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ORIGINAL ARTICLE

Nationwide prospective audit of pancreatic surgery: design, accuracy, and outcomes of the Dutch Pancreatic Cancer Audit

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Abstract

Background: Auditing is an important tool to identify practice variation and 'best practices'. The Dutch Pancreatic Cancer Audit is mandatory in all 18 Dutch centers for pancreatic surgery.

Methods: Performance indicators and case-mix factors were identified by a PubMed search for randomized controlled trials (RCT's) and large series in pancreatic surgery. In addition, data dictionaries of two national audits, three institutional databases, and the Dutch national cancer registry were evaluated. Morbidity, mortality, and length of stay were analyzed of all pancreatic resections registered during the first two audit years. Case ascertainment was cross-checked with the Dutch healthcare inspectorate and key-variables validated in all centers.

Results: Sixteen RCT's and three large series were found. Sixteen indicators and 20 case-mix factors were included in the audit. During 2014–2015, 1785 pancreatic resections were registered including 1345 pancreatoduodenectomies. Overall in-hospital mortality was 3.6%. Following pancreatoduodenectomy, mortality was 4.1%, Clavien–Dindo grade $\geq$ III morbidity was 29.9%, median (IQR) length of stay 12 (9–18) days, and readmission rate 16.0%. In total 97.2% of >40,000 variables validated were consistent with the medical charts.

Conclusions: The Dutch Pancreatic Cancer Audit, with high quality data, reports good outcomes of pancreatic surgery on a national level.

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Introduction

Monitoring quality of care has a long history in surgical practice.[1,2] The goal of measuring outcomes is usually to determine the optimal treatment by comparing interventions. Clinical auditing, however, aims at measuring and comparing outcomes of doctors or hospitals for a specific patient population. These results can then be used to improve current practice and increase transparency, which is increasingly demanded by society. Clinical auditing is increasingly being implemented throughout surgery, and prominent initiatives such as the American College of Surgeons National Surgical Quality Improvement Program (ACS NSQIP) have already improved outcomes for patients.[3,4] Auditing is relevant especially to areas of surgery where there is much inter-hospital variation: in pancreatic surgery, differences in mortality between hospitals are among the highest.[5]

Performance indicators measure various aspects of the quality of care. Indicators are subdivided in structural, process, and patient outcome indicators. An example of a structural performance indicator is hospital volume. Process indicators are typically certain guideline recommendations. Patient outcomes may be divided into short-term (e.g. in-hospital mortality) or long-term (e.g. survival), subjective (e.g. quality of life), and intermediate (e.g. intra-operative blood loss) outcomes. Identifying the most important performance indicators is the main challenge of setting up an audit. Performance indicators should be relevant for the patient, have unambiguous definitions, and data collection should be straightforward. Fair comparison of performance indicators across hospitals (i.e. benchmarking) requires adjustment for differences in baseline characteristics. Therefore, baseline characteristics associated with performance indicators (e.g., tumor stage when comparing survival) should also be collected in the audit.[6,7]

Data collection for the mandatory Dutch Pancreatic Cancer Audit (DPCA) started in 2013. All patients undergoing surgical exploration for a suspected pancreatic or periampullary tumor in the Netherlands are included, as imposed by the Dutch Healthcare Inspectorate.[8] The DPCA aims to improve patient outcomes after pancreatic surgery by reducing practice variation and stimulating 'best practices'. In this study we describe the design, results, and validation of a nationwide evidence-based surgical audit in pancreatic cancer surgery.

Methods

Design of the audit

To identify relevant performance indicators and case-mix factors, a systematic literature search was conducted in PubMed in July 2011. Performance indicators and independent case-mix factors in pancreatic cancer surgery were identified by analyzing all randomized controlled trials (RCT's) and large case series ($n > 1000$) in pancreatic surgery published between 2000 and 2011 in core clinical journals. It was assumed that key performance indicators and case-mix factors are frequently reported by experts.

Performance indicators and case-mix factors found in these studies were cross-checked with existing registries. Data dictionaries of two foreign national audits (United Kingdom HPB audit, Swedish HPB registry), and the Dutch national cancer registry (NCR) were also scrutinized, as well as the prospective registries of three pancreatic centers: the Heidelberg University Hospital in Heidelberg (Germany), the Academic Medical Center in Amsterdam (the Netherlands), and Utrecht Medical Center in Utrecht (the Netherlands).

Next, the selection of the most frequently identified performance indicators and independent case-mix factors was based on a consensus process. The identified performance indicators and case-mix factors were first discussed with (inter)national field experts (see acknowledgements). The data model was developed hereafter in a plenary consensus with all members of the Dutch Pancreatic Cancer Group; the national multidisciplinary working group on pancreatic tumors with active members from all involved medical specialties including surgical oncology, medical-oncology, pathology, gastroenterology, radiology, dietary specialist, and nursing specialist. Formalized definitions were established and provided to the data collectors.

The DPCA includes all patients who are eligible for pancreatic surgery because of a (suspected) pancreatic- or periampullary tumor, or pancreatic cysts. Excluded are pancreatic resections for chronic pancreatitis, and pancreatic resections for tumors arising outside the pancreas. Patients discussed within a multidisciplinary team meeting, but not undergoing surgical exploration can be registered on a voluntary basis.

Governance

The DPCA is a collaboration of the Dutch Pancreatic Cancer Group (DPCG) and the Dutch Institute of Clinical Auditing (DICA) and endorsed by the Association of Surgeons of The Netherlands (Nederlandse Vereniging voor Heelkunde, NVvH).[9] The Dutch Pancreatic Cancer Audit has been implemented in all 18 centers performing pancreatic surgery in the Netherlands. The minimum requirement in the Netherlands is to perform at least 20 pancreatoduodenectomies annually per center. Each center is responsible for entering their own data. This is typically performed by a research fellow, study nurse, or surgeon. Ownership of the data remains with each individual center, each with a contract with the data processing agency (Medical Research Data Management; MRDM, Deventer, the Netherlands). The DPCG scientific committee supervises the data analysis and writes annual auditing reports. The data collected for auditing is also available for scientific research to all DPCA participants.

Results of the audit

Morbidity, mortality, length of stay, and readmission rate was examined in all patients undergoing pancreatic surgery in 2014

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