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## Research Article

# A Model for Assessment of Peri-Operative Outcomes Following Hepato-Pancreatic and Biliary Surgery

Shahzad Ahmed<sup>1</sup>, Eloise Lawrence<sup>2</sup>, Ghulam Murtaza Dar<sup>1</sup>, Arslan Pannu<sup>3</sup>, Khurram Shahzad Khan<sup>4</sup>, Salman Jabbar<sup>5</sup>, Ahmad Mirza<sup>6\*</sup>

<sup>1</sup>Department of Surgery, Royal Oldham Hospital, Manchester, UK

<sup>2</sup>Department of Surgery, Manchester Royal Infirmary, UK

<sup>3</sup>Department of General Surgery Sheffield Teaching Hospital NHS Foundation Trust, Sheffield, UK

<sup>4</sup>University Hospitals Hairmyres, Scotland, UK

<sup>5</sup>Department of Surgery, Monklands University Hospital, Scotland, UK

<sup>6</sup>Department of Abdominal Transplant and Hepato-Biliary Surgery, University of Cincinnati Medical Center, Ohio, USA

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### ABSTRACT

Hepato-pancreatic and biliary surgery is associated with significant morbidity and mortality. A large number of these complications can be avoided and promote better outcomes. Peri-operative complications can have significant impact on the overall cost of the procedure. Number of steps can be adopted in the post-procedure phase with accurate documentation, stratification, classification and categorisation of complications. This will help to monitor departmental surgical outcomes and necessary steps that can be adopted to improve patient safety. This study will aim to propose a structure to record post-operative surgical complications following hepato-pancreatic and biliary (HPB) surgery. This record keeping and reflection will help to improve patient care and outcome.

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## Introduction

Postoperative complications are a significant healthcare burden [1, 2]. Postoperative complications are responsible for significant morbidity and reduced postoperative quality of life [3, 4]. A proportion of these complications are preventable and a source of needless patient suffering [5]. These complications are also responsible for prolonged hospital admissions and greater healthcare expenditure [1, 2, 6]. A postoperative complication following cancer surgery is associated with shorter disease-free survival and reduced overall survival [7-10]. This is possibly caused by an immunomodulation effect of the postoperative complication [10]. Surgical audit is an established method of measuring and improving healthcare performance. It is considered an essential part of good medical practice. Despite this surgical audit is poorly performed. The very act of measuring performance is thought to lead to improvements, even without intervention. This study sought to propose a model to measure the impact of a robust prospective surgical complication audit programme on complications following hepato-pancreatic and biliary (HPB) surgery.

## Design

The model for assessment of outcome program (AOP) following HPB surgery is a process of recording peri-operative outcomes, analysing clinical parameters and complications and subsequently aiming to reduce operative morbidity and mortality from complex hepatobiliary and pancreatic procedures. This proposed model has been inspired by the Trauma Performance Improvement Reference manual produced by the Performance Improvement subcommittee of the American College of Surgeons Committee on Trauma in 2002 [11]. We have incorporated changes to the data gathering and analysis to address specificities of HPB surgery.

## Procedure of Recording and Analysing Data

### I Weekly departmental APO meetings

We propose a multi-disciplinary session attended by the lead surgeons, intensive care team, nursing staff, pharmacy, junior doctors, data

\*Correspondence to: Ahmad Mirza, M.D., FRCS, Department of Abdominal Transplant and Hepato-Biliary Surgery, University of Cincinnati Medical Center, 234 Goodman St., Cincinnati, Ohio 45219; Tel: 0015135462533; E-mail: Ahmad.mirza@uchealth.com

manager and medical students. Each patient complications are discussed and proforma completed. The proforma outlines general patient demographic details, date and type of HPB surgery performed, complications and outcome. All records are recorded on a central database for a subsequent review and analysis.

## II Grading of complications

The International Study Group in Pancreatic Surgery (ISGPA) and International Study Group in Liver Surgery (ISGLS) described criteria specific to pancreatic and liver surgery is employed. The main complications of pancreatic surgery were pancreatic fistula, delayed gastric emptying and post-pancreatectomy haemorrhage described according to criteria proposed by International Study Group of Pancreatic Surgery (ISGPS) [12-14]. Similarly, three major complications recorded for liver surgery were bile leak, liver failure and post-hepatectomy haemorrhage as proposed by International Study Group of Liver Surgery (ISGLS) [15-17]. For all the other complications and interventions grading the Clavien-Dindo system was employed [18].

## III Error analysis and justification

For all peri-operative complications an individual error analysis should be conducted on available clinical information against 15 parameters. These most importantly include error in patient selection, delayed or missed diagnosis, intra-operative technical error, equipment failure and drug error. Once an error analysis is completed it should be further evaluated if the specific complication was justifiable, unavoidable or consistent with routine practice. In situations where the complications were considered as not part of the routine practice a thorough root cause analysis should be performed to identify the error.

## IV Action Plan

Once the complications have been graded and if found to be non-justifiable then trust internal audit incident reporting tool, modification of departmental training program and individual counselling and discussions should be undertaken. This gives us an opportunity to immediately implement changes in clinical practice to improve peri-operative morbidity and mortality.

## V Assessment of mortality

All post-operative deaths should be discussed at the monthly mortality meeting. Each case should be discussed in detail and categorised on basis of non-preventable, possibly preventable, probably preventable and preventable deaths.

## VI Readmission and return to theatre records

For all types of HPB surgery (benign and malignant) the readmission rate should be analysed. We should aim to discuss all readmissions at weekly APO meetings and procedural checks kept in place to avoid too early discharges leading to increased number of readmissions. The clinical course of all readmitted patients should be recorded and year to year analysis performed to identify improvement in service delivery and overall outcome.

The clinical course of all patients who return to theatre for operative complications should be individually recorded and discussed at the AOP meetings. The conclusions once drawn, and lessons learned are recommended to be elaborated openly in group discussions for all other team members to be aware of early recognition and knowledge of technical operative skills that can be employed to address a particular situation.

## VII Dissemination of information

It is recommended all outcomes discussed should be tabulated and presented at quarterly audit meetings of the surgical directorate. Also, interesting outcomes should be presented both nationally and international platforms to share knowledge and experience. This practice encourages wider participation, learning opportunity and feedback to improve outcome and quality of care.

## VIII Statistical Analysis

All categorical data can be analysed by employing bar charts and frequencies. Individual complications in a particular sub-group of patients undertaking a similar surgery performed and comparison was made one year to year basis. To compare like for like surgery, patients can be divided into four group comprised of liver surgery, Whipple's procedure, distal pancreatectomy and cholecystectomy (open and laparoscopic). All data can be prospectively collected and compared for outcomes year by year. Percentage of overall morbidity and mortality for each sub-group of patients can be performed and outcome analysed. Statistical analysis can be performed using SPSS software.

## Results

Sub-group analysis and outcomes for each group can be analysed separately.

### I Post-Whipple's Outcome

The no of Whipple's procedure conducted over consecutive years and compilation of major post-procedure outcomes can be tabulated. The incidence of pancreatic fistula, post-pancreatectomy haemorrhage and delayed gastric emptying can be observed.

### II Post-Liver resection outcome

Similarly, the yearly comparison of post-operative complications and outcomes following liver resection can be made. The incidence of bile leak, post-hepatectomy liver failure and post-hepatectomy haemorrhage can be tabulated and compared.

### III Post-distal pancreatectomy Outcome

Complications related to distal pancreatectomy including pancreatic fistula, delayed gastric emptying and post-pancreatectomy haemorrhage should be tabulated separate to Whipple's procedure. They are two different procedures with separate.

#### IV Outcomes post-Cholecystectomy

Cholecystectomies performed has shown considerable increase in number of both elective and emergency procedures. They form a considerable portion of benign biliary surgical work. It's important to tabulate their outcome, complications and recurrent admissions.

#### V Error code, Justifications and action plans

For all complications an errors code is recorded (Table 1). This should be followed by further discussion on justifications and action plan to improve future outcome.

**Table 1:** Description of error codes for assessment of perioperative outcome.

<b>I</b>	Selection of patient	<b>IX</b>	Error in administration of blood products
<b>II</b>	Diagnosis- Missed or delayed	<b>X</b>	Unavailable human resources
<b>III</b>	Equipment failure and not available	<b>XI</b>	Poor patient monitoring
<b>IV</b>	Technical error during surgery	<b>XII</b>	Incomplete patient record keeping
<b>V</b>	Error of judgement in patient care	<b>XIII</b>	Failure of escalation of treatment
<b>VI</b>	Delay in treatment	<b>XIV</b>	Unaware of local guidelines and policies
<b>VII</b>	Error of medicine administration	<b>XV</b>	No error identified

#### Discussion

This project has shown that HPB APO program can be an effective and practical method to monitor and address significant peri-operative morbidity and mortality associated with pancreatic and liver surgery. This program will also show that teamwork and clear communication at all levels of patient care can significantly impact on patient outcome. The number of pancreatic and liver resections being performed has been increasing year by year. This model of AOP will help to improve safety and all aspects of patient care. Thorough review of each patient complication will help to improve patient care. Aspects of general patient care i.e. communication, diagnostics and therapeutic interventions have all been addressed and continuous feedback and input by all team members will help to improve inpatient stay. This program will help clinicians to address issue of audit cycle and clinical governance. Overall improvement in all aspects of patient care has been observed. The hospital readmission rate following initial discharge has always been considered a sub-optimal treatment. The AOP project can help to exactly identify the number of readmissions following each

procedure and address issues of peri-operative optimisation, pre-habilitation before major liver and pancreatic surgery to reduce readmission rate. This will help to relieve hospital beds to more unwell patient. In most centres elective laparoscopic cholecystectomies are performed as day case with only few select cases requiring overnight stay. The implementation of an APO project will require dedication, commitment and multiple team members will be involved in collecting, updating and analysing information to make it reproducible and clinically applicable.

#### Conclusion

The application of APO program in hepato-biliary and pancreatic surgery will show that post-operative outcomes can be accurately recorded and guide future management. Data will be gathered for all age groups and will show the complication distribution. HPB AOP is an effective tool to monitor reduction in complications following implementation of effective clinical practices to enhance peri-operative outcomes.

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