

Quality Improvement Project

Improving Compliance with Statins in Patients with Peripheral Arterial Disease: A Quality Improvement Study

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Abstract

Atherosclerosis is an inflammatory disease affecting medium sized arteries. The prevalence, health, and financial impact of the disease has made it a key target for public health and large scale intervention. The statin class of drugs improve morbidity and mortality for patients with peripheral arterial disease (PAD) through polymodal actions. This quality improvement study aimed to determine, and subsequently reduce, the percentage of patients with PAD discharged without statins. According to the Vascular Society of Great Britain and Ireland, and draft National Institute of Health and Clinical Excellence guidance, all patients undergoing major vascular procedures should be prescribed a statin.

A baseline audit of patients with PAD under the care of the vascular team at our institute^d was undertaken for the period Dec 2009–July 2010. Electronic discharge letters (EDLs) were analysed and compliance with statin prescription were recorded. A number of interventions aimed at improving compliance were then enacted and monitored through weekly PDSA cycles. Junior doctor leadership was key to identifying the problem and conceiving, implementing, and measuring changes. A second cycle was run, using similar data collection methods to the first, for the period August–October 2010.

In the first cycle, EDLs pertaining to 113 patient admissions, involving 96 patients with PAD, were examined. Statins were not prescribed in 30.1%. In the second cycle, 86 patient admissions, involving 76 patients, were examined. Statins were not prescribed in 24.4%, representing an 18.9% decrease. Poorly compliant sub-groups included patients presenting with embolism or those for elective angioplasty.

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Disease Context

Atherosclerosis is an inflammatory disease affecting medium sized arteries; especially coronary, carotid, and femoral vessels.¹ Peripheral Arterial Disease (PAD) is increasingly common within the aging populations of most western societies. Symptomatic disease is thought to affect 5% of those over 60 years.²

Statins are competitive inhibitors of HMG-CoA reductase – a key enzyme in the rate-limiting step for the biosynthesis of cholesterol.^{3,4} Thus, decreased cholesterol synthesis, when combined with up regulation of LDL receptor activity, favours reverse cholesterol transport (to the liver) from atherosclerotic plaques.⁴

Outline of the Problem

There is significant evidence to support the beneficial role of statins in improving morbidity and mortality for patients with PAD.^{5–7} This has led to the development of guidance from

the Vascular Society of Great Britain and Ireland, and draft guidance from the National Institute of Health and Clinical Excellence (NICE) and the Scottish Intercollegiate Guideline Network (SIGN), relating to prescription of statins to patients undergoing major vascular procedures.^{8–10} However, it has been shown that statins are particularly unlikely to be prescribed to elderly patients, despite clear indications.¹¹ Several reasons are postulated, including misplaced fears regarding adverse effects, as well as failure to recognise their importance in arterial disease.^{12–14} These barriers are not limited solely to PAD and extend to other chronic conditions such as diabetes and osteoporosis.^{15,16} Similarly, Viskin *et al.* showed that only 58% of myocardial infarct survivors were prescribed beta-blockers upon discharge when they were indicated.¹⁷

Key measures of improvement

Improvement was measured by analysing Electronic Discharge Letters (EDLs) for statin prescription compliance. In addition, weekly PDSA cycles were carried out to monitor inpatient compliance prior to discharge.

Table 1 ICD-10 codes which corresponded to PAD for the purpose of the quality improvement exercise

ICD-10 Code	Description
1672	Cerebral atherosclerosis
1700	Atherosclerosis of aorta
1702	Atherosclerosis of arteries of extremities
1740	Embolism and thrombosis of abdominal aorta
1743	Embolism and thrombosis of arteries of lower extremities
1744	Embolism and thrombosis of arteries of extremities, unspecified
1745	Embolism and thrombosis of iliac artery
1748	Embolism and thrombosis of other arteries
RO2X	Gangrene, not elsewhere classified

Institutional Context

St. Peter's Hospital in Surrey, UK, is part of Ashford and St. Peter's NHS Foundation Trust. A medium sized district general hospital with 450 beds, it is the largest provider of acute hospital services in Surrey, serving a population of more than 380,000 people and has a hospital standardised mortality ratio of 101.92.¹⁸

Process of gathering information about the problem

A baseline audit of patients with PAD under the care of the vascular team at St. Peter's Hospital was undertaken for the period Dec 2009–July 2010. To help standardise data collection, patients were considered to have PAD if their diagnoses came under one of nine WHO ICD-10 categories (Table 1).¹⁹ A second cycle of data collection was then run using similar methods for the period August–October 2010.

Analysis and interpretation

In the first cycle, EDLs pertaining to 113 patient admissions (96 patients with PAD) were examined. Of these, 78% (86/113) were elective, while 22% were emergency cases. Statins were prescribed in 69.9% (79/113). Sixteen patients presented multiple times for graft problems; a third of patients were never prescribed statins.

Strategy and implementation of change

Following this collection, a set of Plan, Do, Study, Act (PDSA) cycles were used to institute and monitor a range of interventions aimed at improving compliance, by identifying and targeting elements of the local care environment. PDSA cycles were selected for this intervention due to their acceptance as a tool for monitoring clinical improvements within healthcare.²⁰ The interventions implemented are outlined in Table 2.

Table 2 A list of interventions instituted to improve statin prescription rate

Interventions Instituted	
Intervention	Details
Raising awareness through structured teaching, posters and emails	Structured teaching was delivered through a 20 minute lunchtime presentation to four junior doctors on the vascular firm. This was followed by a 20 minute question and answer session. A poster was displayed in the doctors' office with a simple message – “Don't forget to prescribe Statins” and this was supported by weekly emails.
Patient list modification	A dedicated Statin compliance column for each patient was added to the patient list and reviewed on daily ward rounds by the Senior House Officer (RA).
Drug chart monitoring through weekly PDSA cycles	This was used to check and review performance and ensure maximal compliance.
Junior doctor leadership	Junior doctors were given verbal reminders on ward rounds, encouraging compliance together with positive role modelling and leadership 'by example'.

Table 3 Statin prescription rates at the end of the quality improvement PDSA cycles

PDSA Cycle	Week Starting	% of inpatients on Statins at start of the week	% of inpatients on Statins at the end of the week
Baseline	27 th Sept 2010	40% (2/5)	40% (2/5)
1	4 th Oct 2010	40% (2/5)	100% (7/7)
2	11 th Oct 2010	60% (3/5)	100% (6/6)
3	25 th Oct 2010	89% (8/9)	100% (9/9)
4	8 th Nov 2010	60% (6/10)	100% (12/12)
5	15 th Nov 2010	100% (12/12)	100% (10/10)

The importance of junior doctor leadership in implementing quality improvement work is increasingly being recognised and was fundamental to our strategy.²¹

Effects of change

In the second cycle, 86 patient admissions took place (76 patients). Statins were prescribed in 75.6% (65/86). This represents an 18.9% decline in those not being prescribed statins from the first cycle ($p = 0.425$ using Fisher's Exact test). Particularly low sub-groups include patients presenting with embolism or for elective angioplasty.

PDSA cycles were run at the start and end of the week for inpatients (see Table 3). During each subsequent cycle the interventions deployed were intensified and became increasingly incorporated into normal clinical practice.

Work by Perla *et al.* on the use of run charts indicates that our run of five consecutive data in a positive direction may be statistically significant ($p < 0.05$).²²

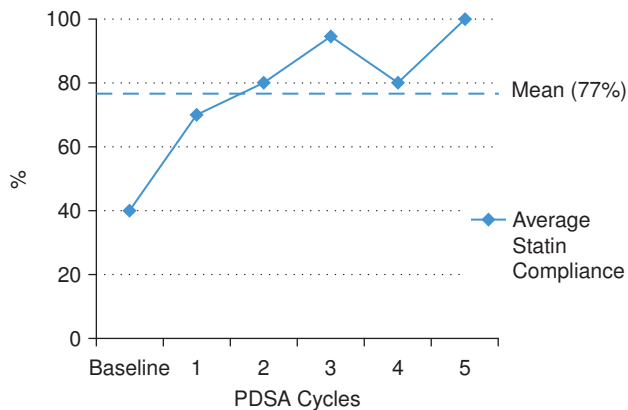


Fig 1 Run chart showing how compliance with Statin prescription increased.

Discussion (lessons learnt, messages for others, next steps)

Statins should be prescribed for all patients with PAD unless contraindicated.^{8–10} This audit has shown that statin compliance for hospital inpatients can be improved. This compares to figures from the UK Carotid Interventions Audit, which found that 83% of patients were prescribed statins.²³

Particular attention should be paid to those presenting with embolism or for elective angioplasty where statin prescription may not be considered an important aspect of management. The prescription of statins should form one of the quality standards for management of patients with PAD. The new NHS Quality and Outcomes Framework (QOF) provides a mechanism to do this.²⁴ Overall our work shows that persistence and constant attention to detail is needed to achieve good results.

Barriers

Educating junior doctors on the broad range of indications for statins takes time to absorb and implement. We found that many patients are being admitted for short stays (e.g. elective angioplasty) and being discharged without consideration for statin status. In order to counter this, we suggest that the pharmacy department (which supplied medicines to take away) should be incorporated into a more integrated strategy for vascular patients.

Junior doctors ‘on the front line’ represent an untapped talent pool for quality improvement measures. Equipping junior doctors with information on potential pitfalls could help reduce system errors and the ‘error-creep’ that insidiously finds a way through increasingly complex healthcare organisations.^{25,26}

Teamwork and effective communication ensured that PDSA cycle results were consistent. Maintaining morale while implementing change is challenging, however, it is a key requirement for success. Through ensuring personal recognition of achievement and ensuring skill development opportunities through training, morale can be maintained without increasing cost.²⁷

In time of fiscal restraint, it would be prudent to maximise

compliance with statins in patients with PAD. Statins cost approximately £20 a year.²⁸ In comparison, elective amputation costs £2,600 and emergency £5,600.²⁹ As a result, statins are a cost-effective measure against the progression of PAD, and would continue to be so even if the number needed to treat reached over 130.

Following these results, this audit was presented at the Educational Half-day for General Surgery at St. Peter’s Hospital. Further work will look at integrating with the pharmacy department more robustly through the development of a local policy and senior clinician engagement.

Conclusion

The importance of statin prescription in PAD is well understood.³ This quality improvement study has shown that simple interventions can lead to a 100% statin prescription rate for PAD in an inpatient setting. This exercise also highlighted the valuable role of junior doctor leadership in implementing and sustaining improvement programmes.

Ethical approval

No ethical approval required for this study.

Conflict of interest

No conflicts of interest have been declared by the authors.

Author contribution

RAA: Concept, Design, Critical Revision, Final Approval.

CFC: Writing, Critical Revision, Final Approval.

EE: Critical Revision, Final Approval.

NB: Concept, Design, Critical Revision, Final Approval.

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