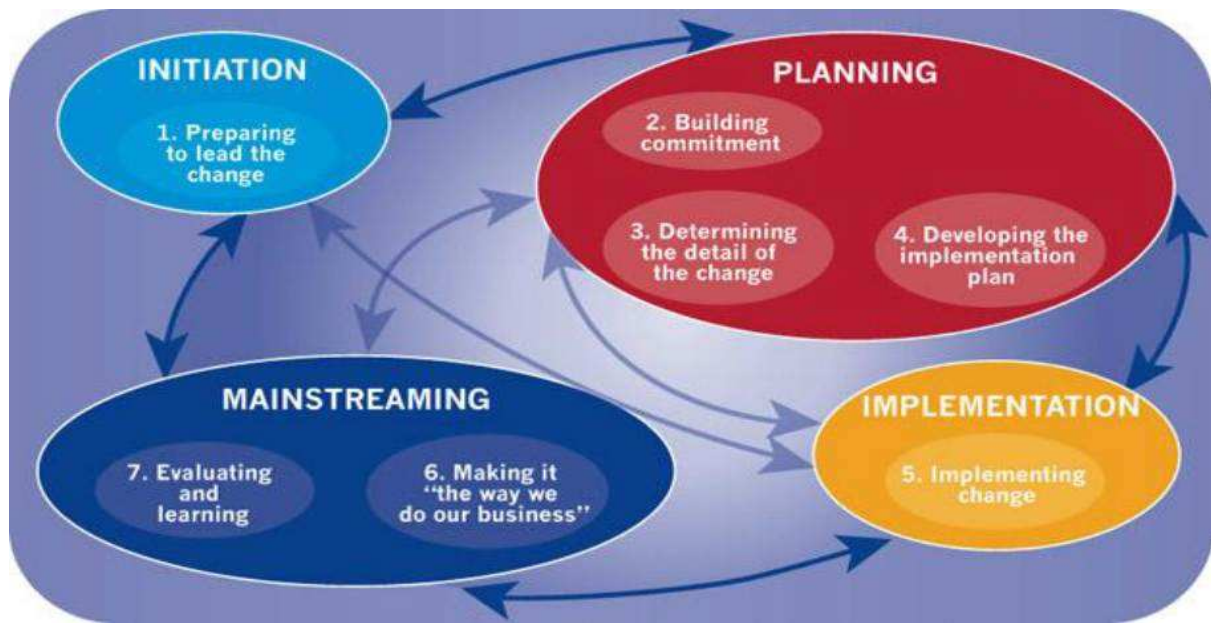
There are examples of classic change models that exist and have been applied to many change initiatives. Lewins change model describes 3 stages of change called

Unfreeze, Change and Freeze. It has been described as being simplistic yet still relevant today, and many change models are based on this theory. It is useful as a simplified outline when attempting to start a more in-depth insight into change management. Kotters change model consists of a sequence of 8 consecutive steps to initiate and implement change. Kotters argues that it is important to change step by step to allow progress to be made without confusion. Both Lewins (1951) and Kotter (1996) models are linear in their approach and seem to propose that change progression is inevitable. The change leader felt that Kotters 8 steps, while describing why transformation fails, failed to allow for the complexity of change along with the fact that it encourages an 'early burst' followed by a lack of energy in the final two steps (Cameron & Green, 2009) Another criticism that could be levelled at these two change models is that they do not include potential roles of power and politics in change processes (Senior & Swailes, 2010)

3.3.1 Why the HSE Change Model?

The change model chosen as part of this project is the HSE Change Model (HSE, 2008). It is both processes centred, active and extremely relevant to this project. It is made up of 4 key stages: Initiation, Planning, Implementation and Mainstreaming. This change approach was chosen as it is based on a Literature Review of best practice and experience in healthcare in Ireland specifically. It's adapted for organisational development and has a strong focus on people involved in aspects of the change. The drivers for change are unarguable, but nevertheless resistance was inevitable and this allows dynamic flexibility to go back to earlier steps. Resistance can be integrated easier than in a linear model. There is attention drawn to collaboration and this is relevant with many stakeholders involved. The change model is drawn from many other past models including Kotter (1995) and the Project Management Institute (2004). Public sector managers continue to be expected to cope with change in the organisation. Despite this emphasis there has been little attention drawn to its management based on experience of what works in practice. It is a reflection of other change models with the limitation of being particular to the Irish Healthcare sector.

Figure 3.1: HSE Change Model (HSE, 2008)



3.2 Initiation

Preparing to lead the change

This stage will lay the foundations for change and develop a strategy for success. There needs to be a responsibility developed here on the part of the change leader to lead the change. Authentic leadership (Avolio, Walumbwa, & Weber, 2009) is “a pattern of transparent and ethical leader behaviour that encourages openness in sharing information needed to make decisions and accepting followers’ inputs.” As a leader, the core purpose of this change was to examine and change blood ordering practices by clinicians for general surgical procedures in a large academic teaching hospital. The project originates from the need for all Blood Transfusion Laboratories to have a Maximum Surgical Blood Ordering Schedule (MSBOS); a is a list of procedures along with requirements for red blood cells that will be revised and implemented. The current system sees little adherence to the current MSBOS. The aim is to establish and implement an MSBOS for an academic teaching hospital through a vision translated into change that will affect a number of areas in the hospital.

In order to change the nature and the degree of choice about whether to change, or not, was addressed. The activities that need to be ended are the practice of over-

ordering of red blood cells for elective surgery patients. This allows a change for staff ordering red blood cells along with a change for laboratory staff in advising new guidelines. There was a redesigning of the current MSBOS that has been drawn up based on retrospective data correlated and examined. This information has been reviewed by the Anaesthetics department in this hospital and guidelines agreed. The clear steps of the HSE Change Model serve to guide the process.

There were various management tools used as part of the initiation. A PESTLE analysis was completed. This is a primary management tool used to identify external drivers for change. It provides a framework for analysis of the 'broad macro environment' (Johnson, 2008 E). Drivers for change are listed in **Appendix 3** Pestle Analysis. They are many drivers for change with this project. There are concerns surrounding the provision of a blood supply with increased population and a decrease in donors along with the Blood Transfusion Departments responsibilities in the provision of a safe and accessible blood supply. Red blood cells are expensive where in Ireland we have one of the most costly transfusion services anywhere in the world. There is a need for blood stock management with blood usage based on capacity and demand. While there is no legal provision surrounding blood wastage or misuse, it is the responsibility of all Blood Transfusion Laboratories to maximise the provision of blood for all potential recipients.

A SWOT Analysis (**APPENDIX 4**) is a strategic planning tool used to pre-empt leverage points consisting of the exploration of opportunities and strengths for change versus the weaknesses and threats in an organisation. A SWOT analysis can identify issues from strategy development approaches, but can also lead to over generalising. They focus the project onto key areas where progress can be made along with establishing a need and value to the change. There are several strengths and opportunities to this project that can be used to enable change. The strengths of this project are savings in time, cost and efficiency. There is backing from management and a strong core of staff enabling the change. There are no requirements for resources to complete the change. The opportunities lie in the alignment to evidence based best practice in the area. These strengths and opportunities are sufficient to allow the change process to progress through evidence based information and appropriate communication. There are also examples of

weaknesses and threats to the change. The disadvantages lie in any change that is made to the current system. The change affects high profile service users who may be resistant to change. There is not a culture of change in the hospital. The timeline for change is short to draft and introduce new criteria and obtaining data from the IT system for evaluation is time consuming.

Analyse Stakeholders

Clarifying the leadership roles and identification of key influencers was the next step in the initiation stage. It set out key individuals and their involvement and importance to the project. It helps to identify the people whom the change will affect and involve. This is described in detail in Stakeholder Analysis **Appendix 6**. Once all stakeholders have been identified it is important to see who has the most impact without failing to address all Stakeholders as potential resisters. Leverage points have been described as places to intervene in the system (Meadows, 1999). Therefore, it can be seen that the people critical to the project are Anesthetic team who have the final say on any transfusion requirement along with laboratory staff who can provide advice on the new MSBOS. These individuals are essential for intervening in the current system. In the current setting, a resource neutral project with potential cost benefits would be more likely to be supported. This project will have insignificant effects on cost and the potential for long term cost savings. The main people that are required to be involved in the redesign process are laboratory and theatre team. The roles and responsibilities of those involved have been made clear. The laboratory staffs are there to provide advice but ultimately it is theatre staff that has the final say. The partnership between Blood Transfusion and theatre is already established through monthly Blood Transfusion Committee meetings that have attendance from the theatre directorate. Any possible changes have been initiated and discussed at this forum.

The greatest impact that this project will have is on theatre staff and any staff involved in the pre ordering of red blood cells for elective surgery patients. The situation currently sees interns ordering specimens and red blood cells for patients. This is very often an over assumption on what will be used. Anesthetic staffs have the final say before surgery commences whether a blood or even a specimen is required in any particular instance. The people who will be of the greatest help are

anesthetic staff who know the current system and can see the benefit of the revised system. Laboratory will have assistance, but this will be at a limited value compared to the service users. The laboratory staff will act more as allies.

Groups that are likely to resist the change are Anesthetic staff who are more comfortable in the knowledge that a specimen has been processed by the laboratory and that a set number of units are crossmatched and available in the theatre fridge for use. A previous study done in this hospital showed that only 12.5% of blood crossmatched for theatre patients was transfused.

The laboratory has the largest vested interest as it will be a saving on the workload of the laboratory. It would also see a reduction in the workload of theatre staff. The service users are the key voice that needs to be heard as part of the change process. The communication process will mostly begin through the Transfusion Committee meetings. The group that has the greatest interest are the Anesthetic team.

Risk & Issue Analysis

There has been some issues raised through the retrospective review and are essential to the completion of this project.

Issue 1: Eliminating routine T&S for the set procedures does create some potential safety concerns including the fear that, in the absence of routing T&S, blood may not be available if required in an emergency. Firstly, it is worth noting that this audit measured same day transfusion rates which included intra-operative and peri-operative need for blood. It does not quantify the urgency of these requests. Many of the requests were not urgent and could have waited the 45 minutes needed process a T&S sample. Although rare, the possibility of an urgent request or major haemorrhage does exist. In such cases, uncrossmatched O negative, universal donor blood can be used. This represents a more cost effective solution compared to performing a T&S on all surgical patients. In Beaumont Hospital, an emergency T&S can be performed in 45 minutes.

Issue 2: There may be a delay in provision of red blood cells for patient who have previously developed red cell antibodies through previous transfusion or pregnancy.

In such cases provision of red blood cells is not immediate. Any requirements that need to be met in an emergency during theatre will take a number of hours.

Resolution 1: The resolution to this is that this institutions trauma and resuscitation protocol dictates that O negative blood is available at all times and can be dispatched immediately. There is a stock of O negative blood available within 15 minutes, meaning that in blood will be available for transfusion in the event of an unforeseen emergency requirement. Any further requirements can be met by processing of a T&S specimen or ordering of red blood cells from the Irish Blood Transfusion Service (IBTS).

Resolution 2: In cases where patients have developed antibodies to previous transfusion or pregnancy provision of red blood cells will be delayed. This would have been the case even if the patient had a T&S processed pre surgery. Its the routine policy to set up a small number of units and nay more would need emergency issue. The theatre department have addressed this issue and have said that they are willing to accept O Negative blood in cases of emergency.

3.3 Planning

Building Commitment

The purpose of planning is to determine details of the change and create support for the change. The objective of this phase was to gain support and commitment. It is imperative to create an environment receptive to change. Leaders must have the ability to create a vision and communicate it clearly. The change leader spoke to staff through a presentation of rationale and proposal (**Appendix 6**). Staff members were willing to change with some resistance seen which will be discussed later. The change leader met with people who were managers in their area and has considerable experience, who could provide advice and expertise. The leaders were willing to change and engage in the change once the idea had been communicated, and their feedback and template guidelines incorporated into the MSBOS. The Anaesthetics Department and the Day of Surgery Admission (DOSAs) wards are the main service users. This is a change to their working practices and it is important that consultants in the area approve of the change. The change will see a list of

relevant procedures approved and implemented for prescribing doctors to follow. It will propose a reduction in the amount of red blood cells ordered for theatre based on a retrospective audit.

The process of engagement began in the laboratory. The Chief Medical Scientist approved the project and seen it as beneficial to the department and the wider hospital. The proposed idea was discussed at the Hospital Transfusion Committee Meeting where staff members from relevant areas meet monthly. A retrospective audit was conducted to provide a meaningful picture of the change. This was developed further with consultation from theatre regarding the findings.

The purpose of this change is to preserve the blood supply and limit the number of unnecessary specimens process by the laboratory. Any MSBOS, while a recognised tool for all Blood Transfusion Departments, is a unique schedule for all hospitals depending on the nature of the elective procedures. The staff at local level will provide support of the project as they are familiar with the new schedule and can provide advice to any users of the service unfamiliar with the concept in this particular hospital. The change will add value to all departments. In the day ward there will be a reduction in the number of T&S specimens taken for elective surgery patients along with a change in the number of cases where they will pre-operatively order red blood cells. For theatre, it will show a reduction in the number of specimens taken pre-operatively along with a reduction in the number of requests they will have to make to the Blood Transfusion Department. Currently, the majority of specimens are taken in the day ward and the majority of blood requests are made by theatre.

The readiness and capability for making change are addressed through education and meetings on the topic. There are no barriers to this project except resistance. There is no new core competencies needed, just a modification of the current system. The theatre staffs are used to a system that has been in place, in this hospital. It was important that the change leader provide a strong visible and credible leadership for a change. This is achieved through communication of evidence backed up by best international practice. Following presentation and education sessions, the new Maximum Surgical Blood Ordering Schedule was made available

to all staff through the Blood Transfusion Guidelines Booklet available to all hospital areas in paper and electronic formats. Once education sessions were complete a start date was adopted for change.

Resistance

There were concerns surrounding the availability of red blood cells detailers in the initiation stage. This was a major potential resistor previous to the discussion on the topic. Even though there was consensus on the topic at first, there was a feeling that clinicians would be losing some of their judgements in deciding how many red blood cells were ordered. Once this was made clear that these were guideline figures and the Blood Transfusion Department was not attempting to assume control there was a change in attitude towards the project. There was a development of supporters (UZZI and Dunlap, 2005) that became important to the project implementation. The Head of Theatre Directorate was on-board along with relevant Anaesthetic consultants that met with the Hospital Transfusion Committee. During various discussions it became clear that a further step of looking into delays in theatre would be a beneficial step that was not initially anticipated. Unfortunately the short time frame became a resistor to completing a comprehensive analysis on this step. The introduction of the system saw some staff members reluctant to utilise the system. The previous system provided a sense of comfort based on potential blood requirements that were generally overestimated. The change leader felt that possibly the role and operations of the Blood Transfusion Laboratory, along with its favourable location close to theatre were not stressed enough.

Determining the detail of the change

The purpose of determining the detail for change and outline what the organisation has in place to facilitate the change. The Blood Transfusion Department has a core knowledge surrounding the subject. The previous MSBOS has not been adhered to for many years since its previous incorporation. It has provided a constant irritation from blood over ordering and unnecessary workload having been widely accepted upon its re-drafting. The current interns in the hospital are aware of the change being brought about and the affect it has on their pre-operative work ups. It will see a reduction in the amounts of specimens taken at this stage. The support of all areas involved has increased the readiness and capacity for change. Analysis of the

current system versus the proposed system presents a picture of a system that is more user friendly, cost saving and beneficial to all parties. The current situation is understood in its current capacity and data collected has shown areas for improvement. It has not been possible to include all surgical departments at this stage, which is an area for development. The Stakeholders in this project have had their own input on the change which has been very important in gaining support. The evidence that has been provided in the introduction compares poorly with best practice. It shows an overuse of the laboratory in terms of specimen taking and overuse in cross matched red blood cells. The data has been collected into specific disciplines of elective surgeries for comparison. The current process shows trends that are above those required for appropriate service delivery and organisational effectiveness.

The information provided in the retrospective audit compiled is as accurate as possible. It contains all listed elective procedures for a two and a half year period. It does not include emergency surgeries. The information obtained shows specimens processed by the laboratory and the number of red blood cells cross matched. It is impossible to ascertain if red blood cells were transfused pre-, intra-, or post-operatively. This information is extremely detailed and relevant in this hospital and can be linked to experiences and organisational behaviours. The information is presented in table format which is easy to decipher via low, medium and high risk procedures that will be addressed in the evaluation. All the data provides a valuable insight into blood ordering practices and there need for modification, but it must be highlighted that at all times it is at the discretion of Anaesthetics what specimen requirements and blood product requirements that particular cases have. Every patient is different and it is the responsibility of the laboratory to process specimens and provide red blood cells in a timely manner where required.

The factors that have emerged from this study see a deficiency in practices operating between the Blood Transfusion Department, Day of Surgery Admission Ward, and Theatre. There needs to be a change in practice between the areas and a culture change in the organisation. The lines of communication are primarily the Hospital Transfusion Committee as well as occasions where presentations of information can be made Data collected post change was fed back through official

channels. The project compiled volumes of data, but this has not transcended through to the final data which is concise and manageable. The post data volume is significantly less in volume but not in value to the organisation.

3.4 Implementing Change

Developing the Implementation plan

The structure of the organisation does not necessarily need to change. There is not a major shift required in governance, either management or clinical. In the SWOT analysis, carried out earlier, the main threat that ranked the highest was the change of practice involving high level staff. Once staff members were on-board the change leader was confident of successful implementation. There was also confidence the results would provide the basis for mainstreaming.

To assess the impact of the project there will be a direct comparison between pre and post audit figures. Monitoring these figures will show what change has occurred and what change will need to be further advances. The sequence of implementation that is required for introduction began with an outline of the plan for change followed by presentation of evidence based data communicating the change required. The parties responsible include the Blood Transfusion Department, Day of Surgery Admission ward and Theatre in adhering to best practice. The timeframe for completion is a two week period where guidelines will be introduced and audited against previous data. The original objectives have been reviewed at this point and it has been decided that they should be reviewed to include a focus on delays in theatre to be used to measure progress.

The purpose of this step is to ensure that the project is meeting its purpose. There is a need to strengthen the partnership between the areas in connection. There a clear date for introduction of the scheme 31th March 2014 communicated to all areas. As previously mentioned it was clear to all staff that theatre would have the final say on any blood product orders. All guidelines were implemented in areas available to all staff including the hospital intranet and the Blood Transfusion Guidelines that are available in hard copy in all departments. There will not be a focus on individuals and their compliance with the system as this is not a true reflection of the varied nature of

surgical procedures. The data returned to the areas following the completeness of the project will aim to show improvements that can be increased through knowledge. The essential element that drives this project from the change project is the fact that building new relationships and bringing about new behaviours will have such a beneficial effect on all areas. The level of problems arising is limited in the fact that theatre users either want red blood cells or they do not need to order red blood cells. It is a clinical decision based on experience on their part. The taking of specimens in the Day of Surgery Admission ward is more difficult as each rotation of interns will not be aware of the system. This will be addresses at the teaching sessions for all interns entering the hospital. The hospital has recently embraced a new document management system. Any finding will be uploaded for all users of the service to see the beneficial nature of the change following the project going into live operation.

3.5 Mainstreaming

The purpose of mainstreaming is to focus on the success of the change. This will lie in the findings to be discussed in Chapter 4. The positive findings that will be discussed in the evaluation will be used to integrate new behaviours, skills and practices. A presentation of the finding has been developed and will be presented to theatre and the day ward with the details of the change. This has showed encouraging results that need to be communicated to all staff to celebrate success. It will reinforce behaviours and hopefully help to further mainstream the change.

3.6 Summary

The chapter traced the change process and the detail involved in this change including any modifications to the original plan. The drivers for change were discussed, along with the reasons for choosing the HSE Change Model. A key factor in driving the change was the planning in the initiation stage to gain support from influential stakeholders gaining their support from the outset. The model helped the change process to completion through the use of the four C'S of persuasion

- Credibility – stakeholders, empowering service users
- Common ground – identifying issues, detailing benefits to all areas

- Compelling evidence – literature review
- Connect - providing a face for the change, resonance

Resistance was a serious issue and was met immediately to address concerns. The project was difficult to oppose once best practice was outlined, benefits were projected and support gained.

Chapter 4 Evaluation

4.1 Introduction

This chapter of the dissertation will describe evaluation in relation to this change project. There will be discussion surrounding various evaluation methods available along with the reasoning for the type of evaluation carried out. The evaluation of this project for change would form the basis for permanent introduction for all service users through the outcomes achieved. The World Health Organisation describes evaluation as “the systematic examination and assessment of the features of an initiative and its efforts, in order to produce information that can be used by those who have an interest in its improvement or effectiveness” (WHO, 1998). An Irish study by Butler states that evaluation can produce the evidence to make informed decisions across all levels of an organisation (Butler, 2002). This is particularly significant in this change project as it addresses a number of hospital directorates. As described by Ovretveit as well as Edmunds & Brown qualitative evaluation looks at words and their meanings while empirical numbers and their significance are the focus of quantitative analysis. Quantitative is fixed and linear in design where measurement is the research instrument. (Edmunds & Brown, 2012; Ovretveit, 2002)

There are a plethora of models and frameworks available proposed to address evaluation in a similar vein to the amount of change models. They range from being outcome centred, to summative, to goal based, and non-goal based. The change leader took the opportunity to focus on quantitative evaluation. A quantitative approach was chosen in this instance as the change leader was aware of the problems associated with blood ordering practices along with the reasons for a lack of adherence to the current MSBOS. It was not being championed by the Blood Transfusion Department any longer and had become obsolete. In the work up there had been a lot of feedback provided surrounding the current system. The issues at hand were clear and did not require understanding beforehand. The benefits of a quantitative approach in this instance were that the change was a top down approach. Within the initiation stage of the HSE Change Model urgency was stated

based on ethical factors of blood wastage and economic factors surrounding the cost of red blood cells.

The evaluation will entail dividing elective procedures into those that had a transfusion rate of less than and great than 5%. Procedures with a transfusion rate of <5% will tackle the aim of reducing specimens and blood orders while procedures with a transfusion rate of >5% will focus on the aim of reducing blood ordering. There will be a wastage and cost analysis, red blood cells and consumables. This would be completed by descriptive statistics that represent quantitative characteristics in dealing with the MSBOS. There will be an outcome assessment that makes a judgement on whether or not the objectives are being achieved.

Lazenbatt's description of evaluation is a "method of measuring the extent to which an intervention achieves its stated objectives" fits the criteria that have been outlined in the aims and objectives of this change initiative. The four C's described are an effective method of evaluation in this instance for interpreting the extent of the change (Lazenbatt, 2002);

- Efficiency - are aims and objectives attained
- Effectiveness – have objectives led to achieved outcomes
- Economy – has all outcomes been achieved
- Equity – has everyone had an opportunity to achieve outcomes

It must be noted that while this project focuses on reducing the number of red blood cells crossmatched for theatre patients along with reducing the number of specimens being processed by the laboratory, at all times the decision to transfuse remains a clinical one. The nature of theatre means that every patient has a different requirement. While guidelines will be implemented there can be no 100% adherence to these guidelines. In consultation with theatre there were a number of exclusions put forward for patients who need a specimen processed and red blood cells provided. These exclusions include;

- Patients with previously identified plasma antibodies
- Patients with a Haemoglobin (Hb) <10g/dl
- Patients with coagulation/platelet disorders

- Patients having surgery in another unit off site from the main hospital.

4.2 Elective Procedures with a transfusion percentage less than 5%

In a two and a half year period a previous audit of 1,860 general surgical procedures were incorporated into this study (**Tables 4.1 and 4.4**). The first evaluation focused on 1,618 procedures that had a transfusion rate of less than 5% (**Table 4.1**). Ten procedures were identified in which the transfusion probability was <5%. It was proposed that these elective procedures would no longer require a Type and Screen (T&S) to be processed by the Blood Transfusion Department along no red blood cells required. Of 1618 procedures performed, the total number of transfusions was 21, with an overall transfusion probability of 1.3%. The percentage of patients having T&S performed pre-operatively varied across this range of procedures from 54.2% (appendectomy) to 98.8% (mastectomy).

Table 4.1: Lower risk surgical procedures

Surgical Procedure	Number of Procedures Performed	Number of Type and Screens	Number of Transfusions (Transfusion Probability (%))
Appendectomy	653	354 (54.2%)	3 (4.6%)
Cholecystectomy	310	305 (98.4%)	10 (3.2%)
Hiatus Hernia Repair	35	31 (88.6%)	1 (2.8%)
Inguinal Hernia Repair	123	79 (64.2%)	3 (2.4%)
Mastectomy			
[+/- SLNBx or Regional Excision of LN]	107	104 (97.2%)	0 (0%)
[+ Radical excision of LN of Axillae]	84	83 (98.8%)	2 (2.4%)
Other Hernia Repairs	61	56 (91.8%)	1 (1.6%)
Parathyroidectomy	56	48 (85.7%)	0 (0%)
Thyroidectomy	181	176 (97.2%)	1(0.6%)
Varicose Vein Stripping	8	6 (75%)	0 (0%)

SLNBx = Sentinel lymph node biopsy, LN = lymph node

Once these figures were presented to theatre and reviewed by the Anaesthetics Department they advised a list of the procedures that they were satisfied would no longer require a T&S specimen processed along with no red blood cells required. This list (**Table 4.2**) included nine of the procedures listed above;

Table 4.2: Procedures that do not require T&S

Procedure
Varicose vein surgery
Parathyroidectomy (excluding mediastinal exploration)
Simple mastectomy +/- sentinel lymph node biopsy
Appendectomy (Laparoscopic & Open)
Cholecystectomy (Laparoscopic)
Femoral Hernia Repair
Inguinal hernia Repair (laparoscopic & Open)
Repair of SMALL incisional hernia
Umbilical Hernia Repair

Further to this the Anaesthetics Department also returned a list of further procedures they were satisfied would also no longer required a specimen processed under a number of different specialities (**Table 4.3**). This discussion was additional on their part and would be included in addition to the original change.

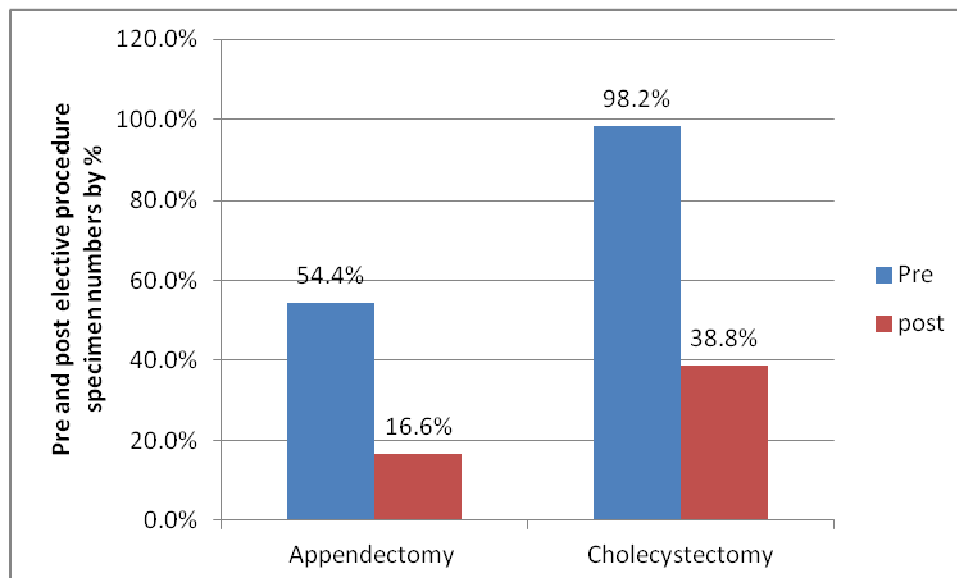
Table 4.3: Additional procedures that do not require a T&S

Procedure
General Surgery
Excision of Pilonidal sinus
Incision & drainage of abscess
Formation of AV (Arteriovenous) Fistula
Axillary lymph node dissection
Reversal of Ileostomy
EUA (Examination under Anaesthesia) of rectum
Injection/banding of Haemorrhoids
Diagnostic Laparoscopy
Urology
Circumcision
Hydrocelectomy (Unilateral & Bilateral)
Orchiectomy (Unilateral & Bilateral, excluding abdominal exploration)
ENT (Ear, Nose and Throat)
FESS (Functional Endoscopic Sinus Surgery)
Miringotomy
Adenoidectomy
MLB (Micro laryngoscopy and Bronchoscopy)
Gynaecology
D&C (Dilation and Curettage)
Hysteroscopy
Laparoscopic Oophorectomy (Unilateral & Bilateral, excluding extensive tumour resection)
Neurosurgery
Lumbar discectomy
Simple decompressive laminectomy (excluding tumour resection)
Vagal Nerve Stimulator

These procedures would no longer require a T&S specimen to be sent to the Blood Transfusion Department. Evaluation was carried out on data collected for two elective procedures, Appendectomy and Cholecystectomy, for a two week period regarding adherence with the new system. The largest number of specimen's was received on these procedures. Data retrieved is displayed in a Bar Chart (**Figure 4.1**) below in a % format. This data shows that for each procedure;

- Appendectomy elective surgeries showed a reduction in the number of specimens from 54.2% to 16.6%. The timeframe for data retrieval for both procedures was much smaller than the previous data collected and is displayed via a percentage. This included 30 procedures with a total of 6 specimens received (16.6%).
- Cholecystectomy elective procedures showed a reduction in number of specimens from 98.2% to 38.8%. This included 18 procedures with a total of 7 specimens received (38.8%)

Figure 4.1: Pre and post specimen numbers (%)



4.2.1 Evaluation

This evaluation focused on elective procedures with a transfusion percentage of less than 5%. Following Lazenbatt's 4C's of evaluation for this section;

- Efficiency: the aims were to evaluate the ordering practices of blood ordering and reduce the number of specimens processed by the laboratory and the amount of blood orders.
- Effectiveness: the objectives were to compile a list of procedures that no longer required a T&S specimen. This list was verified by the Anaesthetics Department and further added to.
- Economy: The outcomes of this evaluation were successful. Of the 10 procedures, it was agreed that 9 would no longer require a specimen. In addition, a list of procedures were further added that were also to proceed without a specimen. Also **Figure 4.1** indicated a reduction in the amount of specimens sent to the laboratory in the timeframe.
- Equity: Upon first presentation of the topic to theatre staff the author feels that there may have been an absence of some service users who may not have been informed completely surrounding the change. It is the goal of disseminating these results will further improve these figures.

4.3 Elective Procedures with a transfusion percentage greater than 5%

The literature review determined that transfusion rates greater than 5% require a specimen to be processed and no red blood cells ordered. Where transfusion rates are greater than 30% red blood cells should be crossmatched for these procedures. In this section of the evaluation the concern is with blood ordering practice instead of the number of specimen's processed. It contains five procedures that had higher transfusion probabilities >5% (**Table 4.4**). Of 242 high risk surgical procedures evaluated, the total number of transfusions was 49, with an overall transfusion probability of 20.24%. Individually, the transfusion rates vary from 11.4% (adrenalectomy) to 32.7% (oesophagectomy). All procedures had a T&S processed and red blood cells had been ordered.

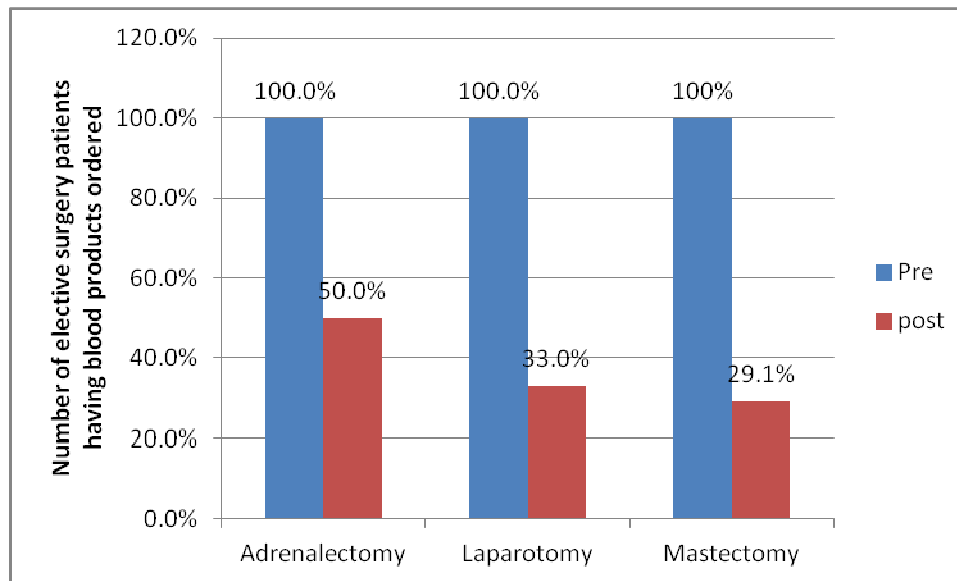
Table 4.4: Higher risk surgical procedures.

Surgical Procedure	Number of Procedures Performed	Number of Type and Screens	Number of Transfusions (Transfusion Probability (%))
Adrenalectomy	35	35 (100%)	4 (11.4%)
Elective Laparotomy	8	8 (100%)	1 (12.5%)
Gastrectomy	73	73 (100%)	20 (27.4%)
Oesophagectomy	55	55 (100%)	18 (32.7%)
Mastectomy [+ reconstruction, augmentation, TAHSO]	71	71 (100%)	6 (8.4%)

TAHSO = Total abdominal hysterectomy and salpingo-oophrectomy

These procedures would therefore, with a transfusion rate of >5%, require a T&S specimen to be processed by the Blood Transfusion Department without red blood cells being ordered. The exception would be Oesophagectomy which had a transfusion rate of greater than 30%, Oesophagectomy was not analysed beyond this point as blood as this procedure required red blood cells to be crossmatched. There was an analysis carried out of adrenalectomy, laparotomy and mastectomy procedures.

Figure 4.2: Pre and post red blood cells ordered (%)



These procedures would no longer require red blood cells to be ordered. Following introduction of new guidelines data was collected for these elective procedures listed in **Figure 4.2**, for a two week period regarding adherence with the new system. This data shows that for each procedure;

- Adrenectomy elective surgeries showed a reduction in the number of procedures that had ordered red blood cells. The timeframe for three procedures is much smaller than the previous data collected and is displayed via a percentage. In the post study there were 8 procedures with a total of 4 having red blood cells ordered (50%). Laparotomy elective surgeries showed a reduction in the number of procedure that had ordered red blood cells. In the post study there were 3 procedures with a total of 1 having red blood cells ordered (33.3%)
- Mastectomy elective surgeries showed a reduction in the number of procedure that had ordered red blood cells. In the post study there were 24 procedures with a total of 7 having red blood cells ordered (29.1%).

4.3.1 Evaluation

This evaluation focused on elective procedures with a transfusion percentage of greater than 5%. Following Lazenbatt's 4C's of evaluation for this section;

- Efficiency: the aims of this section were to evaluate blood ordering practices only.
- Effectiveness: The objectives were to compile a list of procedures that no longer required blood to be ordered pre-operatively.
- Economy: The outcomes of this evaluation were successful. Figure 4.2 indicates that there has been a significant reduction in the amount of red blood cells ordered for each procedure in the timeframe.
- Equity: Upon first presentation of the topic to theatre staff the author feels that there may have been an absence of some service users who may not have been informed completely surrounding the change. It is the goal of disseminating these results will further improve these figures.

4.3 Costs Involved in Crossmatching Red blood cells

4.3.1 Cost of Processing T&S Specimens

There was a cost estimate for those procedures that no longer needed a routine T&S. Thyroidectomises were excluded as they still requires a T&S. This figure has been calculated by multiplying the number of unnecessary T&S specimens performed (n=1437) by the laboratory cost of a T&S analysis (€83) and divided by 2.5 to obtain a yearly average. The economic savings equal €47,708 per year. A costing was completed for performing an electronic crossmatch and serological crossmatch (2-3% of all patients require this method) of red blood cells (**Table 4.5 and 4.6**)

Table 4.5: Cost of electronically crossmatching 4 units of red blood cells.

Consumable	Price €	Quantity	Cost
Compatibility Labels	1.05	4	4.20

Table 4.6: Cost of serological crossmatching 4 units of red blood cells

Reagent /Consumable	Price €	Quantity required	Cost €
IgG Card	3.23 (per card)	1	3.23
Diamed ID- Diluent	0.76 (per ml)	200µl	0.15
Anti-Fya Control	2.93 (per ml)	25 µl	0.07
Tips	0.094 (per tip)	8	0.76
Segmenters	0.207 (per segmenter)	4	0.83
Test tubes	0.04 (per tube)	8	0.32
Compatibility labels	1.05(per label)	4	4.20
Total Cost			€9.56

4.3.2 Cost of expired units of RBC

A unit of RBC costs €273.31. At the end of this study, the number of units that had been crossmatched and that were returned were examined to see if any units had expired. The re-use and expiry rates were calculated as a % of the total no. of units returned. The cost of expired units, and percentage contribution to the overall wastage in the study period were calculated. A total of 7 units expired January 2001-June 2011 (Statistics obtained from Transfusion Committee Meetings). 291 units were returned to stock with re-use and wastage rates of 97.6% and 2.4% (7 units) respectively. Unnecessary crossmatching for this study group directly contributed to wastage of 7 units. The cost of expired units was calculated to be €1,931.17 (7 x €273.31). This accounted for 43.5% of the wastage in the 6 month study period.

4.4 Summary

This chapter has addressed the issue of evaluating a change process. The outcomes of the change suggest successful change initiative in regard to the original aims and objectives. In summary, the change leader found that the data collected in the post evaluation showed a significant improvement in adherence to the MSBOS and also a significant reduction in the number of specimens processed

Chapter 5 Discussion

5.1 Introduction

This chapter will provide a review of the change project implemented. This project set out to reduce blood product ordering along with a reduction in the number of specimens processed by the laboratory. There will be consideration of the strengths, as well as the limitations of the study. Working in the environment with over ordering of red blood cells was frustrating for all staff involved. It was not difficult to initiate the idea of a need for change. The literature review provided substantial information that supported a change in practice. While no specific numerical guidelines exist specifically for each procedure or speciality, there exists evidence based guidelines on creation of a Maximum Surgical Blood Ordering Schedule. It is unique to each hospital. The author felt the selection of a single change model that covers all aspects of the change was extremely important. The HSE Change Model (HSE, 2008) was selected as the sole model for change.

It is important to stay focused on the aims and objectives of the change project throughout. The **aim** of this Organisational Development project was the Revision and Implementation of a Maximum Surgical Blood Ordering Schedule for a Large Acute Hospital. The **objectives** were as follows;

- **Specific:** identify the most common elective surgical procedures for which red blood cells were crossmatched to evaluate blood usage on elective procedures leading on to a reduction in specimen processed in the Blood Transfusion Department.
- **Measurable:** Set criteria for ordering red blood cells from the hospital blood bank for elective procedures. This will act as the standard to measure compliance to determine if clinicians are complying with the MSBOS.
- **Achievable:** To draw up a MSBOS and to inform all users of the service of the proposed change and obtain buy-in from all service users.
- **Realistic:** The dissertation requires no resources to achieve its objectives and is a priority for the Blood Transfusion Department and Theatre Admissions.

- **Time Bound:** Introduction of the system within one month from which an evaluation can be carried out.

The results from the evaluation indicate that there is considerable variation in transfusion probability for the fifteen general surgical procedures examined; from 0% – 32.7%. However, for many of the lower risk surgical procedures the need for transfusion is almost negligible. The routine requesting of Type and Screen (T&S) in these cases represents inefficient utilisation of resources. Of 1618 lower risk surgical procedures performed, the overall transfusion rate was 1.3%. In select procedures, this rate was even lower. These represent procedures in which routine T&S may be omitted without compromising patient safety.

Substantial evidence exists for the use of transfusion probability as a systemic criteria for T&S guidelines. Studies suggest any procedure with greater than 19 cases (N value ≥ 19) and a transfusion rate of $\leq 5\%$ would not need routine type and screening (Dexter, Traub, & Qian, 1999; van Klei et al., 2002). It was proposed that all lower risk procedures would no longer require a T&S. These procedures all have an N value ≥ 19 and a transfusion rate of $\leq 5\%$. The benefits of reducing T&S include reduced demand on staff and laboratory processing time, reduced theatre delays, and substantial costs saved. A T&S costs €83 in this hospital. Elimination of routine T&S on the selected lower risk procedures has the potential to save €47,000 per year. The economic and ethical issues surrounding blood wastage show that a total of 7 red blood cells were directly attributable to theatre wastage, totalling almost €2000. This is the first study of its kind that has specifically investigated the cost of the service provided by the Department. It was an important aside to note the various costs involved. The total cost of completing a crossmatch involves;

- Medical Scientist time (estimated 20 minutes staff time)
- Porter staff (estimated 15 minutes staff time)
- Cost per crossmatch - estimated to be €4.20 per electronic crossmatch and €9.56 per serological crossmatch (2-3% of theatre crossmatching)

However, eliminating routine T&S for the above mentioned procedures does create some potential safety concerns including the fear that in the absence of routine T&S, blood may not be available if required emergently. Many of the requests were not urgent and could have waited the 45 minutes required process a T&S sample. Although rare, the possibility of an urgent request or major haemorrhage does exist. In such cases, uncrossmatched O negative, universal donor blood can be used. This represents a more cost effective solution compared to performing a T&S on all surgical patients. The institutional trauma and resuscitation protocol dictates that there is an availability of four units of O negative blood are available at all times. A further stock of red blood cells can be made available immediately, meaning that in blood will be available for transfusion in the event of an unforeseen emergency requirement.

5.2 Organisational Impact

The author completed a number of management tools documented in the Appendix section at the beginning of the project to set out the current situation and the ideal situation upon completion. The author felt that these tools were instrumental in understanding the changes necessary and what may be expected. Upon completion review of this data indicated a favourable outcome in all aspects. Some omissions were made including receiving of feedback from service users. It was felt that the system would smooth transition and adherence to the system would be sufficient feedback. An example of an area that the author felt needed expansion was informing clinicians of the location and service provided by the Blood Transfusion Department. It was felt this needed to be stressed much stronger. It is important for the author to continue the mainstreaming of this change project.

Behavioural

Since the implementation of the change many behavioural aspects surrounding the change have improved dramatically. A pre audit carried out showed critical deficiencies in blood ordering practices. Updating users on the operations of the Blood Transfusion Department enables users to understand the service provided and enabled a behavioural change. A sense of ownership was thrust upon the

department once implementation began leading to improved attitudes and a positive behavioural change

Structural

The evaluation results indicate an improved structure to how the system is managed. The change idea behind the project is far less complex than may be expected considering the role of the Blood Transfusion Department in the important role it provides in blood provision. This is not to understate the Departments role but merely to demonstrate that education of users on the service provided can lead to substantial changes. The initial presentation demonstrate to staff that the laboratory is 400m from theatre and that it will take a porter only approximately 2 minutes to make their way to the laboratory and back to theatre. It was estimated by some service users that there was a significant distance to be travelled. It was put across that the department is immediately available to cover all emergencies. While it was part of this initiative that blood may be made available immediately for certain procedures, it was assured to staff that;

- For patients without a T&S specimen processed it will take 45 minutes to process a specimen. In the intervening period emergency O Negative red blood cells are available.
- For those patients who have the exclusions listed in the introduction of the Chapter 4 red blood cells can be made available, including transport time to theatre, in less than 10 minutes 24 hours a day.

Personal

There will be a continued coordination with the introduction of this change in theatre ordering practices. The process needs mainstreaming over a period of time to ensure its adherence. There will be renewed confidence in the system once relevant findings have been reported back to the service users. They will provide greater validity and reliability. There was initial resistance to the project in the sense that theatre staff are used to having specimens processed and red blood cells crossmatched. There is clearly some resistance in place as the evaluation results, while promising, provide some areas for improvement. The aim was never to gain 100% compliance, an unachievable figure in an unpredictable environment of a theatre directorate, but results can be improved upon. The aim was also not to focus

on specific staff members but a concerted effort to change practice of a Directorate. It is also the case that all staff were not at the initial presentation and may not have input into the revised procedures that were made available. Upon meeting staff with the change results it would be hoped to encompass more staff, and possibly get more on board with positive results. There has been no negative feedback about delays in blood provision.

It could be considered that the personality and position of the change leader may have had an adverse effect throughout the change in achieving desired results. In example, it may have been more appropriate to be more forceful in dealing with resistance upon initial introduction of the system. The change leader is not in a position of management, which is felt would have assisted in a more positive forceful attitude towards the change. The support of the theatre directorate manager made up for the change leaders lack of managerial credentials.

Cultural

Procedures and beliefs make up the culture of an organisation and in an academic teaching hospital must have patient care as the shared value at the core of service provision. Evaluation results show a shift in culture that can be pushed further. It must be championed that the change to new guidelines for blood product ordering will improve the institution in driving towards evidence based practice.

5.3 Strengths and Limitations

On reflection, it is felt that this change process was worthwhile, rewarding and constructive. The principal strength of this project is that the implemented change has achieved its objectives. The aims and objectives were allowed to be answered in a short time frame. There are increased efficiencies with regard to processing of specimens and a reduction in workload for the laboratory. This manifested itself in increased levels of confidence of staff on both sides of the system that no negative feedback has arisen. The system is in place for a future study of a particular speciality that may lead to even further decreases in specimen processed or red

blood cells ordered. The findings of the study can be viewed as a strength, as it expands further on another Irish study by Prichard (2011) regarding blood usage.

There are a number of limitations to this study. The timeframe of the change project implementation was quite limited. The introduction and implementation were thorough and comprehensive, but the evaluation is lacking in comprehensive data to support the change. The data collected is promising, and no doubt that further data will provide greater validity to the change. Another limitation is that it is difficult to set exact figures or goals for compliance, it will never be 100%. It is hoped that through continued education and statistical evidence that percentages can continue to lower to a threshold level in future evaluations of the system. Future reviews may be able to add specific required outcomes based on the complete findings of this change management project. The relatively small sample size used for evaluation in the current study provides generalisation of results, the reason for this being time constraints on the author.

There is one aspect of the project that needs to be addressed. It arose during the methods section that delays caused by incomplete laboratory specimens in theatre would have added significant credibility to the change project. This was realised quite late on and there was not significant time to evaluate such findings. It is felt there is definite scope for looking into this area of boundary between theatre, the day ward and the laboratory. It was originally not in the objectives, was added to the objective section, and subsequently removed.

Attitudes, Barriers and facilitators

It is extremely important when implementing change to understand attitudes. The author found initial positive attitudes do not always correlate to actual behaviour shown with some resistance in the evaluation. While barriers will always exist it is up to the author to determine the advantages and disadvantages of a change project. An author can have positive thoughts and beliefs but they must be backed by support to overcome barriers. There are additional factors that could have affected the evaluation results and non-adherence including conflict between peers, lack of communication, inadequate training and lack of support systems. For any new initiative to be put into place successfully, support systems must be put in place. A

lack of support systems can act as a barrier (Drennan et al., 2009). Support is a broad concept entailing many aspects, yet is vital to any change to work practice and expansion of service.

Another area of importance noted was the role of facilitators cannot be understated in practice. The stakeholder analysis demonstrated the important staff members that could be used as facilitators. The facilitators in place included good working relationships, a thrust in the service provided by the laboratory and effective communication. The author felt it was important to develop a supporting environment was beneficial to influencing behaviour (Ajzen, 2005).

5.4 Resistance

The literature provides explanations towards resistance from high powered clinicians and healthcare professionals. It can arise from a lack of understanding to blurring of boundaries. Evidence suggests that role development into areas that are traditionally medicine can result in blurring of roles and resistance. Resistance from healthcare professionals can be reduced with communication and understanding of the roles of stakeholders. There were potential barriers at the start of the project that were envisaged and strategies were put in place. Pre-implementation strategies (force field analysis) prepared a clear and practical plan with a solid grounding in evidence.

Recommendations for future Improvements

Upon reflection, there are some limitations to the project. The evaluation section needs analysis over a longer period of time to add validity to results. The concept of an MSBOS is not a new phenomenon, yet there remains a large gap in the literature from an Irish perspective. There needs to be further studies carried out in different centres to allow a comprehensive evaluation of literature from and would provide feedback for completion and avoid groundwork in terms of literature reviews being carried out and frameworks established anytime a study of this nature is initiated. It is fine to establish guidelines from international studies as a template but would be more appropriate with the emergence of new surgical techniques and aimed at a population study that is unique to Ireland.

The dissemination of findings is often discounted following initial implementation of a change project. Findings from the current study will be presented to staff at local level and within the theatre and the ward involved in the change. It is the intention to submit an abstract to the relevant body for publishing.

5.5 Summary and Conclusion

The need for change was apparent from everyday experience in the current environment. Support from the literature was a defining element in the establishment of a need for change. It was implemented utilising the HSE Change Model. The use and selection of a suitable change model was important to lessen any resisting factors. The value of a process centered evaluation focusing on quantitative data provided depth and quality to the information. An important indicator of a successful change was the decision of the Anaesthetics Department to embrace draft proposals the addition of extra procedures. This showed that confidence had been established in the change project and that resistance had been overcome. It also gave the author great confidence going forward.

This change management process involved the revision and implementation of a new Maximum Surgical Blood Order Schedule in the Blood Transfusion Department. It was introduced to streamline service, reduce costs and align to best practice in the area. Although the initial data collection was time consuming collating necessary information, it has been worthwhile and supported by quantitative evidence and positive feedback from colleagues. The change represents a more structured approach to blood ordering practices in this hospital combined with a reduction in the number of specimens taken from patients.

References

- AABB. (2011). *Technical Manual* (17th ed.).
- Ajzen, I. (2005). *Attitudes, Personality and Behaviour*. Berkshire: Open University Press.
- Al-Benna, S., & Rajgarhia, P. (2010). Blood transfusion requirements in elective breast reconstruction surgery. *Breast (Edinburgh, Scotland)*, 19(6), 475–8. doi:10.1016/j.breast.2010.05.006
- Alter, H. J., & Klein, H. G. (2008). The hazards of blood transfusion in historical perspective. *Blood*, 112(7), 2617–26. doi:10.1182/blood-2008-07-077370
- Avolio, B. J., Walumbwa, F. O., & Weber, T. J. (2009). Leadership: current theories, research, and future directions. *Annual Review of Psychology*, 60, 421–49. doi:10.1146/annurev.psych.60.110707.163621
- Balogun, J., & Hope Hailey, V. (2004). *Exploring Strategic Change* (2nd Editio.). Prentice Hall.
- Butler, M. (2002). *Evaluation in the Irish Health Sector*. Dublin.
- Cameron, E., & Green, R. (2009). *Making sense of change management: a complete guide to models, tools & techniques of organizational change* (2nd Editio.). London: Kogan Page.
- Chapman, J. (2007). Unlocking the essentials of effective blood inventory management. *Transfusion*, 47(2 Suppl), 190S–196S; discussion 201S. doi:10.1111/j.1537-2995.2007.01384.x
- Chapman, J. F., & Cook, R. (2002). The Blood Stocks Management Scheme, a partnership venture between the National Blood Service of England and North Wales and participating hospitals for maximizing blood supply chain management. *Vox Sanguinis*, 83(3), 239–46. Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/12366766>

- Chapman, J. F., Hyam, C., & Hick, R. (2004). Blood inventory management. *Vox Sanguinis*, *87 Suppl 2*, 143–5. doi:10.1111/j.1741-6892.2004.00472.x
- Chapman, J. F., Milkins, C., & Voak, D. (2000). The computer crossmatch: a safe alternative to the serological crossmatch. *Transfusion Medicine (Oxford, England)*, *10(4)*, 251–6. Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/11123808>
- Cohen, M. A., & Pierskalla, W. P. (2003). Management Policies for a Regional Blood Bank. *Transfusion*, *15(1)*, 58–67. doi:10.1046/j.1537-2995.1975.15175103512.x
- Currie, C. J., Patel, T. C., McEwan, P., & Dixon, S. (2004). Evaluation of the future supply and demand for red blood cells in the United Kingdom National Health Service. *Transfusion Medicine (Oxford, England)*, *14(1)*, 19–24. doi:10.1111/j.0958-7578.2004.00475.x
- Dexter, F., Traub, R. D., & Qian, F. (1999). Comparison of statistical methods to predict the time to complete a series of surgical cases. *Journal of Clinical Monitoring and Computing*, *15(1)*, 45–51. Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/12578061>
- Drennan, J., Naughton, C., Allen, D., Hyde, A., Felle, P., O'Byrne, K., Butler, M. (2009). *National Independent Evaluation of the Nurse and Midwife Prescribing Initiative*. Dublin: University College Dublin.
- Dulara, S. C., Jangid, P., Jain, R., & Jangid, A. (2014). A Prospective Study of Blood Transfusion Practice in Elective Orthopaedic Surgeries. *International Journal of Recent Trends in Science and Technology*, *10(1)*, 36–39.
- Edmunds, S., & Brown, G. (2012). Doing qualitative research in dentistry and dental education. *European Journal of Dental Education*: Official Journal of the Association for Dental Education in Europe, *16(2)*, 110–7. doi:10.1111/j.1600-0579.2011.00734.x
- Friedberg, R. C., Jones, B. A., & Walsh, M. K. (2003). Type and screen completion for scheduled surgical procedures. A College of American Pathologists Q-Probes study of 8941 type and screen tests in 108 institutions. *Archives of*

Pathology & Laboratory Medicine, 127(5), 533–40. doi:10.1043/0003-9985(2003)127<0533:TASCFS>2.0.CO;2

Friedman, B. A. (1979). An analysis of surgical blood use in United States hospitals with application to the maximum surgical blood order schedule. *Transfusion*, 19(3), 268–78. Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/452067>

Friedman, B. A., Oberman, H. A., Chadwick, A. R., & Kingdon, K. I. (1976). The maximum surgical blood order schedule and surgical blood use in the United States. *Transfusion*, 16(4), 380–7. Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/951737>

Garrard, J. (2014). *Health Sciences Literature Review Made Easy: The Matrix Method* (p. 4).

Genoe, K., Cioffi, J. M., Givisiez, F. N., Rogerson, M., Howe, D., Delage, G, González, G. L. De. (2010). Inventory Management. *Vox Sanguinis*, 98(3p1), e295–e363. doi:10.1111/j.1423-0410.2009.01252.x

Georgsen, J., & Kristensen, T. (1998). From serological to computer cross-matching in nine hospitals. *Vox Sanguinis*, 74 Suppl 2, 419–25. Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/9704476>

Gombotz, H., Rehak, P. H., Shander, A., & Hofmann, A. (2007). Blood use in elective surgery: the Austrian benchmark study. *Transfusion*, 47(8), 1468–80. doi:10.1111/j.1537-2995.2007.01286.x

Greinacher, A., Fendrich, K., Alpen, U., & Hoffmann, W. (2007). Impact of demographic changes on the blood supply: Mecklenburg-West Pomerania as a model region for Europe. *Transfusion*, 47(3), 395–401. doi:10.1111/j.1537-2995.2007.01129.x

Hairman, F., Ruce, M., Hapman, J. C., et al. (1997). Guidelines for autologous transfusion . II . Perioperative haemodilution and cell salvage BRITISH COMMITTEE FOR STANDARDS IN HAEMATOLOGY BLOOD TRANSFUSION TASK Drafted by the Autologous Transfusion Working Party□.; 768–771.

- Heddle, N. M., Liu, Y., Barty, R., Webert, K. E., Whittaker, S., Gagliardi, K., Owens, W. (2009). Factors affecting the frequency of red blood cell outdates: an approach to establish benchmarking targets. *Transfusion*, 49(2), 219–26. doi:10.1111/j.1537-2995.2008.01970.x
- HSE. (2008). *Improving Our Service: A Users Guide to Managing Change in the Health Service Executive*. Dublin.
- IBTS Website. (2014). Retrieved February 25, 2014, from http://www.ibts.ie/Become_a_Donor/Keeping_Blood_Safe/
- Jayarane, S., Prathiba, R., Vasanthi, N., & Lopez, C. G. (2002). An analysis of blood utilization for elective surgery in a tertiary medical centre in Malaysia. *The Malaysian Journal of Pathology*, 24(1), 59–66. Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/16329557>
- Katsaliaki, K. (2008). Cost-effective practices in the blood service sector. *Health Policy (Amsterdam, Netherlands)*, 86(2-3), 276–87. doi:10.1016/j.healthpol.2007.11.004
- Kotter, J. (1996). *Leading Change*. Harvard Business Press.
- Lazenbatt, A. (2002). *The Evaluation Handbook for Health Professionals*. (Routledge, Ed.). Taylor and Francis Group.
- McClelland, D. B. L. (1994). Red cell transfusion for elective surgery: a suitable case for treatment. *Transfusion Medicine*, 4(4), 247–249. doi:10.1111/j.1365-3148.1994.tb00261.x
- Meadows, D. (1999). *Leverage Points: Places to Intervene in a System*. Vermont: The Sustainability Institute.
- Moran, J. W., & Brightman, B. K. (2001). Leading organizational change. *Career Development International*, 6(2), 111–119. doi:10.1108/13620430110383438
- Muñoz, M., García-Erce, J. A., Villar, I., & Thomas, D. (2009). Blood conservation strategies in major orthopaedic surgery: efficacy, safety and European regulations. *Vox Sanguinis*, 96(1), 1–13. doi:10.1111/j.1423-0410.2008.01108.x

- Murphy, M. F., Wallington, T. B., Kelsey, P., Boulton, F., Bruce, M., Cohen, H., ... Williamson, L. M. (2001). Guidelines for the clinical use of red cell transfusions. *British Journal of Haematology*, 113(1), 24–31. Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/11328275>
- Ovretveit, J. (2002). *Evaluating Health Interventions*. Philadelphia: Open University Press.
- Pereira, A. (2005). Blood inventory management in the type and screen era. *Vox Sanguinis*, 89(4), 245–50. doi:10.1111/j.1423-0410.2005.00700.x
- Pierskalla, W., & Roach, C. D. (1972). Optimal issuing policies for perishable inventory. *Manag*, 18(11), 603–614.
- Prastacos, G. P. (1984). Blood Inventory Management: An Overview of Theory and Practice. *Management Science*, 30(7), 777–800. Retrieved from <http://www.jstor.org/stable/2631647>
- Prichard, R. S., O’Keefe, M., McLaughlin, R., Malone, C., Sweeney, K. J., & Kerin, M. J. (2011). A study of pre-operative type and screen in breast surgery: improved efficiency and cost saving. *Irish Journal of Medical Science*, 180(2), 513–6. doi:10.1007/s11845-010-0668-y
- Robinson, E. A. E. (2007). The European Union Blood Safety Directive and its implications for blood services. *Vox Sanguinis*, 93(2), 122–30. doi:10.1111/j.1423-0410.2007.00942.x
- Sanjay, P., Dodds, a., Miller, E., Arumugam, P. J., & Woodward, a. (2007). Cancelled elective operations: an observational study from a district general hospital. *Journal of Health Organisation and Management*, 21(1), 54–58. doi:10.1108/14777260710732268
- Seghatchian, J., & Solheim, B. G. (2007). Current opinions on safer red cell transfusion practice and the appropriate use of alternative strategies. *Transfusion and Apheresis Science*, 37(2), 201–207. doi:10.1016/j.transci.2007.09.001
- Senior, B., & Fleming, J. (2006). *Organizational Change*. Pearson Education.

- Senior, B., & Swailes, S. (2010). *Organizational Change* (4th Editio.). Prentice Hall.
- Shaker, H., Wijesinghe, M., Farooq, A., & Artioukh, D. Y. (2012). Cross-matched blood in colorectal surgery: a clinical waste? *Colorectal Disease*: *The Official Journal of the Association of Coloproctology of Great Britain and Ireland*, *14*(1), 115–8. doi:10.1111/j.1463-1318.2010.02535.x
- Shander, A., Hofmann, A., Ozawa, S., Theusinger, O. M., Gombotz, H., & Spahn, D. R. (2010). Activity-based costs of blood transfusions in surgical patients at four hospitals. *Transfusion*, *50*(4), 753–65. doi:10.1111/j.1537-2995.2009.02518.x
- Singh, J. K., & Singh, P. (2011). Routine pre-operative cross-match for elective colorectal resections: an appropriate use of resources? *The Surgeon*: *Journal of the Royal Colleges of Surgeons of Edinburgh and Ireland*, *9*(1), 8–12. doi:10.1016/j.surge.2010.06.008
- Sirchia, G. (1994). Use of red blood cells for elective surgery in 43 European hospitals. *Transfusion Medicine*, *4*(4), 251–268. doi:10.1111/j.1365-3148.1994.tb00262.x
- Stanworth, S. J., Cockburn, H. a C., Boralessa, H., & Contreras, M. (2002). Which groups of patients are transfused? A study of red cell usage in London and southeast England. *Vox Sanguinis*, *83*(4), 352–7. Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/12437523>
- Thomson, a., Farmer, S., Hofmann, a., Isbister, J., & Shander, a. (2009). Patient blood management - a new paradigm for transfusion medicine? *ISBT Science Series*, *4*(n2), 423–435. doi:10.1111/j.1751-2824.2009.01251.x
- Tinmouth, A. T., McIntyre, L. A., & Fowler, R. A. (2008). Blood conservation strategies to reduce the need for red blood cell transfusion in critically ill patients. *CMAJ*: *Canadian Medical Association Journal = Journal de l'Association Medicale Canadienne*, *178*(1), 49–57. doi:10.1503/cmaj.071298
- Van Klei, W. A., Moons, K. G. M., Rheineck-Leyssius, A. T., Kalkman, C. J., Rutten, C. L. G., Knape, J. T. A., & Grobbee, D. E. (2002). Validation of a clinical prediction rule to reduce preoperative type and screen procedures. *British Journal of Anaesthesia*, *89*(2), 221–5. doi:10.1080/jmf.11.6.400.402

- Voak, D., Napier, J. A. F., Boulton, F. E., Cann, R., Finney, R. D., Fraser, I. D., ... Dodsworth, H. (2008). Guidelines for implementation of a maximum surgical blood order schedule. *Clinical & Laboratory Haematology*, 12(3), 321–327. doi:10.1111/j.1365-2257.1990.tb00042.x
- Wallis, J. P., Wells, a W., & Chapman, C. E. (2006). Changing indications for red cell transfusion from 2000 to 2004 in the North of England. *Transfusion Medicine (Oxford, England)*, 16(6), 411–7. doi:10.1111/j.1365-3148.2006.00702.x
- Walsh, T. S., & Prowse, C. (2007). BCSH guidelines for policies on alternatives to allogeneic blood transfusion. 1. Predeposit autologous blood donation and transfusion, August 2006. *Transfusion Medicine (Oxford, England)*, 17(5), 353; discussion 366. doi:10.1111/j.1365-3148.2007.00751.x
- WHO. (1998). *WHO European Working Group on Health Promotion Evaluation (1998) Health Promotion Evaluation: Recommendations to policy Makers*. Brighton.
- World Health Organisation. (n.d.). W. Retrieved from <http://www.who.int/bloodsafety/en/>

Appendices

Appendix 1 Project Impact Statement

Describe here how things are now in relation to the issue	Describe here how things should (ideally) be when the issue has been addressed
<p><u>Behavioural</u> : describe current patterns of behaviour/ attitudes of the key people involved with the issue</p> <ul style="list-style-type: none"> • No adherence to current MSBOS • Blood Transfusion Staff do not advise interns on over ordering for preoperative patients • There is currently no auditing of the system. 	<p><u>Behavioural</u>: what sort of behaviours would (ideally) be evident when the issue has been addressed?</p> <ul style="list-style-type: none"> • Staff are made aware of the MSBOS and adhere to its guidelines. • Blood Transfusion staff will be aware of the new guidelines and can pass on relevant advice to clinical staff. • There will be a greater deal of auditing to ensure compliance.
<p><u>Structural</u>: describe the way roles and responsibilities are currently organised</p> <ul style="list-style-type: none"> • Currently, the theatre admission staff will accept/deny a patient to theatre based on patients specimen being processed or awaiting completion. • Red blood cells supplied based on request from clinical staff. • The new DOSA ward is currently the location for the taking of T&S specimens f 	<p><u>Structural</u>: describe how roles/responsibilities would be organised once this issue has been addressed</p> <ul style="list-style-type: none"> • Patients can be admitted to theatre for certain procedures without a specimen being processed by the Laboratory. • Blood Transfusion Department can provide advice on guidelines for certain procedures. • The ne DOSA ward will be one of the main targets for the new MSBOS..
<p><u>Personal</u>: describe how you participate in and contribute to the current reality</p> <ul style="list-style-type: none"> • As part of the Laboratory Directorate I participate in the supply of red blood cells. • Currently, I have spoken to theatre surrounding this topic and the benefits it will provide. • It will be the responsibility of myself to liaise with relevant regarding various aspects of the change. 	<p><u>Personal</u> : describe how you will participate in and contribute to the new reality</p> <ul style="list-style-type: none"> • An active part in ensuring that that there is compliance with the MSBOS. • I will continue to liaise with theatre staff and analyse any relevant feedback. • I hope to engage and participate in the change. This will involve being in contact with staff
<p><u>Cultural</u>: describe “how things are done around here” now, e.g. accepted ways of doing things, implicit understandings</p> <ul style="list-style-type: none"> • Clinicians order red blood cells as a safety measure for theatre. • Blood Transfusion staffs are not currently advising clinicians on over ordering of red blood cells. • Certain understanding at present sees clinicians ordering products uninhibited. 	<p><u>Cultural</u>: what will be “the way things are done around here” when the issue has been addressed?</p> <ul style="list-style-type: none"> • Inform Clinicians of the service that the Blood Transfusion Department provide. • A new MSBOS along be attached to the new Blood Transfusion Guidelines. These are available to all staff on the hospital intranet page. The future situation will see advice passed on, on certain procedures.

Appendix 2 Force Field Analysis

Stage 1 - Changes in the workplace

DRIVING FORCES	RESTRAINING FORCES
<p>Stakeholders: The original idea for the change project was raised by the head of the Surgical Directorate. It is supported by the head of the Surgical Directorate along with all management in the Laboratory Directorate</p>	<p>Resistance: There will be resistance towards this change project as many of the practices have been in place for a number of years</p>
<p>Reduction in Workload: It will result in a reduction in the workload in the for the Blood Transfusion Laboratory along with a cost saving element.</p>	<p>Provision of Red blood cells: There may be a delay in the provision of Red blood cells for patients who do not have a specimen processed by the Blood Transfusion Laboratory. This need will be met via O neg blood being made available and requires a risk analysis.</p>
<p>Updated MSBOS: There is a evidence based need to have an updated MSBOS in place in every hospital</p>	<p>Communication: This project requires a number of steps to be communicated to all parties. The communication needs to be filtered to Interns, Nursing staff, theatre admission and Anaesthetics who have the final say on any change.</p>
<p>Retrospective Audit Completed:Data has already been correlated and analysed to show the value of the project. It is from this data that relevant recommendations will be made.</p>	<p>Data Analysis:Obtaining a list of procedures to audit for post analysis will involve learning how to generate theatre lists from the HIPE system in the hospital.</p>
<p>Achievable and Realistic: This project is both achievable and realistic. There is a need for an updated MSBOS and a realistic timeframe for completion and evaluation.</p>	<p>Theatre Admission: It will require a change to the theatre admission policy where certain procedures will be allowed into theatre without a specimen being sent to the Blood Transfusion Department</p>

Force Field Analysis - STAGE 2 Importance and Ease of Change

A IMPORTANCE
5
Very Important to the Change

1
Of little importance

B EASE OF CHANGE
1
Very Easy to Change

5
Very Difficult to Change

DRIVING FORCES	A	B	A * B	Ranking
	Importance	Ease of Change		
Stakeholders	5	1	5	
Reduction in Workload	4	1	4	
Updated MSBOS	4	4	16	3
Retrospective Audit Completed	3	1	3	
Achievable and Realistic	3	2	6	
RESTRAINING FORCES	A	B	A * B	Ranking
	Importance	Ease of Change		
Resistance	5	4	20	2
Provision of Red blood cells	5	4	20	1
Communication	5	3	15	
Obtaining Data	3	2	6	
Theatre Admission	3	5	15	

STAGE 3: STRATEGY

Priority 1:

STRATEGY FOR PRIORITY 1

Provision of Red blood cells

The provision of red blood cells will be affected by this change project. The current situation sees specimens being sent to the laboratory for processing on all patients prior to surgery. The new situation would see certain procedures not requiring a specimen to be taken. In cases such as these compatible red blood cells would not be immediately available for these surgeries. There is a supply of O Neg blood available at all times to cover the 45 minute period it would take the laboratory to process an emergency specimen. This has been addressed with all parties involved and will require a risk assessment.

Priority 2:

STRATEGY FOR PRIORITY 2

Resistance

There is a resistance element to this project that needs to be addressed. The project will involve a change to practices of some very senior staff in theatre. These staff have many years of experience in a theatre setting and the rationale for change needs to be backed up by sufficient evidence to be accepted.

Priority 3:

STRATEGY FOR PRIORITY 3

Updated MSBOS

The change to the MSBOS is the main point being addressed in this project. There is much literature surrounding the topic. It has been justified in its need and needs investigation, change and evaluation. The project details the changes that need to be made for the successful introduction of an updated MSBOS in this centre.

Appendix 3 PESTLE Analysis

<p><u>Political</u> Environmental concerns surrounding this topic include the reduction in the amount of the population donating. There is a shortage in the blood supply and evidence based data suggests that this will only worsen.</p> <p>The Blood Transfusion Department is run under the Department of health and follows its mission statement 'to 'improve the health and wellbeing of people in Ireland in a manner that promotes better health for everyone, fair access, responsive and appropriate care delivery, and high performance'. The provision of a safe and accessible blood supply benefits the whole population.</p>	<p><u>Economical</u> The provision of red blood cells is expensive and while the economic state of the country should not be a factor as cost saving should be employed at any time.</p> <p>Seasonality plays a role in the provision of red blood cells. It is difficult to pin-point specific trends where red blood cells will definitely be required but preservation of stocks will help in any times of shortage.</p>
<p><u>Social</u> The provision of red blood cells is based on consumer attitudes and demographics towards donation. Mobile units that cover the country ensure the provision of red blood cells.</p> <p>Major events and influences do not affect trends on blood usage. Publicity and media coverage can affect the amount of units donated.</p>	<p><u>Technological</u> There are introductions coming for technology for the sector. It is the responsibility of each Blood Transfusion Laboratory to ensure there stock management is in place for future stock movement between centres. There is innovation approaching that needs to be planned for in the area.</p> <p>The blood usage and requirements have an affect on capacity in the National Blood Centre and each individual Blood Transfusion Laboratory.</p>
<p><u>Legal</u> While there is no specific legal framework for the provision of blood surrounding wastage or misuse, it is the responsibility of all Transfusion laboratories to ensure they maximise the provision of blood for all users.</p>	<p><u>Ethical</u> The IBTS states in their mission statement that: 'The IBTS is committed to excellence in meeting patients' needs through the professionalism of our staff and the generosity of our donors.'</p>

Note: PESTLE analysis can be useful before SWOT analysis because PESTLE helps to identify SWOT factors. PESTLE and SWOT are two different perspectives but can contain common factors

Appendix 4 SWOT Analysis

Strengths

- Core of competent staff
- System in place to be modified
- Economic issues
- Savings in time cost and time

Weaknesses

- Resistance
- Time
- Large volume of data
- Low Moral

Opportunities

- Reduction on Blood wastage
- Reduced workload
- Cost Saving




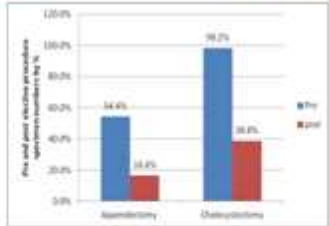
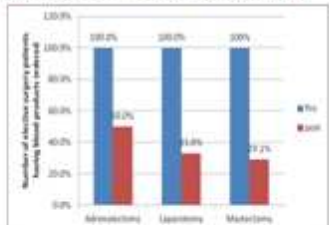
Threats

- Culture
- Resistance from high powered clinicians
- No support
- IT system

Appendix 5 Stakeholder Analysis

Stakeholder	Job Role	Project Role	Interest*	Why?*	Impact*	Responsibility*	Readiness*	Capacity*
Directorate Manager	To oversee the Laboratory Directorate as a whole.	Limited role in the project	Medium	Awareness	Medium	Medium	Low	Low
Laboratory Manager	To oversee the running of the Laboratory including staff	Limited role in the project	Medium	Too Busy	Medium	Medium	Low	Low
Chief Medical Scientist	To oversee the running of the Blood Transfusion Department	Substantial role in the project	High	Project Credibility	High	High	High	High
Medical Scientist	To cover all functions of the Transfusion laboratory	Substantial role in the project	High	Awareness	Medium	Low	High	High
Anaesthetic Staff	To provide Anaesthetic support for all surgery patients.	Substantial role in the project	Medium	Project Credibility	High	High	Medium	High
Theatre Admission staff	To admit all patients to theatre based on agreed checklists for entry.	Medium role in the project	Medium	Awareness	Medium	Low	Medium	Medium
Day of Surgery Admission Ward	To provide an entry route to the hospital for patients who do not require a hospital stay.	Medium role in the project	Medium	Awareness	Medium	Low	Medium	Medium
Interns	To provide work ups for patients presenting to theatre based on individual teams requirements	Medium role in the project	High	Understanding	High	Medium	Medium	Medium
Author	To cover all functions of the Transfusion Laboratory	High	High	Personal Impact	Medium	High	High	High

Appendix 6 Poster

 <h1 style="text-align: center;">Maximum Surgical Blood Ordering Schedule</h1> <p style="text-align: center;">MSc Healthcare Management Paul Sheridan Email: paul.sheridan@yahoo.com</p> <p style="text-align: center; font-size: small;">RCSI DEVELOPING HEALTHCARE LEADERS WHO MAKE A DIFFERENCE WORLDWIDE</p>		
Introduction & Background	Methodology	Evaluation
<p>Pre operative ordering of red blood cells for surgical procedures is often an inappropriate assumption and has a negative effect on red blood cell stock management. Cross matching is time consuming and expensive for the Hospital as well as reducing the lifespan of blood. Strict donation procedures as well as an ageing population already limit future donors (1).</p> <div style="text-align: center;">  </div> <p>Rationale: To revise the Maximum Surgical Blood Ordering Schedule (MSBOS). This is a table of surgical procedures that lists red blood cell requirements for patients presenting to theatre for elective procedures.</p>	<p style="text-align: center;">Figure 1: HSE Change Model (2)</p> <div style="text-align: center;">  </div> <ol style="list-style-type: none"> 1. Initiation Data collected and objectives communicated to staff relevant to the change following an extensive review of the literature for evidence based practice. Change Tools: Stakeholder Analysis, SWOT, PESTLE, Forcefield Analysis 2. Planning Development of a communication strategy. Collection of statistics of proposed change. Create a shared vision among stakeholders to support the change effort. 3. Implementation Creation of a shared vision for the change with presentations and communication with wards and staff members affected backed by area managers. 4. Mainstreaming Three strategies for mainstreaming <ol style="list-style-type: none"> 1. Discussion surrounding results following evaluation with all relevant staff 2. Presentation to staff in the laboratory following successful implementation 3. Evaluation against best practice to allow change to be incorporated into practice 	<p style="text-align: center;">Figure 1: Reduction in specimens ordered pre and post</p> <div style="text-align: center;">  </div> <p style="text-align: center;">Figure 2: Reduction in red cell orders pre and post</p> <div style="text-align: center;">  </div> <p>A quantitative evaluation was carried out on data. This showing a reduction in the amount of both specimens and blood products ordered. The results presented will have a strong impact on a number of areas in the hospital and will attempt to also reduce workload and costs.</p>
Aims & Objectives		Conclusion
<p>Aim: Revision and Implementation of a Maximum Surgical Blood Ordering Schedule in a Large Acute Hospital</p> <p>Objectives:</p> <ul style="list-style-type: none"> Identify common surgical procedures performed within the hospital Set limits for ordering of red blood cells and use this as the standard to measure compliance Identify Stakeholders and obtain buy-in from all service users To reduce the number of type and screen specimens processed by the laboratory 		<p>Change, though challenging, can be achieved if it is approached systematically. Future audits will confirm the impact of the long term change of practice. With no defined end point this project can be seen as an on-going process in the organisation.</p>
		References
		<ol style="list-style-type: none"> 1. Singh K., Singh P. (2011) Routine pre-operative cross-match for elective colorectal resections: an appropriate use of resources? <i>The Surgeon</i> 9:8-12 2. Health Service Executive (2008) <i>Improving our services: A users guide to managing change</i>

Appendix 7 Gantt Chart

