

Anticoagulation for patients undergoing implantation of a cardiac implantable electronic device

Abstract

Aims/background The number of cardiac devices implanted increases year on year, as does the complexity of the patients being managed. A large proportion of this patient group have an indication for anticoagulation, and this raises challenges around the perioperative management of these agents.

Method A quality improvement project was conducted to review current practice, understand local experience and improve patient care.

Results Following the initial review, local guidelines were updated, the postoperative anticoagulation decision escalated to the responsible clinician and a clearer pathway for communicating the decision created.

Conclusions The implemented changes have shown an overall improvement in junior doctor feedback and also clinical documentation in the electronic patient records.

Key words: Anticoagulation; Cardiac device; Patient journey; Perioperative care; Quality improvement project

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Introduction

Cardiac rhythm management is the treatment of arrhythmias (heart rhythm disorders) and often includes cardiac implantable electronic devices such as pacemakers and defibrillators. These are implanted under the skin, with leads usually threaded down a vein to connect to the heart. The implant procedure is usually performed under local anaesthetic as a day-case procedure.

In 2019–20, 44 796 cardiac implantable electronic devices (796 per million population) were implanted in England alone. Quality improvement metrics include hospital and operator numbers, and procedural complications. These are audited annually by the National Audit of Cardiac Rhythm Management (National Institute for Cardiovascular Outcomes Research, 2021). The most common procedural complication is bleeding or haematoma related to technique and perioperative anticoagulation regimens. These complications contribute to delayed discharges and patient morbidity (Birnie et al, 2013). A significant proportion of patients undergoing implantation of cardiac implantable electronic devices are anticoagulated. The anticoagulation regimens can be varied and complicated. The perioperative management of patients is often left to the junior doctor on the ward, who may be unfamiliar with the various types of anticoagulants as well as the complexity of the procedure. This leads to inadvertent errors in prescribing, resulting in complications or delay in discharge and contributing to patient morbidity.

Perioperative anticoagulation regimens are based on thromboembolic risk vs bleeding risk, and may need to be tailored to individual patients. Broadly, the approach will be to assign the patient into low, standard or high risk of bleeding and dictate the regimen accordingly, depending on their thromboembolic risk.

Data suggest that implantation of cardiac implantable electronic devices with the patient's anticoagulation regimen uninterrupted results in fewer bleeding complications than bridging with heparin (Douketis et al, 2015; Birnie et al, 2018).

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The authors work at a large tertiary cardiac centre in which over 1000 cardiac implantable electronic device procedures are implanted annually (National Institute for Cardiovascular Outcomes Research, 2021). The vast majority of these are undertaken as day-case procedures for improved efficiency and patient outcomes. The process relies on careful preassessment of patients by specialist nurses, along with prompt and safe postoperative discharge.

Anecdotally, uncertainty over postoperative anticoagulation has contributed to anxiety among junior doctors, and resulted in delayed discharge, inefficient patient flow and poor patient experience.

Methods

A quality improvement project was designed to improve management of anticoagulated patients undergoing cardiac implantable electronic device procedures. The project was deemed exempt from a full ethics submission by the quality improvement team in the hospital. A plan, do, study, act (PDSA) methodology was used to identify primary and secondary drivers (Figure 1).

It was important to understand the current practice in order to design and implement the quality improvement project. The key stakeholders were identified, and engagement sought with junior doctors, nurses, pharmacists and cardiologists within the trust. An initial audit was undertaken to review current practice regarding perioperative anticoagulation of inpatients undergoing cardiac implantable electronic device procedures and to better understand the scope of the problem.

Electronic patient records were reviewed for all patients who had undergone a cardiac implantable electronic device procedure between 1 May and 30 June 2021. Data were collected on the type of procedure, anticoagulant use, indication for anticoagulation and perioperative instructions on cessation and resumption of anticoagulation. Current trust guidelines on perioperative anticoagulation were critically reviewed by the stakeholders. Information was also gathered on the junior doctor experience and confidence in managing the resumption of anticoagulation after a patient had undergone a cardiac implantable electronic device procedure (Figure 2).

Results

Between May and June 2021 (2-month period), 253 patients underwent cardiac implantable electronic device procedures, of whom 120 (47.4%) were anticoagulated. Instructions on cessation of anticoagulation before a procedure were documented for 117 (97.5%) patients, but instructions for resuming anticoagulation were only documented for 74 (61.7%) patients.

All junior doctors surveyed expressed concerns around restarting anticoagulation and needed to seek advice from a consultant or registrar, and 60% did not know where to access Trust guidelines on anticoagulation for cardiac devices. Furthermore, all of those surveyed reported the need for more succinct anticoagulation guidelines (Figure 2).

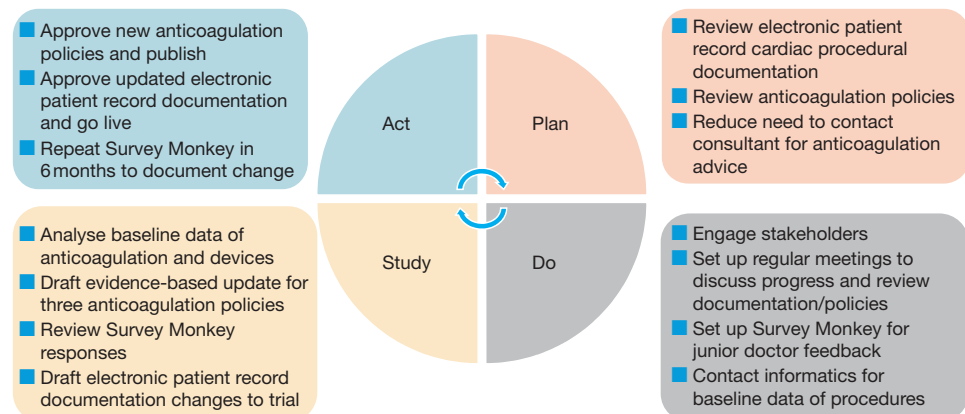


Figure 1. Plan do study act methodology.

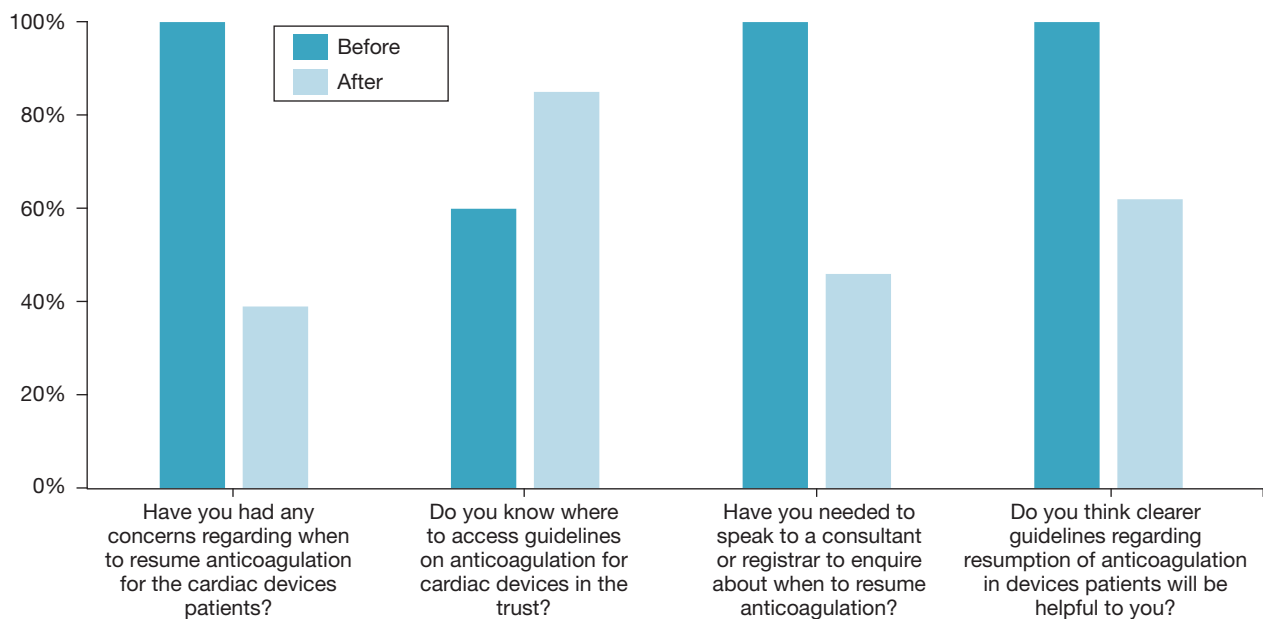


Figure 2. Survey responses.

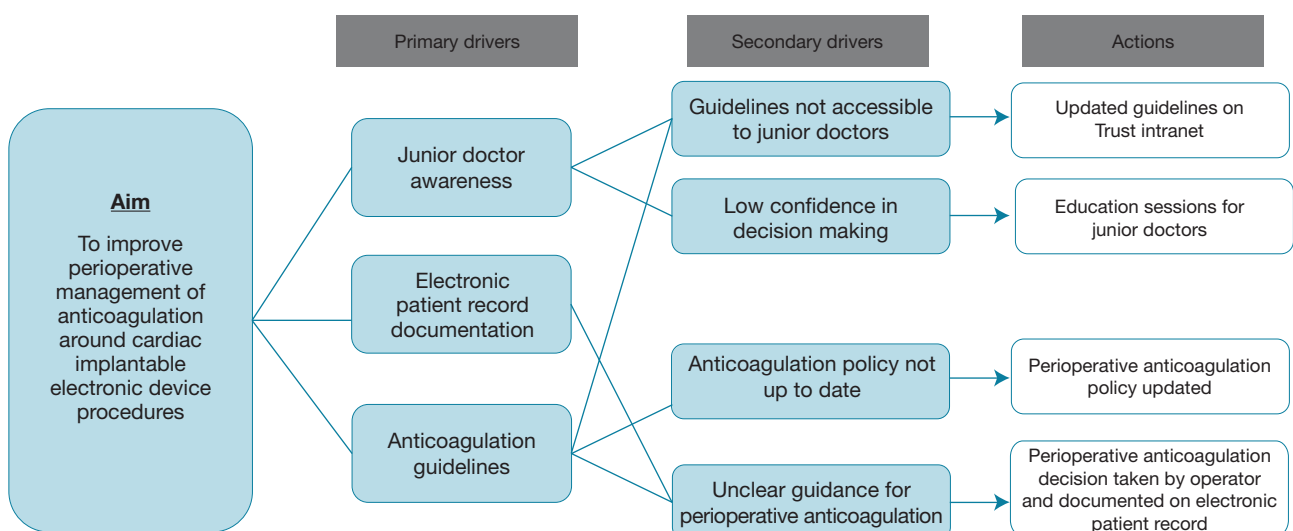


Figure 3. Primary and secondary drivers.

Primary and secondary drivers were identified (Figure 3). The primary drivers were:

1. Trust anticoagulation guidelines were unclear, outdated and inaccessible to junior doctors
2. Documentation on the electronic patient record was delayed and inadequate
3. Junior doctor awareness of the issue was poor and confidence to issue instructions was low.

Secondary drivers were:

1. Anticoagulation policy required update in line with latest evidence
2. The trust guidelines needed updating, and the location of the guidelines on the intranet was not widely known, thus impeding their use
3. The location of the periprocedural instructions for anticoagulation on the electronic patient record was counterintuitive (either around the time of implant or often tasked to the junior doctor on the ward rather than at the time of postprocedural review) resulting in poor documentation and incomplete instructions
4. Junior doctors were not confident and felt ill-equipped to deal with anticoagulation instructions relating to the implant of a cardiac implantable electronic device, because of the complexity of the procedure and the nuances relating to the different types of anticoagulation that patients were taking.

Engagement with stakeholders was sought. The cardiology consultant body and senior cardiac pharmacists were engaged to review and update the Trust's anticoagulation policy. Stakeholders were given the opportunity to raise concerns and/or issues regarding the anticoagulation policy at a departmental meeting and the new policy was agreed at a service line meeting. The policy was officially ratified and uploaded onto the Trust intranet for ease of access.

One of the key changes to the policy related to the assessment of risk for device procedures, namely categorising patients into two groups – low or standard risk of bleeding and high risk of bleeding. Patients receiving new cardiac device implants or undergoing generator changes were considered to be at standard or low risk of bleeding, and those undergoing device extraction, wound revision or implantation of submuscular devices were considered to be at high risk of bleeding. If normal haemostasis is achieved and the operator has no concerns, direct oral anticoagulants can usually be restarted the day after (12–24 hours postprocedure), in line with current evidence (Steffel et al, 2021). In most cases, device implantation procedures can be considered as low bleeding risk, so anticoagulation can be stopped the morning of the day before the procedure.

The electronic patient record team were consulted to review and update the location of the postoperative instructions for resumption of anticoagulation. These were moved to the postoperative review document, ie the cardiologist to take the decision about timing of resumption of anticoagulation and document this on the electronic patient record. This was a mandatory field to be completed by the person reviewing the patient postoperatively, which is usually the operator themselves. This change to the postoperative electronic patient record document was made in October 2021.

Ongoing education sessions were undertaken for junior doctors on a regular basis to inform them of the changes in the anticoagulation policy and where to find it on the Trust intranet.

Additional teaching to broaden the understanding of cardiac implantable electronic device types and patient pathways was also delivered on a regular basis.

Follow up

To evaluate the ongoing impact of the quality improvement project, the survey was redistributed to junior doctors 3 months after the changes were implemented, which was 8 months after the initial survey. The same set of questions were used to gather feedback on the impact of the quality improvement project (Figure 2).

A significant reduction in the proportion of respondents expressing concerns over the timing of anticoagulation was noted (100% to 38.5%). Although 42% of the respondents needed to seek clarification from a registrar or consultant about the resumption of anticoagulation, this was better than the previous 100%. A higher proportion (84.6% vs 60%) of those surveyed knew where to find the Trust policy and a much lower proportion (61.5% vs 100%) felt further clarification was needed compared to the initial responses. This suggested a substantial sustainable improvement in junior doctor feedback.

Reaudit

Reaudit of anticoagulation practice around the perioperative period in this group of patients was undertaken 8 and 12 months after the initial data collection. In January 2022, 90 patients underwent implantation of a cardiac implantable electronic device. Of those, 58 (64%) were anticoagulated and instructions for resumption of anticoagulation was documented for 54 (93%) patients, a significant improvement from the previously recorded 62%. This improvement was sustained when reaudited again in May 2022: 86 patients underwent a procedure during this month and 44 of 50 (88%) anticoagulated patients had a resumption instruction documented (Figure 4).

Discussion

While the formal preassessment addressed the issue of timing of cessation of anticoagulation medication before implantation of a cardiac implantable electronic device, the postprocedure resumption of anticoagulation was left to the junior doctors on the ward.

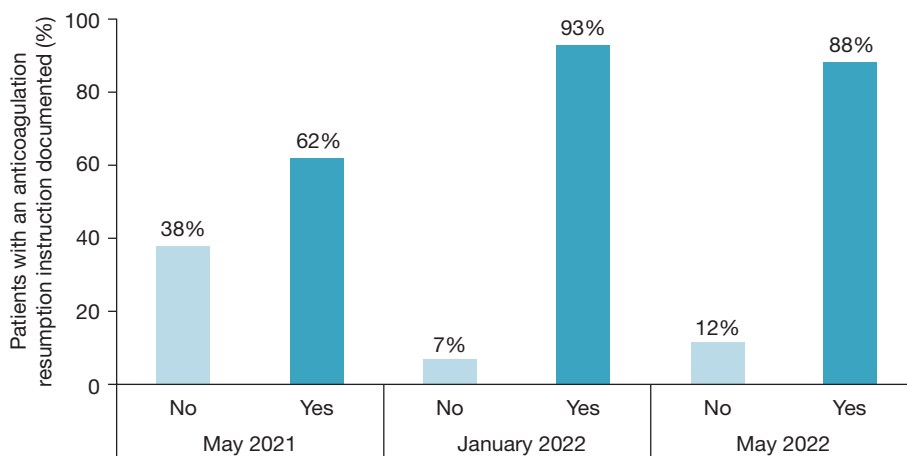


Figure 4. Audit results comparing anticoagulation resumption instructions before and after the update of the electronic patient records document in October 2021.

Junior doctors were having to make decisions about the timing of anticoagulation for patients post implantation of a cardiac implantable electronic device. Unfamiliarity with the procedure, as well as a lack of experience of different anticoagulant regimens, caused discontent and anxiety among junior doctors which resulted in avoidable delays to discharge. The frequent rotation of junior doctors through various specialities allows them to gain experience in a variety of specialities but leaves them relatively inexperienced in the nuances of any speciality at their stage. In a procedure-based centre such as this, they are often faced with decision making related to cases they are unacquainted with.

Updating the anticoagulation policy and amending the postoperative electronic patient record review document has allowed junior doctors to access information as needed and also allowed for discharge instructions to be undertaken by more experienced cardiologists. This should have improved the patient journey, as well as providing support for the junior doctors.

Future work

More work is required to improve performance, but this is an ongoing process. Incorporating updated guidelines into clinical education as well as patient pathways allows training to be practical yet fulfilling. This needs to be done on a regular basis.

Conclusions

This project highlighted an area of patient care in need of development and issues affecting the junior doctors working within the Trust. Updating the anticoagulation policy in line with the latest evidence and making changes to decision making processes has led to increased satisfaction and a sustained improvement in clinic documentation.

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Key points

- Evidence-based perioperative anticoagulation guidelines will improve clinical care for patients undergoing cardiac device procedures.
- Clear and timely instructions for resumption of anticoagulation are best delivered by the responsible cardiologist.
- Providing education and support to junior doctors will improve their confidence in managing these often complex cases.

Conflicts of interest

The authors declare that there are no conflicts of interest.

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