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Group And Save Sampling In Emergency Appendicectomy: A Multi-Centre Audit

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ORIGINAL

Abstract

Background

Emergency appendicectomy is one of the most common emergency surgical procedures performed in Scotland. Despite low reported perioperative transfusion rates, no national guidelines exist for pre-operative group and save (G&S) sampling. This multi-centre audit examined current G&S sampling practice, transfusion rates, and the associated financial and environmental impact across Scotland.

Methods

Data were collected retrospectively from 16 hospitals across 8 Scottish health boards, serving approximately 3.6 million people. Adult patients undergoing emergency appendicectomy during a consecutive 12-month period were included.

Results

A total of 1546 patients underwent appendicectomy, of whom 91.2% had a laparoscopic procedure. A total of 2029 G&S samples were taken. Six patients received a blood transfusion within 7 days of surgery, with a transfusion rate of 0.4%, while 12 out of 16 hospitals recorded no transfusions. The estimated cost of G&S sampling was £28,000-£77,000 with carbon emissions of 872kg CO2e.

Conclusion

Emergency appendicectomy in Scotland is associated with a very low perioperative transfusion rate despite widespread use of G&S sampling. These findings support further evaluation of risk-stratified approaches to pre-operative blood testing.

Keywords

Blood transfusion, preoperative testing, sustainability, appendicectomy

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Introduction

Acute appendicitis is the most common abdominal surgical emergency in the world (1**?**), with laparoscopic appendicectomy being the most common general surgical emergency operation performed in Scotland, with over 2600 procedures (2) and over 50,000 annually in England (3; 4). There are currently no national guidelines on the use of group and save (G&S) samples in emergency laparoscopic appendicectomy cases (5). There is wide international variation in the financial cost of G&S sampling, with a median cost of £19.80 internationally and £13.80 in

the UK (6). Local laboratories estimate the cost of a G&S to be £37.82 (comprising reagent cost of £1.97, staff costs of £27.12 and laboratory overhead costs of £8.73). Two chronologically distinct samples (one of which can be historic) are required by blood transfusion laboratories before crossmatching in the United Kingdom. The CO2 equivalent (CO2e) of an inpatient G&S sample has been estimated at 0.43kg (7).

A number of single centre studies (8; 9; 10), a multi-centre study (11) and a systematic review (12) have suggested that the transfusion rate in laparoscopic appendicectomy is rare enough that universal G&S testing of patients is not required pre-operatively. There is no published data to support that hypothesis in the wider Scottish population and healthcare system. The aim of this audit is to examine the current blood transfusion sample practice in emergency appendicectomy and the rate of transfusion across multiple hospitals in Scotland, to recommend practice change that can be applied nationally.

Materials And Methods

Data were gathered from 8 health boards in Scotland utilising the local network of site representatives from the Scottish Perioperative Medicine Society (SPOMS). SPOMS provided each local representative with a standardised data collection set and a standard operating procedure document to guide the data collection process. Caldicott Guardian approval was obtained at each site, and the study was registered with local audit committees. Data were obtained from theatre recording systems for all adult patients (aged 16 and over) undergoing emergency appendicectomy (laparoscopic, converted to open, open, larger resection) by the general surgical team at each hospital over a consecutive 12-month period falling between 1st January 2023 and 31st December 2024. Patients having an appendicectomy electively or as part of another procedure were excluded.

Baseline demographics, pre-operative haemoglobin, number of G&S samples obtained, and blood transfusions within 7 days of surgery were collected. The data were submitted to the lead investigator and collated for analysis using a Numbers spreadsheet (Numbers, Apple Inc., California, USA). The primary outcome was the proportion of patients receiving a blood transfusion within 7 days of appendicectomy. The secondary outcomes were the rate of pre-operative G&S sampling, the number of G&S samples obtained per patient, and the estimated financial and carbon cost of G&S sampling.

Results

A total of 1546 patients undergoing emergency appendicectomy were included from 16 hospitals (53.7% were teaching hospitals and 46.3% were large district general or rural hospitals). The majority were laparoscopic (91.2%), with a 4.4% conversion to open appendicectomy, a 3.4% open appendicectomy rate, and 1% converted to larger resections. The median age of patients was 38 (IQR [26-55]), 52% were male, and the majority of patients were ASA 1 (41.7%) or ASA 2 (46.9%). The median pre-operative haemoglobin was 140 (IQR [129.5-150]) g L-1. There were 11 patients who had a pre-operative haemoglobin below 100 g L-1.

There was a total of 6 transfusions (see Table 1) occurring within 7 days of surgery, giving a transfusion rate of 0.4%. There were 12 hospitals out of 16 where no transfusions occurred.

There were a total of 2029 G&S samples taken, with 311 (20.1%) patients having 0 samples, 477 (30.9%) having 1 sample, and 757 (49%) having 2 or more samples. The estimated cost of G&S sampling was between £28,000 (at £13.80/sample) and £76,736 (at £37.82/sample), and CO2e of 872 kg.

Discussion

This national, multi-centre, retrospective audit demonstrates that perioperative blood transfusion in laparoscopic appendicectomy is rare. This work supports the position that G&S samples can be safely omitted in the vast majority of patients undergoing laparoscopic appendicectomy. This has been shown across multiple hospitals of varying sizes, serving a diverse population and geographical distribution.

Our findings are largely in line with previous studies, which have shown transfusion rates for laparoscopic appendicectomy in the range of 0-0.4% (8; 9; 10; 11; 12). These studies have been replicated both in the UK and internationally, and have consistently shown a transfusion rate to be low. The rate of conversion to open appendicectomy of 4.4% is consistent with published studies (13).

The demographics of our patients show that the majority are younger, with 66% being under the age of 50, and less comorbid, with 89% being ASA 1 or 2. The requirement for blood transfusion laboratories in the United Kingdom to have two chronologically distinct G&S samples means that the cohort of patients undergoing laparoscopic appendicectomy in this audit may be less likely to have a historical G&S sample because they were younger and had fewer co-morbidities, thus requiring two samples to be taken during the admission before crossmatching.

A strength in our audit is the large cohort of patients taken from 16 hospitals from 8 Scottish health boards, representing a population of approximately 3.6 million people (65% of the Scottish population), and hospitals ranging in size from 34 beds to 1109 beds. There were 6 episodes of transfusion (see Table 1) within 7 days of surgery, giving insight into the potential risk factors for perioperative transfusion: all patients were over the age of 50, the majority were converted to open procedures, and underlying anaemia or anticoagulation was present in half the patients transfused.

Extrapolating these findings to the Scottish population, we estimate the annual cost of G&S sampling for appendicectomy in Scotland to be between £43,000 and £119,000, with associated carbon emissions of approximately 1.4 tonnes CO2e, indicating the potential for substantial financial and environmental savings.

The audit was conducted retrospectively; therefore, we were unable to obtain metrics such as delays to theatre as a result of G&S sampling. Due to the different electronic patient record systems, it was not possible to include the number of rejected G&S samples across the whole cohort, which could represent another source of delay and unnecessary patient discomfort, in addition to a more costly healthcare encounter. We were not able to determine when G&S samples were sent on the diagnostic journey, and patients presenting with undifferentiated abdominal pain may have G&S samples sent as part of their diagnostic work-up. We did not specifically collect data on patients with disorders of coagulation or platelets, who may have required G&S for blood products other than packed red cells.

We would argue that future studies should not focus on the rate of perioperative transfusion in laparoscopic appendicectomy, but instead on identifying patients at increased risk of transfusion to inform guidelines to standardise and reduce unnecessary testing. We would go further and suggest that institutions should examine their local policies, as there is scope to broaden the scope of this work and utilise the same methodology to examine whether G&S is required prior to other surgical procedures.

Conclusion

This audit lends further weight to the evidence that the “just in case” GS is not required routinely for emergency laparoscopic appendicectomy. It is an unnecessary use of increasingly precious resources and may cause delays to theatre with no corresponding patient benefit. Of course,

clinicians may wish to make reasonable exceptions in certain cases or for those patients in very remote and rural areas where the balance of risk may be different.

SPOMS intends to continue this work with support from the Centre for Sustainable Delivery in Scotland with the introduction of a national guideline and hopes to encourage expansion of this work with other surgical procedures.

Conflict Of Interest

Author declare no conflict of interest and no funding for this study.

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