

Deep Venous Procedures Performed in the National Health Service in England between 2005 and 2015

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WHAT THIS PAPER ADDS

This study demonstrates a real increase in the number of endovenous procedures being carried out for deep venous pathology in the last decade in the National Health Service in England. This is likely to have been contributed to by the increasing evidence supporting the safety and clinical benefits of early percutaneous removal of thrombus to prevent post-thrombotic syndrome, and venous stenting for ilio caval obstruction. The findings of this study are likely to have major implications and need to be taken seriously for the provision of care and healthcare resources for the treatment of patients with acute and chronic deep venous pathology.

Objectives: Recent advances in imaging technology and endovenous interventions have revolutionised the management of specific groups of patients with deep venous pathology. This study aimed to examine data published by Hospital Episode Statistics (HES) to assess trends in the number of endovascular and open surgical deep venous procedures performed in National Health Service (NHS) hospitals in England between 2005 and 2015.

Materials and methods: The main diagnosis of deep venous thrombosis (DVT), and total number of primary open and percutaneous procedures for deep venous pathology for patients admitted to the NHS hospitals in England from 2005 to 2015 were retrieved from the HES database and analysed.

Results: An overall declining trend in the annual number of admissions for a primary diagnosis of DVT was observed (linear regression $r^2 = 0.9$, $p < .0001$). The number of open surgical procedures for removal of thrombus remained largely unchanged (range 26–70); the frequency of percutaneous procedures increased steadily over the study period (range 0–311). The number of open surgical procedures relating to the vena cava fell between 2005 and 2009, and remained around 50 per year thereafter. Annual numbers of cases of deep venous bypass (range 17–33) and venous valve surgery (range 8–47) remained similar in trend over this period. The number of vena cava stent (range 0–405), other venous stent (range 0–316), and percutaneous venoplasty (range 0–972) procedures increased over the first 5 years of the study period.

Conclusions: There is an increasing trend in relation to endovenous procedures but not open surgery, being carried out for deep venous pathology in the last decade in NHS hospitals in England. Despite a number of limitations with HES, the increase in the number of endovenous procedures shown is likely to have significant implications for the provision of care and healthcare resources for patients with deep venous pathology.

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INTRODUCTION

Chronic venous disease, both primary and secondary deep venous pathology, affects a large proportion of the adult population.^{1,2} Patients with chronic venous disease may suffer from limb discomfort, heaviness, itchiness, swelling, skin discolouration, and ulceration. It has been shown that

these patients have significantly poorer quality of life than the general population.² Traditionally, the majority of patients with deep venous pathology are treated by non-surgical interventions including lifestyle modification, compression, skin care, moderate exercise, and limb elevation.² Patients with concurrent superficial venous incompetence may achieve some degree of symptom relief from interventional or surgical treatment of their superficial veins.² Patients with acute deep venous thrombosis (DVT) are treated with anticoagulation to reduce the risk of pulmonary embolism and post-thrombotic syndrome (PTS).^{1–3} Open surgery of the deep veins, such as open thrombectomy, deep venous bypass

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and reconstruction, and valve repair or transposition, are limited to relatively few and extreme cases including those with limb threatening phlegmasia caerulea dolens, and those with extensive ulceration who do not respond to other conventional treatments.²

Recently, advances in imaging technology and endovascular interventions have revolutionised the management of specific groups of patients with deep venous pathology.^{2,4} There is evidence from studies, including randomised clinical trials, that catheter directed thrombolysis in patients with acute ilioacaval and subclavian DVT significantly reduces the risk of developing PTS when compared with conventional treatment.^{2,4–6} Meanwhile, there is some evidence from non-randomised studies to support the role of balloon venoplasty and stenting of primary and secondary proximal deep venous obstructive disease.^{2,7,8} As a result, it is likely that there exists an increasing number of patients with deep venous pathology who may benefit from these procedures. It is therefore important to assess the trends in the number of these procedures being performed as this may have significant implications for any healthcare system, including the National Health Service (NHS) in England.

In the NHS, information on hospital activities including all admissions, diagnoses, treatment procedures, patient age groups and gender, time waited, and methods of admission and discharge are collected and coded by individual NHS trusts.⁹ Hospital Episode Statistics (HES) is a data warehouse containing details of all admissions, outpatient appointments, and accident and emergency attendances at NHS hospitals in England. HES is a publicly and freely available online resource containing information relating to all admissions to NHS hospitals in England.¹⁰ The NHS England is the public healthcare system that serves the population of the whole of England. In HES, records are collected for each “episode” of admitted patient care delivered in England by all NHS hospitals or in the independent sector but commissioned by the NHS. Admissions are recorded as one or more “finished consultant episodes”, defined as “a period of admitted patient care under a consultant or allied healthcare professional within a NHS trust”.¹⁰ The main procedure or intervention coded is “normally the most resource intensive performed during the episode of care”. From 2005 to 2015, diagnoses were coded according to the International Statistical Classification of Diseases and Related Health Problems, 10th Revision (ICD-10), and procedures and interventions according to the Office of Population, Censuses and Surveys: Classification of interventions and procedures, 4th Revision (OPCS-4). HES is a powerful epidemiological, socioeconomic and political tool used by the NHS, government, and a number of other organisations and individuals as a data source for various healthcare analyses¹⁰; HES data may have significant implications for the regulation of the healthcare system locally and nationally.⁹

This study aimed to assess trends in the number of endovascular and open surgical deep venous procedures carried out in the NHS hospitals in England between 2005 and 2015 based on data published by HES.

Table 1. International Statistical Classification of Diseases and Related Health Problems, 10th Revision (ICD-10) codes used in this study to represent deep venous thrombosis.

ICD-10 codes	Diagnosis
I80.1	Phlebitis and thrombophlebitis of femoral vein
I80.2	Phlebitis and thrombophlebitis of other deep vessels of lower extremities
I82.2	Embolism and thrombosis of vena cava

MATERIALS AND METHODS

The main diagnosis of DVT and total number of primary procedures for deep venous pathology for patients admitted to NHS hospitals in England from 2005 to 2015 were retrieved from the HES database via the NHS Digital website.¹⁰ The HES data intended for this study was only available for in hospital episodes on the NHS Digital website. The ICD-10 codes used that represented the diagnosis of DVT are shown in Table 1. The OPCS-4 procedural codes used that represented interventions for deep venous pathology, both endovascular and open surgery, are shown in Table 2. The primary procedures were grouped into (1) open surgery: open surgical thrombus removal (L90.1, L90.2, L90.8, and L90.9), vena cava surgery (L79.2, L79.6, L79.7, L79.8, and L79.9), deep venous bypass (L81.8, L81.9, and L83.1), venous valve surgery (L82.1, L82.2, L82.8, and L82.9); and (2) endovascular or percutaneous interventions: percutaneous thrombus removal (L96.1, L96.2, L96.8, L96.9, L99.3, and L99.4), percutaneous venoplasty (L94.6, L94.7, and L99.1) vena cava stent (L79.3), and other venous stent (L94.5 and L99.2). Classifying into groups, as described above, reduced non-specificity and enabled overlapping procedural codes representing similar procedures to be analysed as a group. The total number of DVT diagnoses and procedures for the above groups were calculated. Data were presented as total number of “hospital episodes” per year and ranges. Statistical analysis was performed using Prism version 5 (GraphPad Software, San Diego, CA, USA). Linear regression analysis was performed on the overall trend in admissions per year for a primary diagnosis of DVT in the study period.

HES data comes from the routine exchanges of information between providers and commissioners of healthcare for NHS patients in England. The processing cycle and HES data quality are detailed on the NHS Digital website.¹⁰ Briefly, data collected by healthcare providers was submitted to the Secondary Uses Service which, at pre-arranged dates during the year, takes an extract from the database and sends it to HES for cleaning and validation before making the information available in the data warehouse. Data quality reports and checks are completed at various stages in the cleaning and processing cycle.¹⁰

RESULTS

Admissions for a primary diagnosis of DVT

Fig. 1 shows the total number of admissions to NHS hospitals in England with DVT as the primary diagnosis from

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