REDUCING HOSPITAL-ACQUIRED VTE THROUGH DIGITAL RISK MANAGEMENT: EVALUATING CLINICAL AND ECONOMIC OUTCOMES ENABLED BY ORBIS EPR

THE CLINICAL AND ECONOMIC POTENTIAL OF ORBIS EPR IN NHS HOSPITALS

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Executive Summary

Venous thromboembolism (VTE), comprising deep vein thrombosis (DVT) and pulmonary embolism (PE), represents a significant patient safety concern and an economic burden for NHS hospitals. Hospital-acquired VTE (also referred to as hospital-associated thrombosis or HAT) includes all VTE events that occur during hospitalization or within 90 days following discharge. HAT accounts for 50% to 60% of all VTE cases and is considered a common yet potentially preventable problem (1).

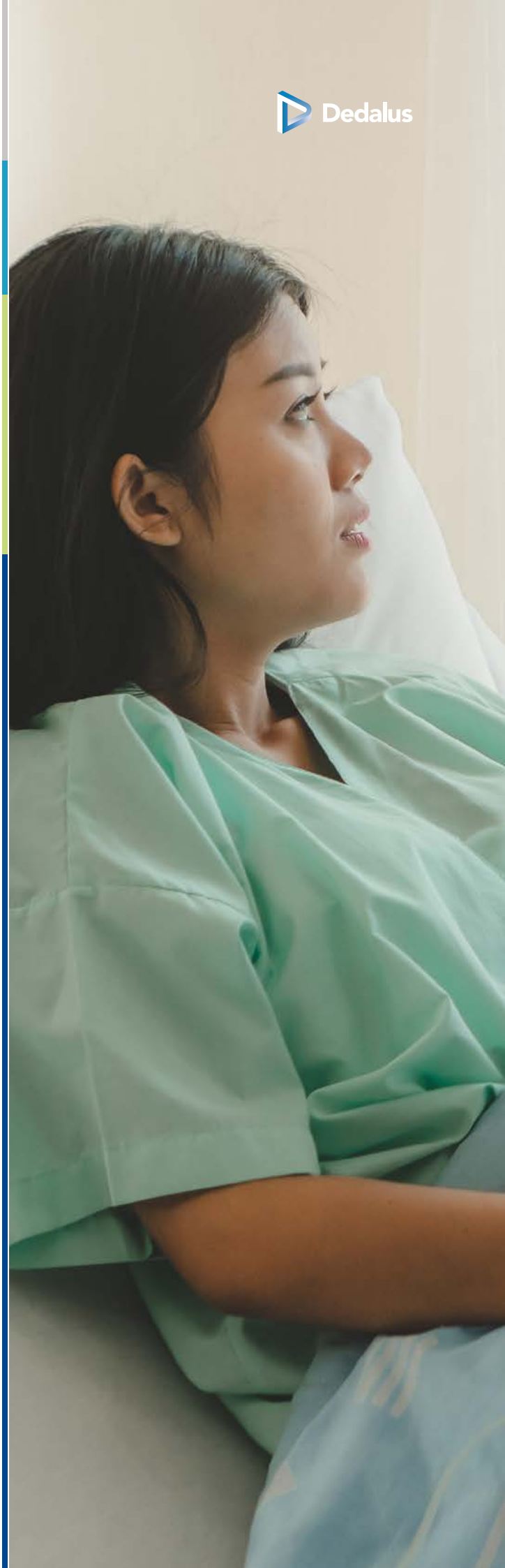
It is estimated that hospital-acquired VTE affects approximately 25,000 patients annually in the UK, contributing significantly to increased patient morbidity, mortality, extended hospital stays, and associated healthcare costs (2,3).

Evidence shows that timely risk assessment and consistent adherence to prophylaxis guidelines can significantly reduce hospital-acquired VTE incidents, complications, and associated healthcare expenditures (1,4).

This white paper outlines the anticipated clinical and economic benefits of implementing the Orbis Electronic Patient Record (EPR) system to manage VTE risk through digital workflows, risk assessments, and clinical alerts.

Background and Problem

Hospital-acquired VTE significantly impacts patient outcomes, causing prolonged hospital stays, increased readmissions, and substantial mortality and morbidity. According to NHS Improvement, around 60% of VTEs are hospital-associated, and fatal PE is a leading cause of preventable hospital death in the UK (2,5). The cost to the NHS of treating VTE and its complications, including extended inpatient stays and readmissions, has been estimated in the hundreds of millions of pounds annually (2). NHS guidelines mandate timely VTE risk assessments and prophylactic interventions, yet adherence remains inconsistent and audits reveal ongoing variability in compliance across Trusts (6). Recent evidence from Hull University Teaching Hospitals highlights a significant prevalence (~20%) of unsuspected pulmonary embolism among ambulatory cancer patients. These findings underscore the need for integrated VTE risk management, where digital tools like Orbis could support early identification and preemptive anticoagulation pathways for high-risk patients (7).



Clinical Challenges

- Inconsistent risk assessment documentation
- Variable adherence to prophylaxis guidelines
- Delayed identification and escalation of VTE incidents

Economic Impact

- **High cost per VTE event due to prolonged hospitalization and ICU stays**
- **Financial penalties for guideline non-compliance**

The Role of Orbis EPR in VTE Management

Orbis EPR provides a comprehensive digital solution that integrates risk assessment, clinical decision support, and real-time alerts, enhancing adherence to NHS and NICE guidelines.

Here is a brief definition of the key **Orbis modules** used in VTE management:

- **clinalytix Medical AI:** An artificial intelligence engine that analyzes patient data (e.g., vitals, labs, history) in real time to detect indicators of risk of developing VTE. As a medical device in use for VTE predictors, clinaytix Medical AI supports pro-active decision-making by flagging patients before visible symptoms escalate (8,9).

- **Info4U:** Orbis in your hand, Info4U enables clinicians to have access to the EPR via a secure handheld device, providing real-time clinical information at the point of care. In the context of the VTE pathway, this supports both workflow efficiency and patient safety through:

    - Pushing real-time alerts when a VTE risk assessment is overdue or a reassessment is triggered due to a clinical status change (e.g., post-surgery or reduced mobility).

    - Providing visibility of completed and pending risk assessments for patients under a clinician's care, reducing missed opportunities for prophylaxis.

    - Enabling immediate action, such as placing prophylactic medication orders or referring for diagnostic imaging (e.g., Doppler ultrasound or CTPA) from the bedside.

    - Supporting ward rounds by surfacing patients flagged as high-risk for VTE, allowing proactive review and escalation where needed.

- **CPOE:** The order communication system in Orbis that allows clinicians to quickly place bundled diagnostic and treatment orders with a few clicks. It can facilitate rapid ordering of prophylactic treatments, reducing time-to-prophylaxis and minimizing errors.

- **Orbis Speech:** A voice recognition and structured documentation module that enables clinicians to dictate notes, assessments, and discharge summaries directly into the EPR. It supports fast, hands-free, and codified documentation, helping to reduce administrative burden and improve data quality.

  In addition, ambient speech functionality, already deployed in parts of the DACH region, can passively capture the full clinical conversation between clinician and patient. It automatically extracts and summarizes relevant information, such as medical history, assessments, orders, and planned interventions, into structured EPR fields. This allows clinicians to maintain focus on the patient while reducing post-consultation documentation workload. By streamlining documentation processes, Orbis Speech supports timely clinical updates, enhanced auditability, and efficient creation of comprehensive discharge summaries.

VTE Workflow

Orbis EPR supports the digital transformation of venous thromboembolism (VTE) prevention and management across the full hospital care continuum. The VTE workflow spans from admission to post-discharge follow-up and is underpinned by timely risk assessment, evidence-based prophylaxis, continuous monitoring, and structured documentation. The following outlines each phase of the VTE care pathway and the corresponding Orbis interventions that enhance patient safety, clinician efficiency, and compliance with NHS guidelines:

1. **Admission and Initial VTE Risk Assessment :** Upon admission, Orbis triggers an automated VTE risk notification icon on the patient card visible in list or unit view, to the entire clinical team embedded within the digital patient admission workflow. This tool prompts clinicians to complete structured risk evaluation within 14 hours, aligned with NICE targets (10).

2. **Preventive Treatment (Pharmacologic / Mechanical):** Based on risk stratification, Orbis supports prescribing appropriate prophylaxis, whether pharmacological (e.g., Low Molecular Weight Heparin) or mechanical (e.g., compression devices), through predefined order sets in ORBIS (11). These can be adjusted based on contraindications, with alerts preventing inappropriate prophylactic prescribing.

3. **Clinical Monitoring & Reassessment:** Orbis automatically prompts clinicians for VTE reassessment when a patient's clinical condition changes (e.g., post-surgical recovery, mobility changes). Built-in decision support tools ensure adherence to reassessment intervals and flag missing documentation to avoid compliance breaches.

4. **Event Escalation (if VTE develops):** In cases where a suspected VTE event occurs, Orbis facilitates rapid escalation. The system allows clinicians to request confirmatory diagnostics (e.g., Doppler ultrasound, CT Pulmonary Angiography) with just a few clicks via CPOE. Real-time alerts are designed to notify relevant teams and trigger escalation pathways.

5. **Treatment Phase (Anticoagulation, ICU Stay):** Once diagnosed, Orbis supports therapeutic anticoagulation through structured medication modules, real-time prescribing, and automatic coding. For patients requiring critical care, Orbis enables visibility of treatment progress and supports efficient ICU handovers and documentation.

6. **Post-discharge Follow-up or Readmission:** At discharge, Orbis Speech enables fast and structured discharge summaries with embedded anticoagulation plans and follow-up recommendations. Patient information can be shared via Orbis, facilitating coordination with community providers and minimizing readmission risk.

This digitally enabled pathway ensures that every at-risk patient receives timely and guideline-concordant care, while also equipping clinicians with the tools to monitor, document, and improve VTE outcomes at scale.

Table 1 summarises the main pathway components, relevant Orbis modules, and the anticipated benefits of digital intervention.

Pathway Phase	Clinical Activities	Orbis Module Interventions	Expected Impact
Admission & Risk Assessment	VTE risk stratification within 14 hrs	**Digital VTE form** **clinalytix Medical AI:** Predictive alerts **Info4U:** Real-time alerts	Early identification of at-risk patients, improved compliance with NICE targets
Preventive Treatment	Prophylactic anticoagulants or mechanical devices	**CPOE:** Order set, Contraindication alerts	Guideline adherence, reduced preventable VTE
Monitoring & Reassessment	Reassessment following surgery, mobility change, or at intervals defined by national guidance	Auto triggers, reassessment prompts in Orbis	Captures evolving risk, reduces missed cases
Event Escalation	Signs of suspected DVT/PE	**clinalytix Medical AI:** Reassessment scoring **CPOE:** One click order for fast CTPA/lab orders	Rapid response to deterioration, reduced complications
Treatment Phase	Anticoagulation therapy, ICU transfer if needed	**Orbis coding:** Accurate coding of VTE-related diagnoses to support billing and audit **Orbis** Integrated ICU workflows	Accurate documentation, safer transitions of care
Post-discharge & Follow-up	Ongoing anticoagulation plan, outpatient review	**Orbis Speech:** Rapid discharge summary creation Orbis Patient Access portal	Efficient discharge, accurate documentation, Safer transitions, reduced readmissions

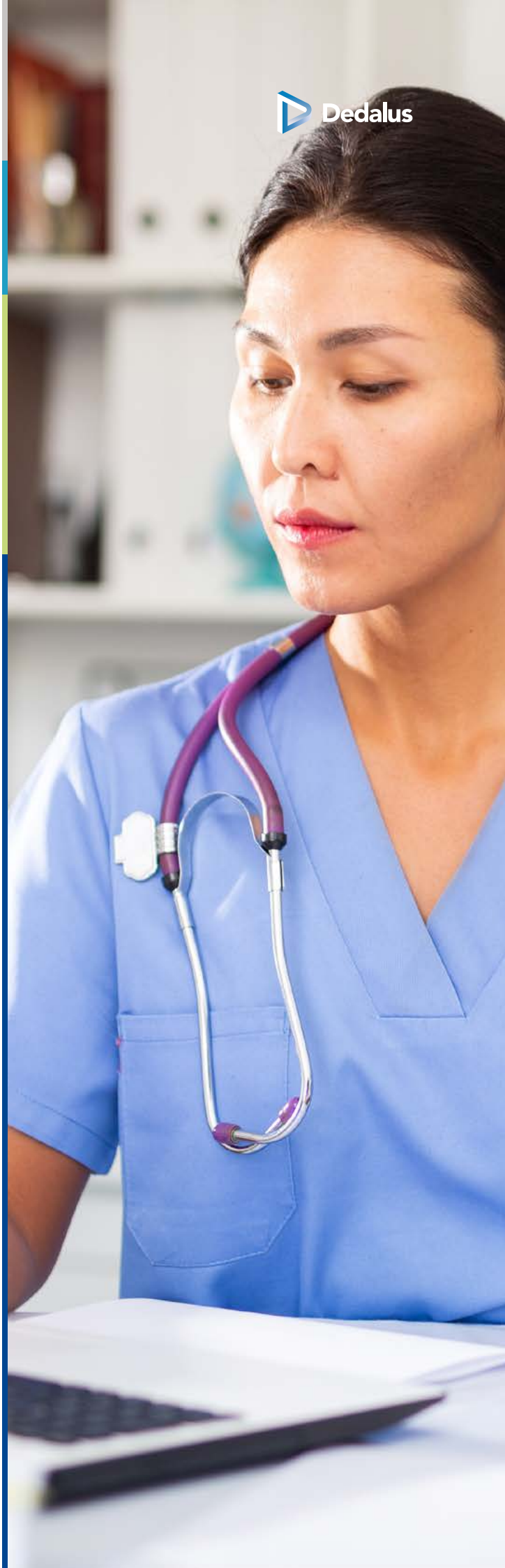
Expected Clinical Outcomes (Hypothesis-Based)

Based on clinical assumptions and evidence from prior digital implementations, the Orbis EPR system is expected to yield measurable improvements in VTE prevention and care coordination across NHS hospitals. These outcomes are hypothesised from the combined effect of structured digital workflows, automated alerts, and improved documentation.

The anticipated clinical outcomes include:

- **Increased compliance with VTE risk assessment** within 14 hours of admission, in line with NICE and NHS England targets.
- **Higher adherence to pharmacological and mechanical prophylaxis protocols,** reducing preventable VTE events.
- **Earlier detection of VTE signs,** leading to prompt escalation and reduced risk of pulmonary embolism.
- **Reduction in overall hospital-acquired VTE incidence,** particularly in high-risk patient cohorts (e.g. post-operative, immobile patients).
- **Shorter average length of stay (LOS)** among patients with suspected or confirmed VTE, due to improved risk stratification and early intervention.
- **Improved quality of documentation and coding,** enhancing clinical audit capability and alignment with reimbursement models.

These projected outcomes should be validated through a post-implementation evaluation, comparing clinical metrics across pre- and post-Orbis deployment phases.



Financial Impact Hypothesis (NHS Trust Example)

To estimate the potential economic benefit of using Orbis EPR for VTE prevention and management, we model a typical NHS Trust with a highly conservative 20,000 adult admissions annually to medical, surgical, and orthopedic wards. Hospitalization is considered the single most important risk factor for developing VTE events and the risk of experiencing VTE events remains high after hospitalization, especially within the first 30 days post discharge (12). According to the literature, approximately 1-2% of hospitalized patients without appropriate prophylaxis may develop a hospital-acquired VTE (13,14). By taking 1%, this equates to around 200 VTE events per year, many of which are preventable through adherence to risk assessment and prophylaxis protocols.

VTE prophylaxis has been shown to reduce the incidence of DVT. It includes mechanical methods (such as anti-embolism stockings and intermittent pneumatic compression devices), and pharmacological treatments (such as heparin and other anticoagulant drugs)(2). Studies show that pharmacological prophylaxis, can reduce VTE risk by 60-70% compared to no prophylaxis (15–18). Assuming a conservative 30% reduction in hospital-acquired VTE due to improved digital compliance and workflow automation with Orbis, this translates to 60 fewer VTE events per year in this Trust. Given that the average cost of treating a symptomatic VTE (including possible imaging, anticoagulation, readmissions, and complications) is £3,000–£5,000 per case, a reduction of 60 cases would yield direct cost avoidance of £180,000 to £300,000 annually (Figure 1).

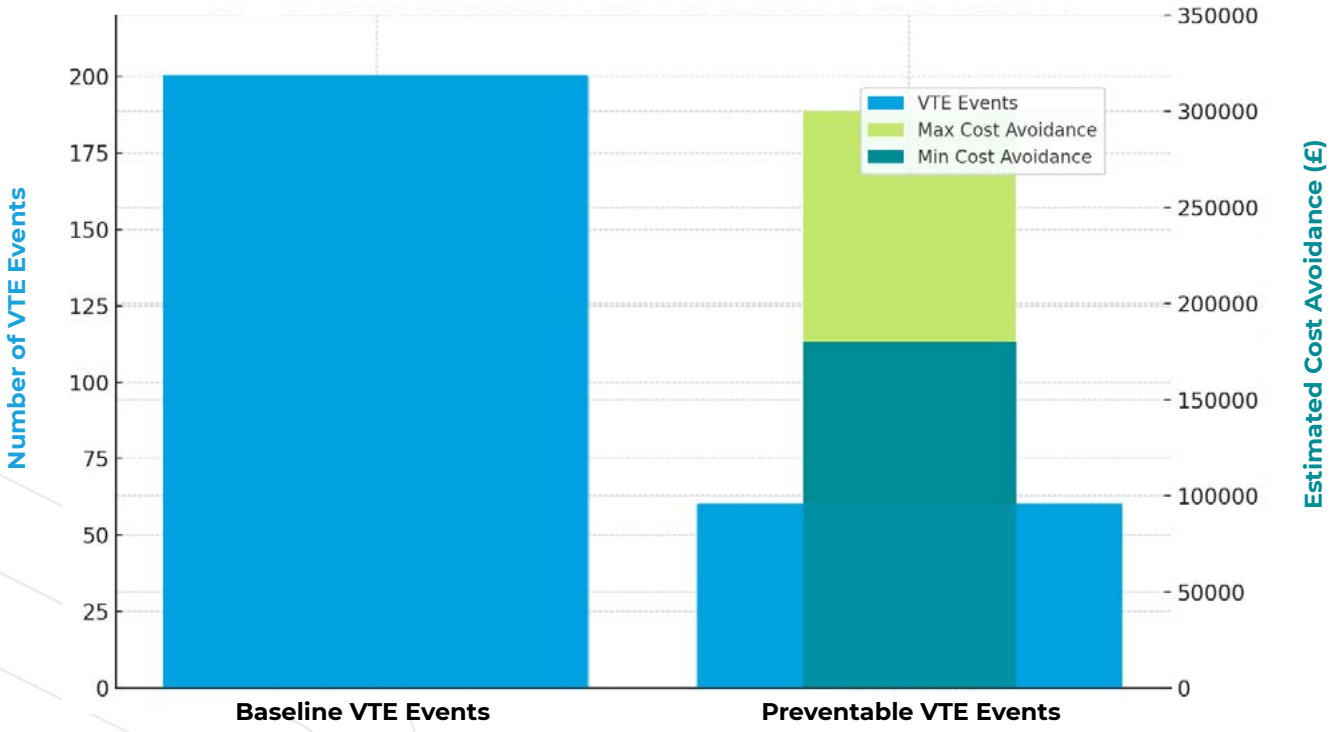


Figure 1. Projected Cost Avoidance from VTE Reduction Using Orbis EPR

Further indirect benefits include:

- Reduced ICU utilisation for patients developing pulmonary embolism or post-operative DVT complications.
- Avoided readmissions, which carry financial penalties under NHS reimbursement schemes.
- Improved coding accuracy and potential uplift in tariff payments due to better documentation.

If we consider modest implementation and operational costs (e.g., training, configuration, integration), the return on investment (ROI) for VTE-specific modules in Orbis could be realised within 6–12 months, with sustainable annual savings thereafter.

It is also worth noting that this model does not account for VTE assessments required in obstetric cases such as births, miscarriages, and terminations, where national guidelines recommend assessment within 6 hours (10). Therefore, the true benefit and reach of Orbis are likely to be greater than estimated here.

These estimates are conservative and hypothesis-based, pending real-world validation from live NHS deployments. A formal health economic evaluation is recommended as part of post-implementation governance.

Conclusion

Hospital-acquired VTE remains one of the most preventable yet persistent causes of in-hospital morbidity and mortality across the NHS. Despite established national guidelines, real-world adherence to VTE risk assessment and prophylaxis continues to vary, leading to avoidable harm, increased healthcare costs, and reputational risk for providers.

This white paper demonstrates how the Orbis EPR system offers a digitally enabled solution to standardize VTE prevention workflows, enhance clinical decision-making, and deliver measurable improvements in both patient outcomes and operational efficiency. From admission risk assessments and automated alerts to structured prescribing and discharge documentation, Orbis supports end-to-end visibility and intervention across the VTE care pathway.

Hypothesis-driven projections suggest that even conservative improvements in compliance and early intervention can result in substantial cost avoidance and improved bed utilization. With scalable modules, robust audit trails, and proven success in other high-risk domains like sepsis management, Orbis provides a strong platform for tackling VTE through a digitally transformed model of care.

We recommend piloting Orbis EPR's VTE modules within a selected NHS Trust and measuring impact across clinical, economic, and user experience metrics over a 6- to 12-month period. Findings from such an implementation would not only validate these projections but also inform wider deployment strategies across the NHS. This rollout strategy aligns with NHS Long Term Plan objectives around patient safety, digital transformation, and reducing preventable harm. It also supports Trust-level goals for CQC compliance, cost efficiency, and workforce optimization.

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