Quality improvement report

Introduction of nurse led DC cardioversion service in day surgery unit: prospective audit

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Abstract

Problem Atrial fibrillation is the most common persistent arrhythmia in adults and carries an increased risk of thromboembolism and stroke. Electrical (DC) cardioversion is an effective treatment, but logistical difficulties in many institutions lead to problems providing a prompt service. This reduces the rate of long term success, delays relief of symptoms, and increases the burden on anticoagulation clinics.

Design Prospective audit of introduction of a collaborative, nurse led DC cardioversion service in a day surgery unit.

Setting Day surgery unit 5 km from an acute hospital in southeast London.

Key measures for improvement Waiting times, success of procedures, and complication rates.

Strategies for change Collaborative working across traditional specialty boundaries; empowerment of patients within the process; using a nurse consultant as a single point of reference to coordinate the service.

Effects of change Sinus rhythm was restored in 131 (92%) of the first 143 patients treated. Three patients needed hospital admission; all were discharged uneventfully within 24 hours. No important complications occurred. Waiting times were reduced from 27 weeks to eight weeks for patients eligible for the service.

Lessons learnt Elective DC cardioversion under general anaesthesia can be safely done by an appropriately trained nurse in a day surgery unit remote from an acute general hospital. This model of care is effective and can reduce waiting times and relieve pressure on acute beds and junior doctors.

Background

Atrial fibrillation is the most common persistent arrhythmia encountered in clinical practice. The incidence of atrial fibrillation has been shown to increase from 0.1% a year in people aged under 40 years to greater than 1.5% a year in women over 80 and greater than 2% a year in men over 80.¹ Atrial fibrillation is associated with a twofold increase in mortality and considerable morbidity related to heart failure, embolic events, or poor rate control. Treatment

options include attempts to restore sinus rhythm by pharmacological or electrical cardioversion.²

Outline of the problem

Elective electrical cardioversion of appropriately anticoagulated patients under sedation or anaesthesia is a safe and effective procedure for restoring sinus rhythm. In the NHS elective DC cardioversion is generally done by junior doctors within acute general hospitals. However, with changing patterns of work for junior medical staff, including the European Working Time Directive, doctors' time is an increasingly scarce resource. In addition, a shortage of beds leads to frequent cancellations, and the ad hoc nature of admissions prevents dedicated theatre sessions. Delays reduce the chance of success,³ increase morbidity for patients, and add workload to anti-coagulant clinics.

Use of day surgery units has been shown to reduce cancellations, but this has not been reported in sites remote from an acute general hospital. The development of off-site diagnosis and treatment centres provides a source of theatre time with dedicated beds. Nurse led DC cardioversion has been suggested as a solution to the shortage of doctors' time, and limited reports have suggested that this is safe in the context of a medical ward with physician support.^{3 4} We report our experience of nurse led DC cardioversion in a day surgery unit without physician cover.

Details of new service

We established a new service comprising twice monthly dedicated theatre sessions within a day surgery unit serving a population of 300 000 in south-east London. For the first 23 months this was situated about 5 km from the acute hospital. Cardioversions were done by an appropriately trained nurse with certification as a provider of advanced life support and with training in interpretation of electrocardiograms.⁵ Further training included 20 cases supervised by consultant cardiologists to ensure that all aspects of the procedure had been considered, including how to manage adverse situations and adjust treatment after the procedure.

We accepted all patients needing DC cardioversion, with the following exclusions: left ventricular ejection

fraction less than 35%, permanent pacemaker in situ, severe valve disease, symptoms of ischaemic heart disease, previous symptoms of bradycardia, and body mass index greater than 35. All patients had a minimum of four weeks' anticoagulation before cardioversion and an international normalised ratio of not less than 2.0 during that time. We sent patients an appointment six weeks in advance of their procedure. Patients were assessed during the week before cardioversion. The nurse consultant acted as a single point of reference for any queries.

On the day of their procedure patients arrived at 7.45 am. The nurse consultant obtained consent in accordance with guidance from the Department of Health⁶ and then carried out the procedure. The protocol initially consisted of monophasic shocks of 200 J, 360 J, and 360 J; from August 2003 we changed to biphasic shocks of 150 J then 200 J as needed. A senior associate specialist or consultant in anaesthetics provided general anaesthesia. After the cardioversion the nurse consultant reviewed patients with their electrocardiograms and made appropriate changes to drug treatments according to an agreed local protocol. A follow up appointment was arranged with the referring consultant for one month after the procedure to allow for review of rhythm and drugs.

Strategies for change

Identification and resolution of those elements of the previous system that led to cancellations and inefficiencies was essential to the success of the new service. We identified these elements as lack of availability of beds within acute wards; lack of workforce and resource planning leading to cancellations due to non-availability of rostered junior staff; inability to arrange timing of cardioversion in response to changing clinical circumstances, such as introduction of new antiarrhythmic drugs; poor coordination with anticoagulation services; failure to involve patients in the process; and poor overall coordination of the service due to the lack of an identifiable clinically aware coordinator. We introduced various solutions to these problems.

Using the day surgery unit avoided cancellations, as beds were always available. Using a nurse consultant with a dedicated session overcame previous problems with non-availability of junior staff. We faxed details of admission dates for cardioversion to the anticoagulant clinic to focus attention on ensuring effective anticoagulation in the period immediately before the procedure. The role of the nurse consultant as a single point of reference for any queries allowed solutions to be found, which also helped to reduce cancellations.

Patients had greater involvement in the process through the redesign of the appointment letter, which encouraged and empowered them to phone if their international normalised ratio was less than 2. Their procedure was then rescheduled, but in sufficient time to reallocate the slot to another patient. Patients were also provided with more information through the introduction of an information sheet, which improved their preparation for assessment and equipped them with detailed information of what to expect on the day of the procedure. Patients were assessed during the

week before cardioversion to ensure suitable anticoagulant control and fitness for the procedure. Feedback from patients emphasised that this was appreciated.

Key measures for improvement

We monitored three key outcomes prospectively. These were waiting times, procedural success, and complication rates.

Effects of change

We evaluated outcomes for the first 143 patients (100 (70%) male, 43 (30%) female; mean age 69 years), accessing the new service between April 2001 and November 2003. During this period 18 (11%) patients out of 161 referred for cardioversion fulfilled exclusion criteria.

Of the 143 patients, 131 (90%) cardioverted successfully to sinus rhythm, a proportion in line with contemporary guidelines from the European Society of Cardiology, American College of Cardiology, and American Heart Association for the management of atrial fibrillation, which describe expected success rates of between 79% and 94%.²

Three patients needed to be admitted to hospital. Two patients with hypotension were subsequently discharged within six hours, and one patient with sinus bradycardia was discharged the next day. No serious complications occurred.

During the period of evaluation, waiting times for elective cardioversion were reduced from 27 weeks when the service had been carried out on ad hoc basis by junior medical staff in the day surgery unit, to eight weeks for eligible patients accessing the dedicated nurse led service. Current waiting times for the 18 excluded patients, who needed inpatient beds, approach 18 months.

Lessons learnt

The re-engineering of the cardioversion service illustrates that a detailed analysis of a service and its weaknesses can identify relatively simple solutions leading to improved outcomes.

Resolving structural weaknesses

We identified structural weaknesses as non-availability of beds, theatre time, and junior doctors. We overcame these by the use of a dedicated theatre slot, dedicated anaesthetist, and dedicated nurse consultant to carry out the procedures.

Resolving process weaknesses

More subtle weaknesses related to the process. Poor coordination and communication between services involved in cardioversion led to cancellations and loss of slots. Establishment of a role for a nurse consultant to coordinate and operate the service allowed an individual member of the clinical staff to develop ownership of the service. Patients were similarly given a role in their own journey. The system previously failed to react to changing circumstances, including low international normalised ratios, changes in drug treatment, or absence of a key investigation, which led to delay and cancellation. This could be avoided in the

Key learning points

Logistical difficulties in many institutions lead to problems providing a prompt electrical cardioversion service, thus reducing success rates

A nurse led cardioversion service within dedicated sessions in a day surgery unit overcomes many of the logistical difficulties

This model of care is effective and can reduce waiting times and relieve pressure on acute beds and junior doctors

new service by the nurse consultant liaising with the anticoagulation clinic, flexibly adjusting admission dates (placing other patients into vacated slots), and obtaining urgent investigations (for example, echocardiograms). Over time the coordinator developed relationships with the previously disparate parts of the service.

Conclusion

An elective DC cardioversion service can be safely operated by an appropriately trained nurse in a day surgery unit remote from an acute general hospital. This model of care is effective and can reduce waiting

times and relieve pressure on acute beds and junior doctors.

Documents used to support the establishment of the service are available from the authors.

Contributors: MPC designed and ran the new service, wrote the manuscript, and is the guarantor. SPK, JP, and EJJ contributed to the design and running of the service and preparation of the manuscript.

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No leg to stand on

"She was bisected, and half of her was missing." This is how Dr Oliver Sachs perceived a nurse during the aura of a migraine. It is described in his book *A Leg to Stand On*, in which he explains how this experience is due to a transient hemianopia that he experiences as a migraine begins.¹

I too have migraine with visual auras, which occur only in the left side of my visual field. Although I usually experience fortification spectra within the left hemi-field, I realised recently that occasionally I have a left homonymous hemianopia as the aura to my migraine.

Such headaches, for me, are provoked by stress, sleep deprivation, and dehydration. For this reason, while I was a senior house officer in a busy district general hospital my migraines often occurred just before or during the post-take ward round.

One such experience taught me the nature of my migraine aura. I was preparing for the ward round by reviewing the relevant basic investigations available for the recently admitted patients. I was developing a migraine with visual aura but continued to work. I reviewed a chest radiograph and was disappointed not to see the large right pleural effusion I clinically expected. So disappointed, in fact, that I double checked the name and date of the examination.

When the time came for the consultant and entourage to review my admission I had progressed, neurologically speaking, to a mild headache without visual aura. Now free from hemianopia, although none the wiser at this point that I had had one, and keen to

show my thorough preparation, I told the consultant that the radiograph did not confirm my examination findings. Although visually unimpaired as I stood with the assembled doctors in front of the illuminated viewing box, I didn't have a leg to stand on. Now that I could see—indeed, now that I was aware of there being a left side to my vision—the large right pleural effusion was obvious.

I read *A Leg to Stand On* when I was a medical student, but I didn't realise its relevance to me until my experience as a senior house officer. While the book taught me the neurology, this experience taught me to appreciate the limitations imposed on my senses by impending migraine. Accordingly, I now avoid tasks that require complete vision until the aura has passed.

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- 1 Sachs O. *A leg to stand on*. London: Picador, 1991.

We welcome articles up to 600 words on topics such as *A memorable patient, A paper that changed my practice, My most unfortunate mistake*, or any other piece conveying instruction, pathos, or humour. Please submit the article on <http://submit.bmj.com>. Permission is needed from the patient or a relative if an identifiable patient is referred to. We also welcome contributions for "Endpieces," consisting of quotations of up to 80 words (but most are considerably shorter) from any source, ancient or modern, which have appealed to the reader.