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Citation: Clark, Stephen (2020) Patient safety checklists in heart and lung transplantation. Trends in Transplantation, 13 (2). ISSN 1887-455X

Published by: OA Text

URL: <https://doi.org/10.15761/tit.1000277> <<https://doi.org/10.15761/tit.1000277>>

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# Patient safety checklists in heart and lung transplantation

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## Introduction

The use of safety checklists in process critical occupations such as aviation and engineering are well established in everyday practice. The World Health Organisation developed a 3 stage surgical checklist in 2007 investigating its use in 8 international centres with over 3000 surgical patients recruited. Both mortality and morbidity were significantly reduced and as a result surgeons have begun to fully implement their use into their practice.

A realization that medical error and oversight plays a major role in patient harm and that medical and nursing staff are not infallible and capable of error has driven the use of surgical checklists within an open and transparent culture of improving patient safety and the quality of care they receive.

A key factor in the successful implementation of a surgical checklist is the full engagement of the staff implementing the checklist. One major drawback to the widespread adoption of standardized WHO style checklists is that it may not cover all pertinent risk factors applicable for transplantation surgery as many checklists are generic and have not been adapted specifically. This negates much of the opportunity to improve safety as far as possible. Uniquely in transplantation opportunities exist for safety and quality improvement through checklists used at both the donor and recipient operation.

With the development of transplant specialty specific checklists, it is anticipated that with widespread adoption, the improvements in patient safety observed in other specialities will be enjoyed by patients undergoing cardiopulmonary transplantation.

## Background

Transplant surgical teams are not perfect and we have no room for complacency when it comes to the safety of our recipients undergoing surgery.

Acknowledgement of error in a transparent and supportive environment with the emphasis on learning is to be encouraged to drive up standards for our patients.

However, high rates of preventable surgical site infections resulting from inconsistent timing of antibiotic prophylaxis administration persist. Anaesthetic related complications remain high and despite many high publicity cases throughout the world, wrong patient, wrong site operations still take place. Surgical teams have often been criticised for their lack of formal briefings or preparation with other team members and equally there is no structured debriefing of the operating team after most procedures. Errors of omission remain common and increasing surgical complexity and sometimes high staff turnover mean that these problems remain of importance.

Aviation, which shares many of these factors affecting safety with transplant surgery has been the foundation of checklist culture. Safety

checklists are accepted without question as a routine part of the role of pilots and as a professional duty. Checklists are used prior to all critical events such that there is a list of checks to be performed providing an opportunity to correct problems or omissions and gives a shared responsibility for safety amongst the crew. This is not a new concept for pilots. Wilbur Wright said after one of his pioneering flights in 1900 "I have learned that carelessness and overconfidence are usually far more dangerous than deliberately accepted risks". This is a view that is equally applicable in transplant surgery as it is in aviation.

Checklists have been clearly demonstrated to facilitate multistep processes to improve team dynamics and minimise error and acts as a backup to human memory [1-7].

Currently transplant surgical teams do most of the right things on most patients most of the time but by using surgical checklists this will assist us in doing all of the right things on all of the patients all of the time. In applying checklists to transplant surgery however there are important points to consider. Checklists need to be adaptable to the local setting – in our case transplantation rather than for example hernia repair surgery. It needs to be supported by evidence and therefore be credible to those who are using it. Checklists need to be evaluated in use and proven to be practicable and promote adherence to established safety practices within hospitals. Importantly the introduction of checklists needs to consume only minimal resources.

## Checklist development

The World Health Organisation developed a simple patient safety checklist in 2007 which was divided into three sections. One undertaken before the induction of anaesthesia, the second undertaken before skin incision at the start of surgery and the final section being completed when the patient leaves the operating room. The checklist comprised very basic checks such as the identity of the patient and the procedure that they were to have performed, the site of operation and simple checks of anaesthesia and monitoring equipment. There were also checks regarding patient allergies, airway and bleeding risks as well as anticipating critical events [8, 9]. The results from 3, 733 patients operated on before the use of the checklist were compared to 3,955 patients operated on using the checklist and demonstrated that the risk of death from surgery fell from 1.5% to 0.8%, complications were reduced by 30% and surgical site infections were reduced by 50%. Similarly there were reductions in the frequency of unplanned re-operations. The SURPASS collaborative group later explored surgical

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Received: August 15, 2020; Accepted: September 04, 2020; Published: September 07, 2020

checklists in academic teaching hospitals which already demonstrated high levels of quality and safety [10]. 3760 patients were observed before implementation of the checklist and 3820 patients afterwards. The total number of complications per 100 patients decreased from 27 to 17, which was an absolute risk reduction of 10% even when corrected for potentially confounding variables.

Surgical safety checklists became mandatory for all operations in the United Kingdom from February 2010 [11]. The WHO checklist was generic and focussed on general surgical and orthopaedic procedures. However there were significant omissions for cardiac and thoracic surgery and therefore a lost opportunity to enhance patient's safety in this specialty [12]. In particular insufficient attention was paid to preparations for excessive bleeding, inclusion of perfusionists and perfusion related issues, the use of theatre briefings and debriefings with the operating team and anaesthetic colleagues and provision for checking cardiovascular monitoring and transfer arrangements for patients back to Intensive Care Unit. Indeed the Society of Thoracic Surgeons in the United States developed checklists in cardiac, thoracic and paediatric cardiac surgery as templates which can be modified by individual units rather than making it a mandatory process as in the United Kingdom.

There is little doubt that the use of a surgical checklist improves teamwork and communication and is a focal point for starting an operation and sharing any concerns or expectations regarding the procedure. It adds redundancy to existing safety processes but requires sensitive introduction local adaptation and human factors awareness and training to be successful [13].

An analysis following the implementation of surgical safety checklists amongst NHS Trusts in the United Kingdom in June 2010 indicated that 77% of Trusts felt that teamwork had improved as a result of introducing the checklist and that safety had improved in 68%. 41% of respondents indicated that near miss incidents had been captured and that in 35% of Trusts that procedures were now smoother and quicker than before the introduction of the checklist. Reductions of surgical flow disruptions, procedural knowledge deficits and miscommunication by 50% simply by undertaking pre-operative briefings has been shown [14].

In transplant surgery specifically there was no provision for checklists at organ retrieval, or to cover donor details and blood group, checks on immunosuppression or on co-ordination and timing to minimize ischaemic times which in heart and lung transplantation are critical.

Very little literature exists on the utility of checklists specifically in any branch of transplant surgery. As an illustration of what is possible to enhance safety in cardiopulmonary transplantation specifically the following retrieval and implantation checklists have been devised for use in our local setting.

Each checklist conforms to a standard layout – sign in, time out and sign out.

## Summary

Organ procurement and transplantation is a complex clinical process that involves interactions and collaboration among the members of multi-disciplinary teams in the healthcare system, typically across more than one clinical setting, and sometimes even more than one country.

The nature of donation and transplantation carries the risk of communication and information errors, which might result in subsequent harm to the patient.

Data from the use of checklists in general surgical disciplines and more recently in cardiothoracic surgery where specialty specific checklists items can further enhance safety suggests that the use of a checklist at retrieval and at implantation will bring benefits and reduce avoidable error.

Initial reactions are often mixed towards the concept and there is likely to be variability in the use and compliance with the checklist such that there are requirements for good leadership and an understanding of human factors. There are issues over responsibility for the checklist, the omission of sections of the checklist or distractions while performing it. Interruptions, apathy and individualism are must be avoided. There may be a concern over added bureaucracy but the use of a checklist may make additional paperwork redundant and replace it either in part or completely and assist uniformity. It is important to ensure the relevance of surgical safety checklists rather than try to have a generic format and miss important safety elements. It is crucial therefore to have checklists specifically for transplant surgery [12].

Checklists have been clearly demonstrated to facilitate multistep processes to improve team dynamics and minimise error. Implementation of the WHO checklist has shown that the best centres ensure adoption of a team-culture, with the operating surgeon visibly supporting the process but also acknowledging the important contribution of all members of the theatre team [15].

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