Medication chart intervention improves inpatient venous thromboembolism prophylaxis

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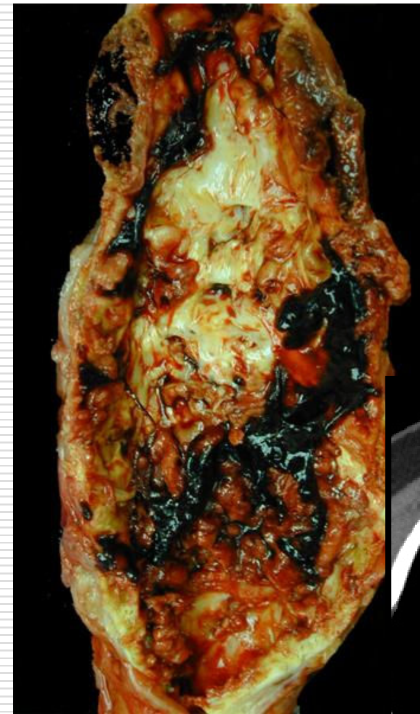
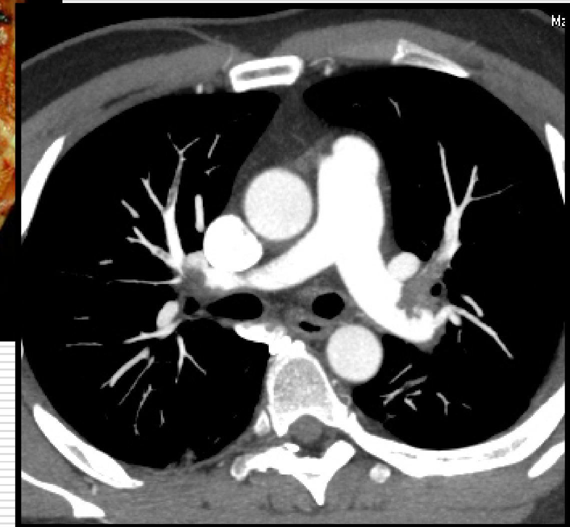
Venous thromboembolism: A major healthcare problem

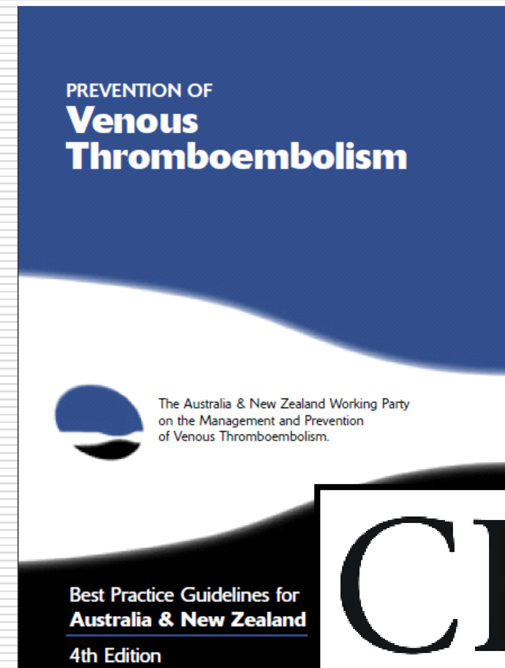
- Major cause of morbidity and mortality in hospitalised patients
- VTE prevalence: 0.1 – 1.0% medical admissions (NICS 2005)
  - 80% symptomatic cases: active or prior (6 months) hospitalisation
- Overall mortality: 10.0%
- SINGLE MOST preventable cause of hospital mortality in Australia

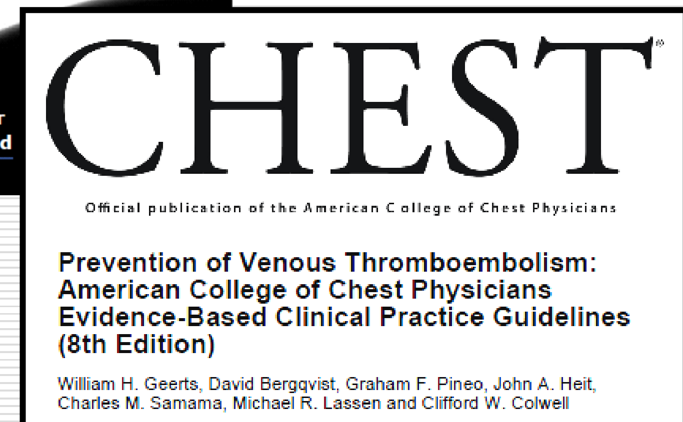




Venous thromboembolism prophylaxis

- Mechanical prophylaxis:
  - Thromboembolic Deterrent Stockings (TEDS)
  - Intermittent Pneumatic Compression Stockings (IPCS)
- Chemical prophylaxis:
  - Unfractionated Heparin
  - Low Molecular Weight Heparin i.e. Enoxaparin
  - Aspirin
- Strong evidence-base guidelines for VTE prevention





Australian & New Zealand prophylaxis guidelines

PREVENTION OF
Venous
Thromboembolism

Best Practice Guidelines for
Australia & New Zealand
4th Edition

RISK	FEATURES	PROPHYLAXIS	DURATION	DOSAGE
LOW	features			

Despite strong evidence-based recommendations:

1. **VTE prophylaxis remains under utilised**
2. **Poor adherence to evidence-based guidelines**

Venous thromboembolism prophylaxis: Existing strategies

- Published strategies to improve VTE prophylaxis uptake:
  - Staff education (*Devlin et al 1999, Anderson et al 1998)*
  - Laminated algorithm cards (*Frankel et al 1999*)
  - Continuous nursing surveillance (*Hall and Eccles 2000*)
  - Computer support systems (*Taylor et al 2000, Macdonald et al 2002*)
  - Audits and feedback cycles (*McEleny et al 1998*)

- Outcomes?
  - Variable success
  - Problems encountered
    - Costly to implement
    - Non-sustained effect
    - Required consistent and self-motivated modification in clinical practice

Modified medication chart: A potential solution

- 3 instruments embedded into routine inpatient medication chart

REGULAR MEDICATIONS | DAY

YEAR 20 .... DATE & MONTH

VARIABLE DOSE MEDICATION | Drug level

Date | Medication (Print Generic Name) | Time level taken

Route | Frequency | Dose

Dr to enter dose time and individual dose | Time Of Dose

Indication/Pharmacy | P'cist r/v | Prescrib

Prescriber Signature | Print Your Name | Contact | Time gi | Nurse

VTE PROPHYLAXIS

Record risk for ALL *adult* patients ≥ 16 yrs

Date | VTE Risk ☐ Med / ☐ Surg ☐ High ☐ Medium ☐ Low | Medication (Print Generic Name) or Contra-Indicated (C/I) ☐ (Indicate reason)

Route

Pharmacy | Dose / Frequency & NOW enter times

Prescriber Signature | Print Your Name | Contact

Date | Graduated compression stockings ☐ Prescribed, ☐ Not Prescribed or ☐ C/I (Indicate reason) | AM | PM | ND

Prescriber Signature | Print Your Name | Contact

Date | Medication(Print Generic Name) | Tick if Slow release

Route | Dose | Frequency & NOW enter times

Indication/Pharmacy | P'cist r/v

Prescriber Signature | Print Your Name | Contact

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VTE PROPHYLAXIS

Record risk for ALL *adult* patients ≥ 16 yrs

Date Route	VTE Risk ☐ Med / ☐ Surg ☐ High ☐ Medium ☐ Low	Medication (Print Generic Name) or Contra-Indicated (C/I) ☐ (Indicate reason)	
Pharmacy		Dose / Frequency & NOW enter times	
Prescriber Signature		Print Your Name	Contact
Date	Graduated compression stockings ☐ Prescribed, ☐ Not Prescribed or ☐ C/I (Indicate reason)		AM PM ND
Prescriber Signature		Print Your Name	Contact

Venous Thromboembolism (VTE) Risk Assessment

All inpatients should have their VTE risk assessed and documented by a medical staff member at the time of admission.

Step 1. Determine HIGHEST Risk Category

Risk Category	Surgical Risk Factors	Medical Risk Factors	Recommended Prophylaxis
High	• Orthopaedic surgery of pelvis, hip or lower limb • Multiple trauma • Major Surgery* and age > 60 years • Major Surgery* and age 40-60 years **with** medical risk factors	• Ischaemic stroke (NOT within first 48 hours) • History of DVT/PE • Decompensated heart failure • Active cancer • Acute on chronic lung disease • Acute on chronic inflammatory disease (eg. IBD, SLE, RA) • Immobility • Age > 60 years, **unless** otherwise well and ambulant, with no other risk factors	**For surgical patients** Heparin 5000 units subcut twice daily Or Enoxaparin 40 mg subcut once daily# for patients of orthopaedic surgeons **AND** Graduated compression stockings (unless contraindicated) **For medical patients** Heparin 5000 units subcut twice daily Or Enoxaparin 40 mg subcut once daily# Or Graduated compression stockings (if chemoprophylaxis is contraindicated)
Moderate	• Major surgery* and age 40-60 years **without** medical risk factors • Minor surgery and age > 60 years • Minor surgery and age 40-60 years **with** medical risk factors		Heparin 5000 units subcut twice daily Or Enoxaparin 20 mg subcut once daily **AND** Graduated compression stockings (unless contraindicated)
Low	• Major surgery*, age 16-40 years **without** medical risk factors • Minor surgery, age 16-40 years **with** medical risk factors • Minor surgery and age 16-60 years **without** medical risk factors	• None of the above (medical risk factors)	**For surgical patients** Graduated compression stockings (optional) **For medical patients** No prophylaxis recommended

Step 2. Check whether there are any contraindications (C/I) to VTE prophylaxis

Contraindications to:	
Heparin / Enoxaparin:	Active or high risk of bleeding, adverse reaction to heparin or enoxaparin, haemorrhagic stroke, on therapeutic anticoagulation, TURP
Graduated compression stockings:	Severe peripheral vascular disease, severe peripheral neuropathy, severe lower limb oedema, extreme leg deformity, recent skin graft, dermatitis

Step 3. Document risk category & prescribe prophylaxis on VTE Prophylaxis section of medication chart

VTE Risk category, date, doctor's name and signature must be documented even if prophylaxis is not prescribed

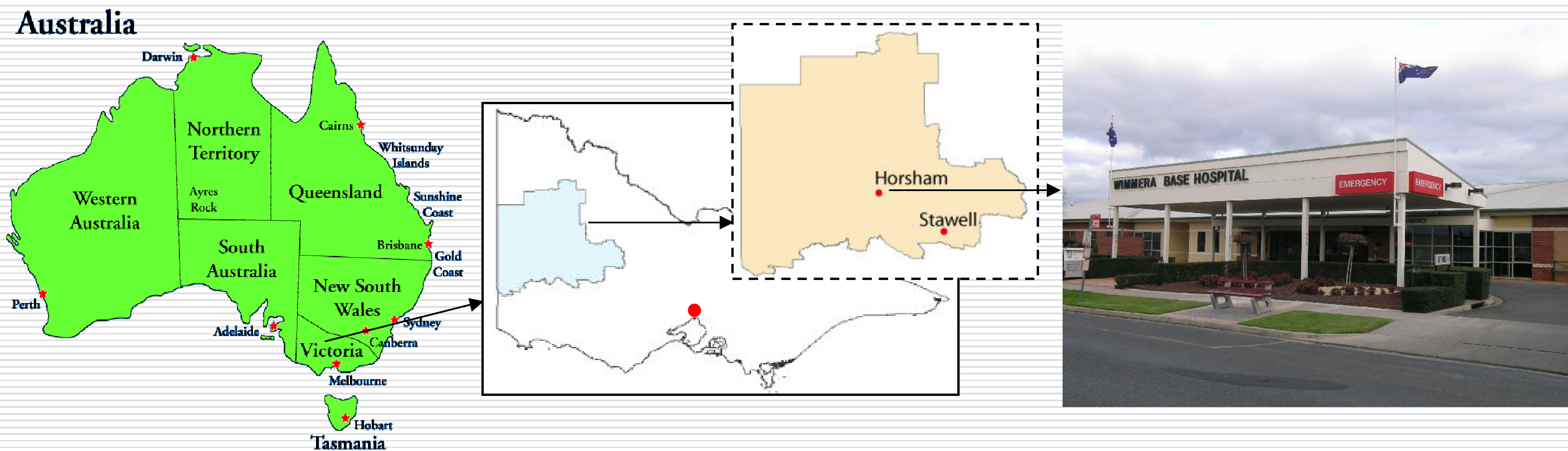
VTE PROPHYLAXIS

Record risk for <u>ALL</u> *adult* patients ≥ 16 yrs

Date / Route	VTE Risk ☐ Med / ☐ Surg ☐ High ☐ Medium ☐ Low	Medication (Print Generic Name) or Contra-Indicated (C/I) ☐ (Indicate reason)	
Pharmacy		Dose / Frequency & NOW enter times	
Prescriber Signature		Print Your Name	Contact
Date	Graduated compression stockings ☐ Prescribed, ☐ Not Prescribed or ☐ C/I (Indicate reason)		AM / PM / ND
Prescriber Signature		Print Your Name	Contact

Wimmera Base Hospital: Ideal Pilot platform

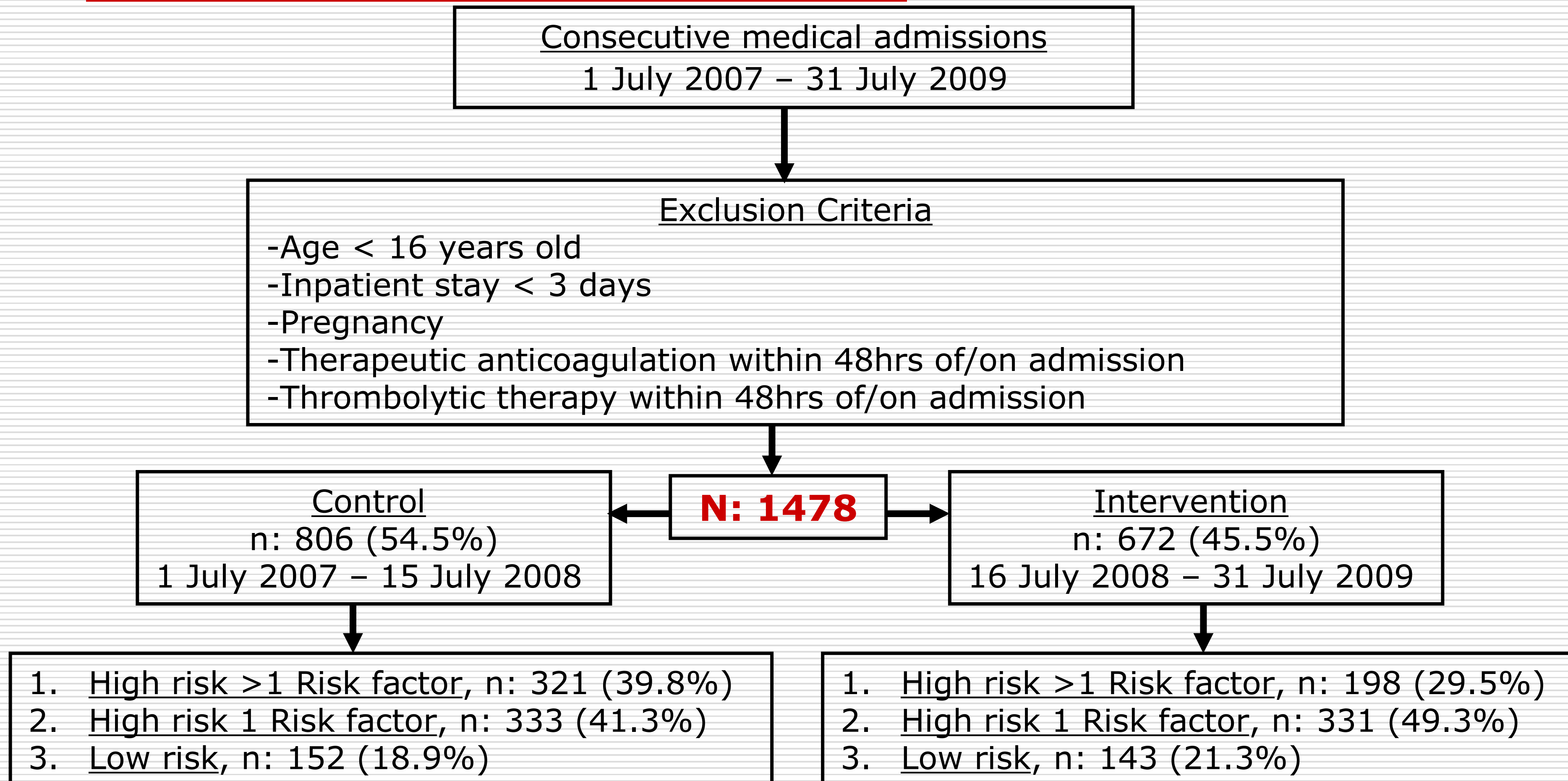
- Modified medication chart: Launched June 2008
- Regional referral centre
  - Wimmera & Southern Mallee region, Victoria, Australia
- Catchment population: 54,000
- Hospital capacity: 80 acute beds, 5 High dependency beds
- Patient flow: 10,000 inpatient admissions per annum



Study Objectives

- To demonstrate that medication chart intervention
  1. Increases VTE prophylaxis uptake in acutely ill medical inpatients
  2. Improves the timeliness of VTE prophylaxis prescription
  3. Encourages appropriate VTE prophylaxis prescription according to patient’s risk level as recommended by best-practice guidelines
  4. Sustains a lasting increase in VTE prophylaxis utilisation

Study design: Retrospective study



Data collection

- Every admission: individual analysis unit
- Retrospective review of medical records
- Standardised data collection form (10% inter-rater agreement)

Patient characteristics

- ❑ Age:......
- ❑ Sex: M/F
- ❑ Weight (kg):......
- ❑ Admission date:......
- ❑ Duration of hospital stay (days):......

Admitted from: (Please tick)

- ❑ Emergency
- ❑ Elective waiting list
- ❑ Transfers from another healthcare facility
- ❑ Information unavailable

Discharge disposition: (Please tick)

- ❑ Home
- ❑ Residential care/Nursing home
- ❑ Death
- ❑ Transfer to another healthcare facility
- ❑ Rehabilitation care/hospital
- ❑ Information unavailable

Data collection: Admission diagnosis

Principal admission diagnosis

Medical conditions (Please tick)

- ❑ Neurological disease
  - o Stroke: Ischaemic/Haemorrhagic
  - o TIA
  - o Cranial haematomas
  - o Epilepsy
  - o Others:
- ❑ Gastrointestinal
  - o Hepatic disorders
  - o Biliary tree disorders
  - o Pancreatic disorders
  - o GIT bleeding
  - o Peptic ulcer disease
  - o Gastroenteritis
  - o Colitis
  - o Others:
- ❑ Cardiovascular disease
  - o Ischaemic heart disease
  - o Congestive heart failure
  - o Arrhythmia
  - o Others:
- ❑ Respiratory disease
  - o COPD exacerbation
  - o Asthma exacerbation
  - o Bronchiectasis exacerbation
  - o Pneumonia
  - o Others:
- ❑ Rheumatologic disease
  - o Connective tissue disease
  - o Osteoarthritis
  - o Other arthritis
- ❑ Endocrine disease
  - o Diabetes and its complications
  - o Thyroid disorders: hyperthyroid/hypothyroid
  - o Osteoporosis
- ❑ Malignancy
- ❑ Renal failure (Cr > 200 umol/L)
- ❑ Syncope
- ❑ Non-pulmonary sepsis
- ❑ Discharge planning
- ❑ Psychiatric disorders
- ❑ Other diagnosis:.......

Parameters adapted from the ENDORSE Study, Lancet 2008, 371: 387-94

Data collection: Risk factors and categories

Venous thromboembolism risk factors and category at time of admission

For medical patients

- ❑ Medical risk factors (Please tick)
- ❑ Age > 60y/o
- ❑ Immobility (bed ridden) >1 day
- ❑ Known thrombophilia
- ❑ History of VTE
- ❑ Active malignancy or chemotherapy
- ❑ Ischaemic stroke (Not within first 48hrs)
- ❑ Decompensated heart failure
- ❑ Acute on chronic lung disease
- ❑ Acute on chronic inflammatory disease (e.g. IBD, SLE, RA)
- ❑ Hormonal replacement therapy or contraception

Risk category (Please tick)

High risk (>1 risk factors)
High risk (=1 risk factors)
Low risk (0 risk factor)

Data collection: Prophylaxis type and Contraindications

Use of Venous thromboembolism prophylaxis

When was VTE prophylaxis ordered (Please tick):

- ❑ Day 0
- ❑ Day 1
- ❑ Day 2
- ❑ Day 3 or later

Methods of VTE prophylaxis used (Please tick):

- ❑ TED stockings
- ❑ Unfractionated heparin: 5000 units
  - o Once daily (d)
  - o Twice daily (bd)
  - o Three times daily (tds)
- ❑ Low molecular heparin (Enoxaparin/Clexane)
  - o Dose: 20mg/40mg
  - o Once daily (d)
  - o Twice daily (bd)
- ❑ Others:……

Contraindications to methods of VTE prophylaxis

CI to pharmacological prophylaxis (Please tick):

- ❑ Any active bleeding
- ❑ Congenital bleeding disorder
- ❑ Acquired bleeding disorder
- ❑ Haemorrhagic stroke
- ❑ Thrombocytopenia (< 100 x10^9 cells/L)
- ❑ Gastrointestinal bleed within the last 3 months
- ❑ Bacterial endocarditis
- ❑ Hepatic failure
- ❑ TURP
- ❑ Therapeutic anticoagulation

CI to mechanical prophylaxis (Please tick):

- ❑ Severe peripheral vascular disease
- ❑ Severe peripheral neuropathy
- ❑ Severe lower limb oedema
- ❑ Extreme leg deformity
- ❑ Recent skin graft
- ❑ Dermatitis

Study population: Demographics

Patient Demographics	Control median (IQR)	Intervention median (IQR)	p-value
Age	73 (56 – 83)	73 (58 – 82)	0.852
Weight	70 (61 – 85)	71 (60 – 86)	0.910
Length of Stay	5.5 (4 – 8)	5.0 (4 – 8)	0.544

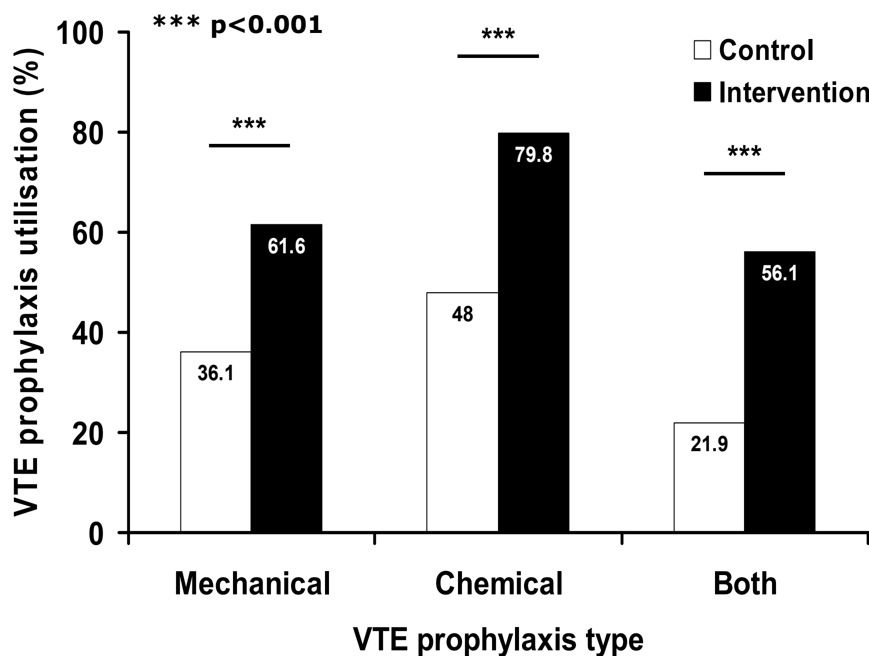
	Control n (%)	Intervention n (%)	p-value
Gender			
Female	448 (55.6)	368 (54.8)	0.752
Male	358 (44.4)	304 (45.2)	
Source of admission			
Emergency	736 (91.3)	618 (92.0)	0.654
Transfer	52 (6.5)	45 (6.7)	0.850
Elective	18 (2.2)	9 (1.3)	0.201
Discharge destination			
Home	605 (75.1)	518 (77.1)	0.365
Transfer	84 (10.4)	74 (11.0)	0.712
Nursing home	79 (9.8)	59 (8.8)	0.501
Death	38 (4.7)	21 (3.1)	0.120

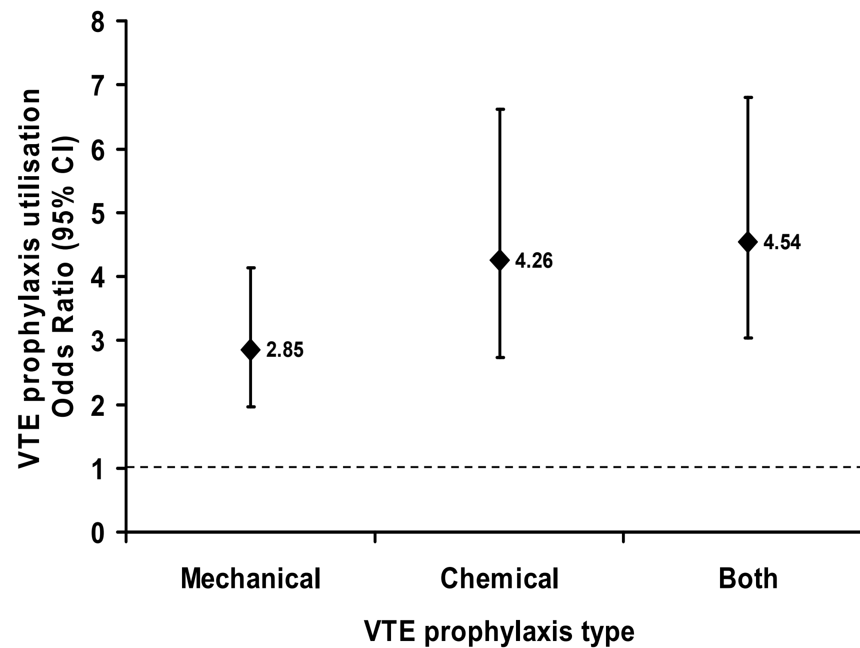
Study population: Admission diagnosis

Admission diagnosis	Control n (%)	Intervention n (%)	p-value
Respiratory conditions	127 (10.1)	130 (11.7)	0.226
Cardiovascular conditions	93 (7.4)	67 (6.0)	0.176
Oncology & haematological conditions	92 (7.3)	62 (5.6)	0.082
Discharge planning	83 (6.6)	66 (5.9)	0.490
Sepsis: Non-pulmonary source	81 (6.5)	62 (5.6)	0.364
Psychiatric conditions & Toxicology	79 (6.3)	73 (6.6)	0.799
Neurological conditions	77 (6.1)	61 (5.5)	0.493
Gastrointestinal & hepatobiliary conditions	42 (3.3)	40 (3.6)	0.746
Rheumatologic and inflammatory diseases	22 (1.8)	19 (1.7)	0.929
Endocrine & metabolic conditions	**20 (1.6)**	**38 (3.4)**	**0.004**
Renal conditions	19 (1.5)	19 (1.7)	0.711
Other medical conditions	**72 (5.7)**	**35 (3.1)**	**0.002**

Medication chart modification increases VTE prophylaxis utilisation

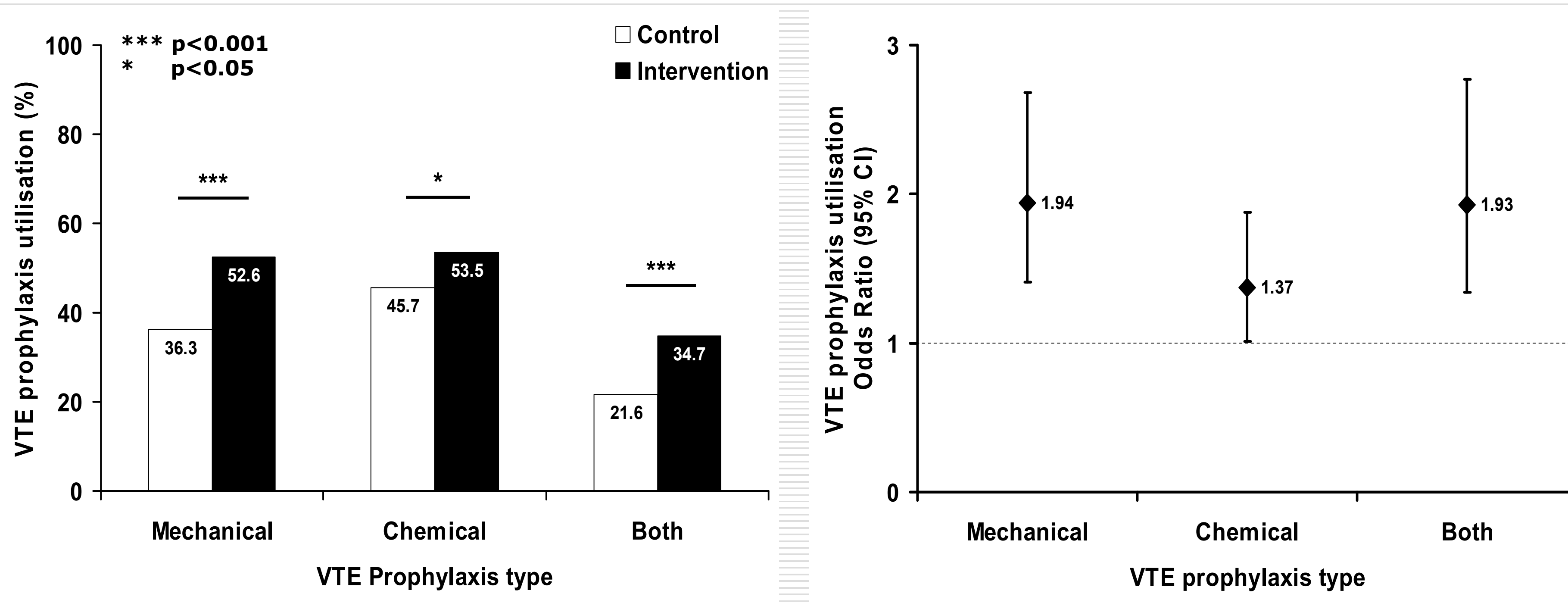
High risk patients: >1 risk factor





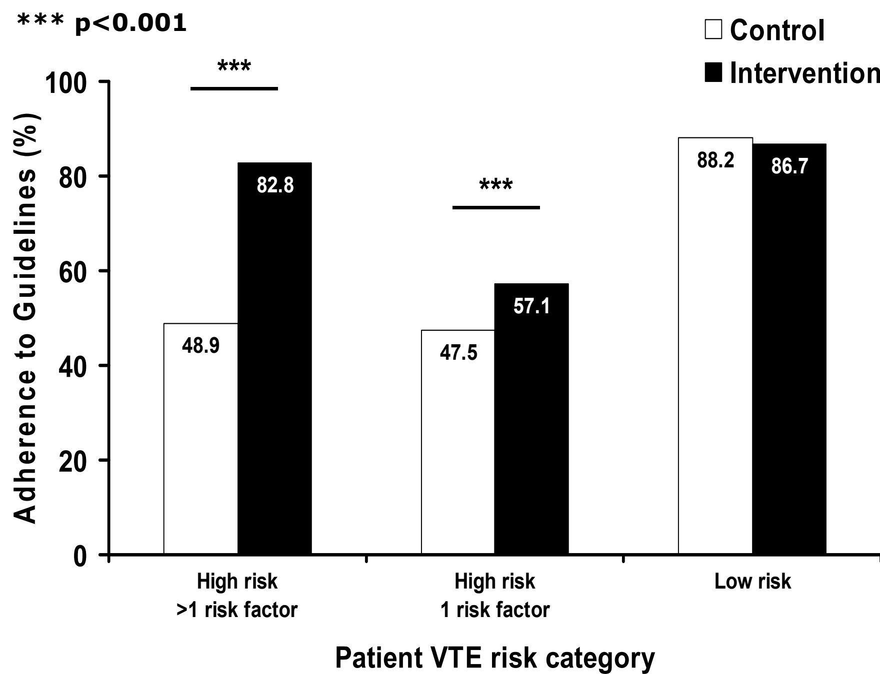
Medication chart modification increases VTE prophylaxis utilisation

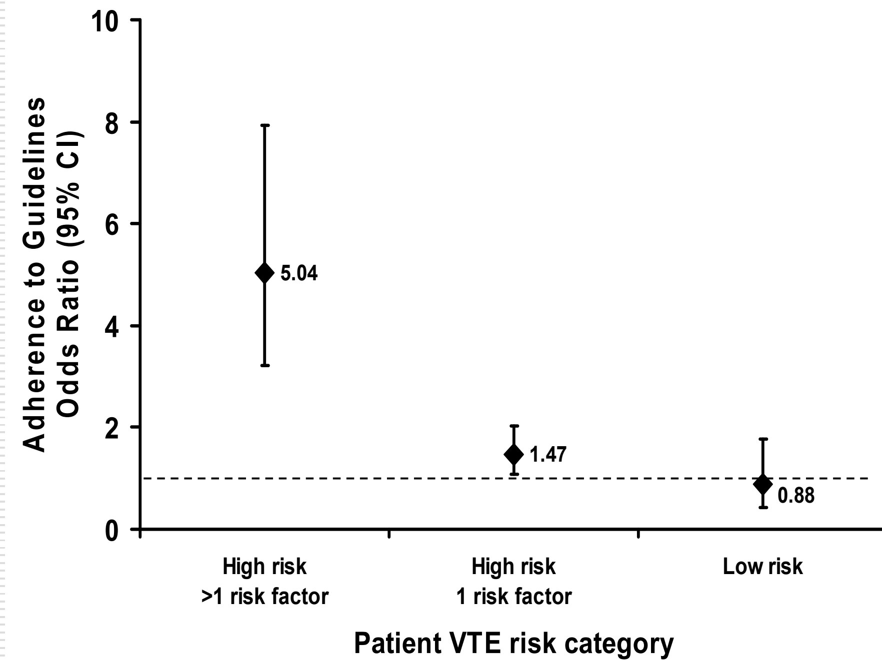
High risk patients: 1 risk factor



Medication chart intervention improves adherence to evidence-base guidelines

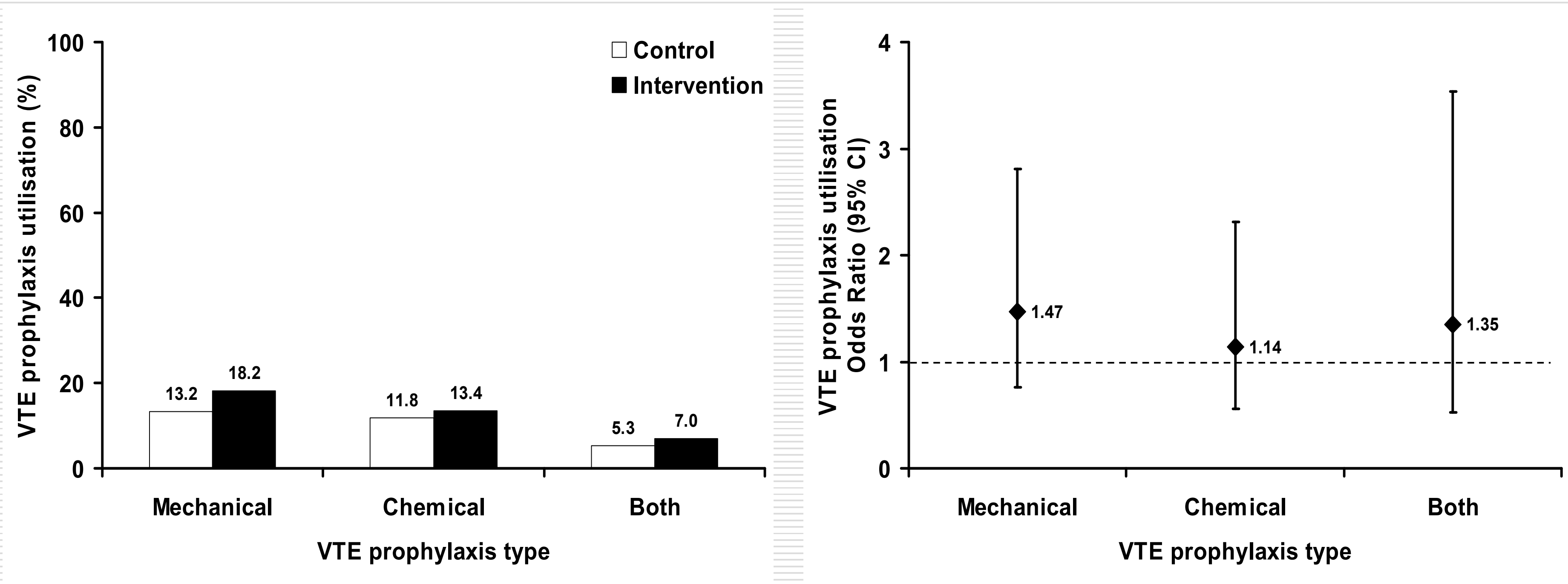
All risk categories





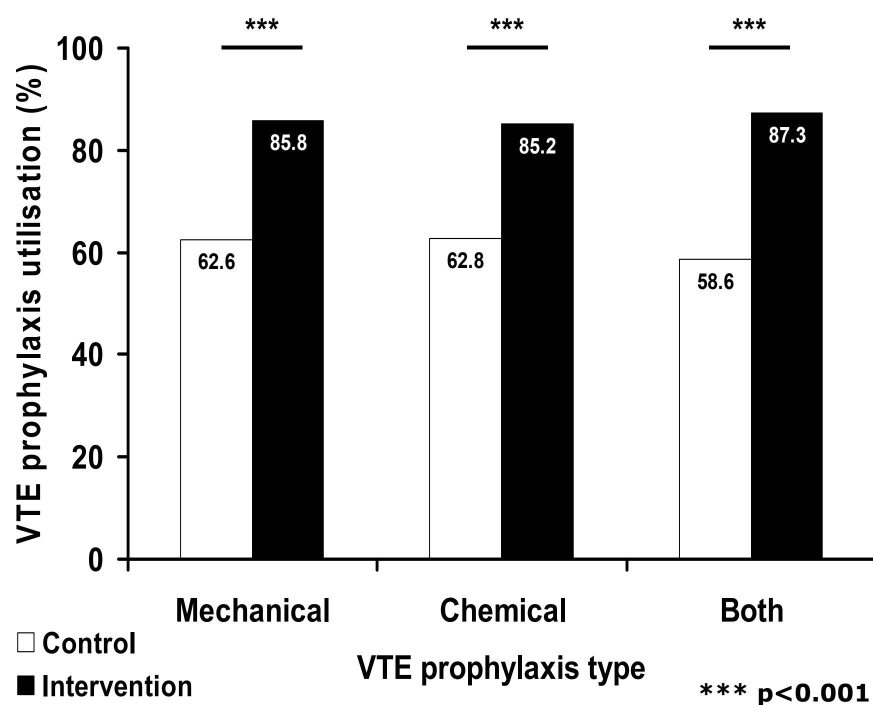
Medication chart intervention improves adherence to evidence-base guidelines

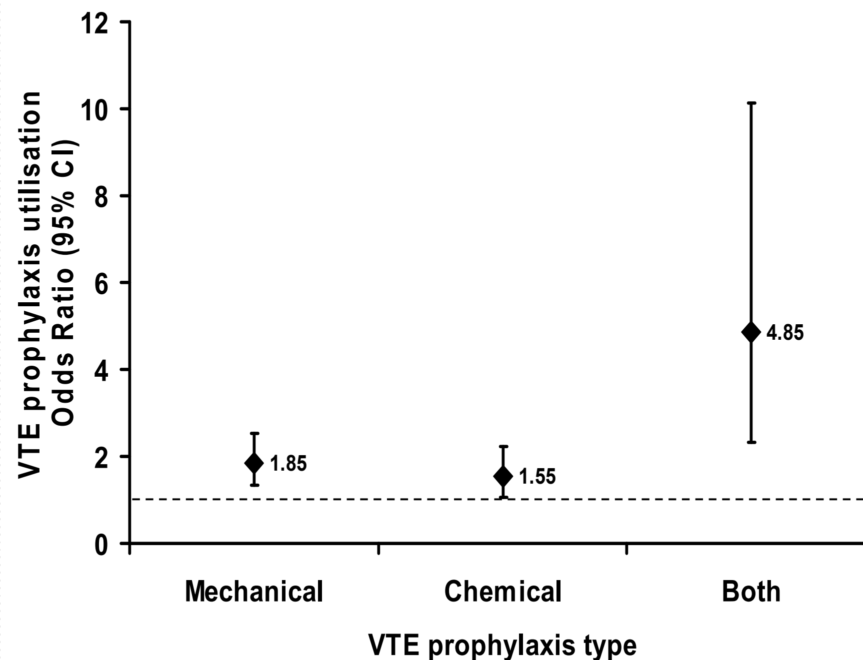
Low risk patients



Medication chart intervention increases VTE prophylaxis utilisation on day of admission

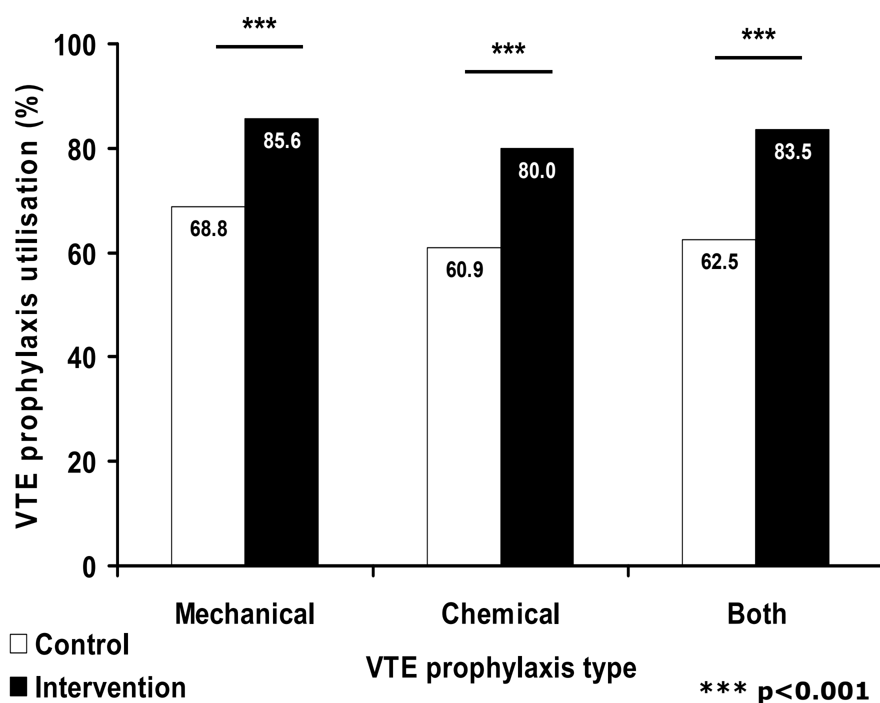
High risk patients: >1 risk factor

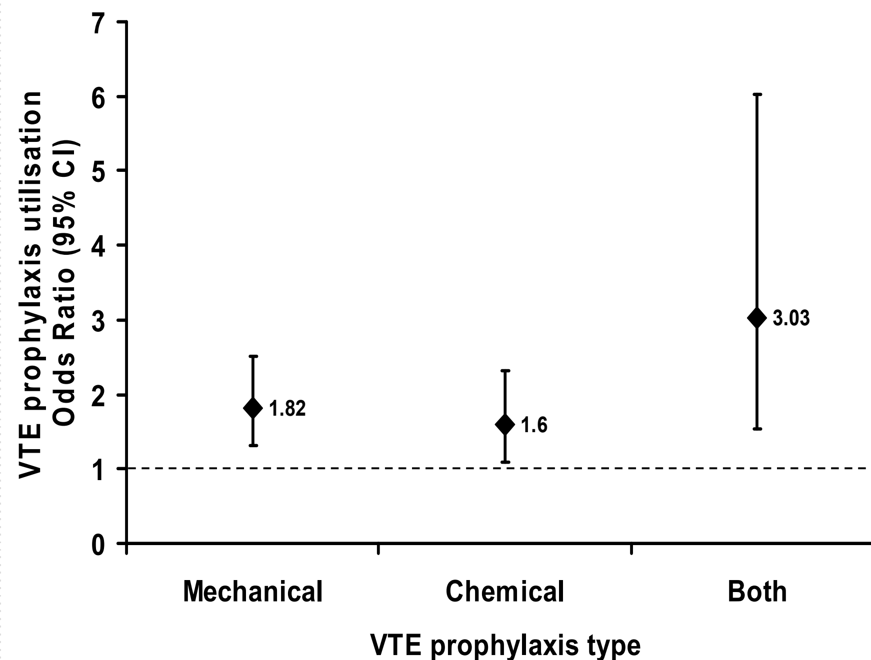




Medication chart intervention increases VTE prophylaxis utilisation on day of admission

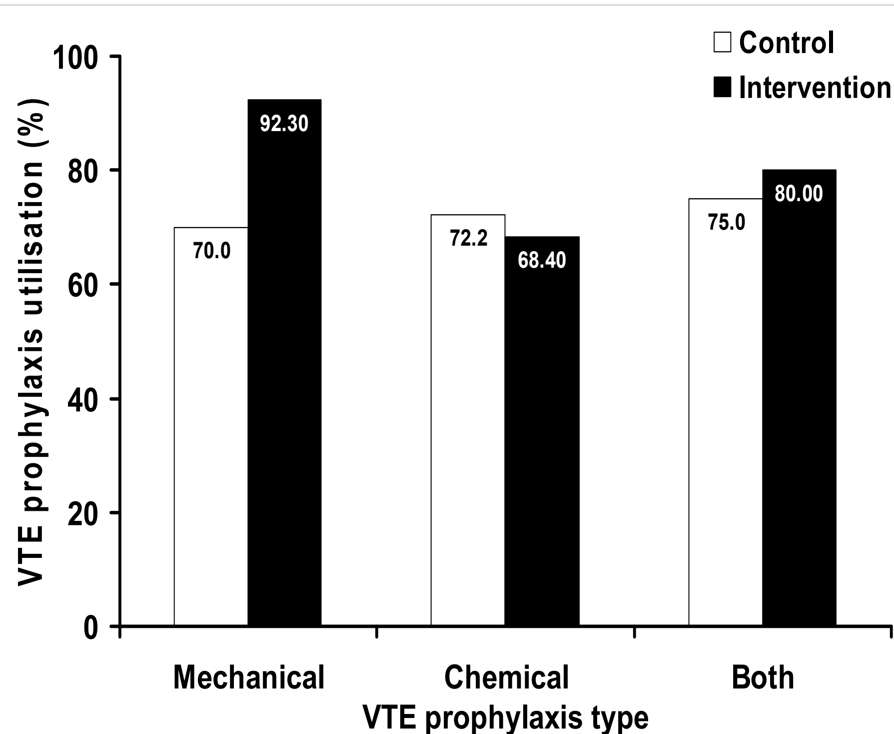
High risk patients: 1 risk factor

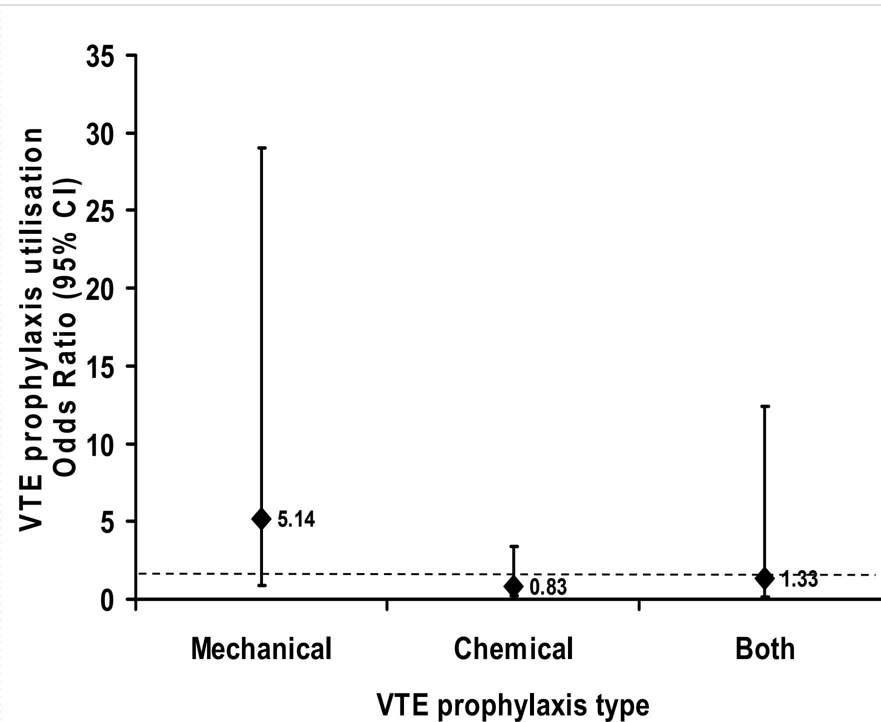




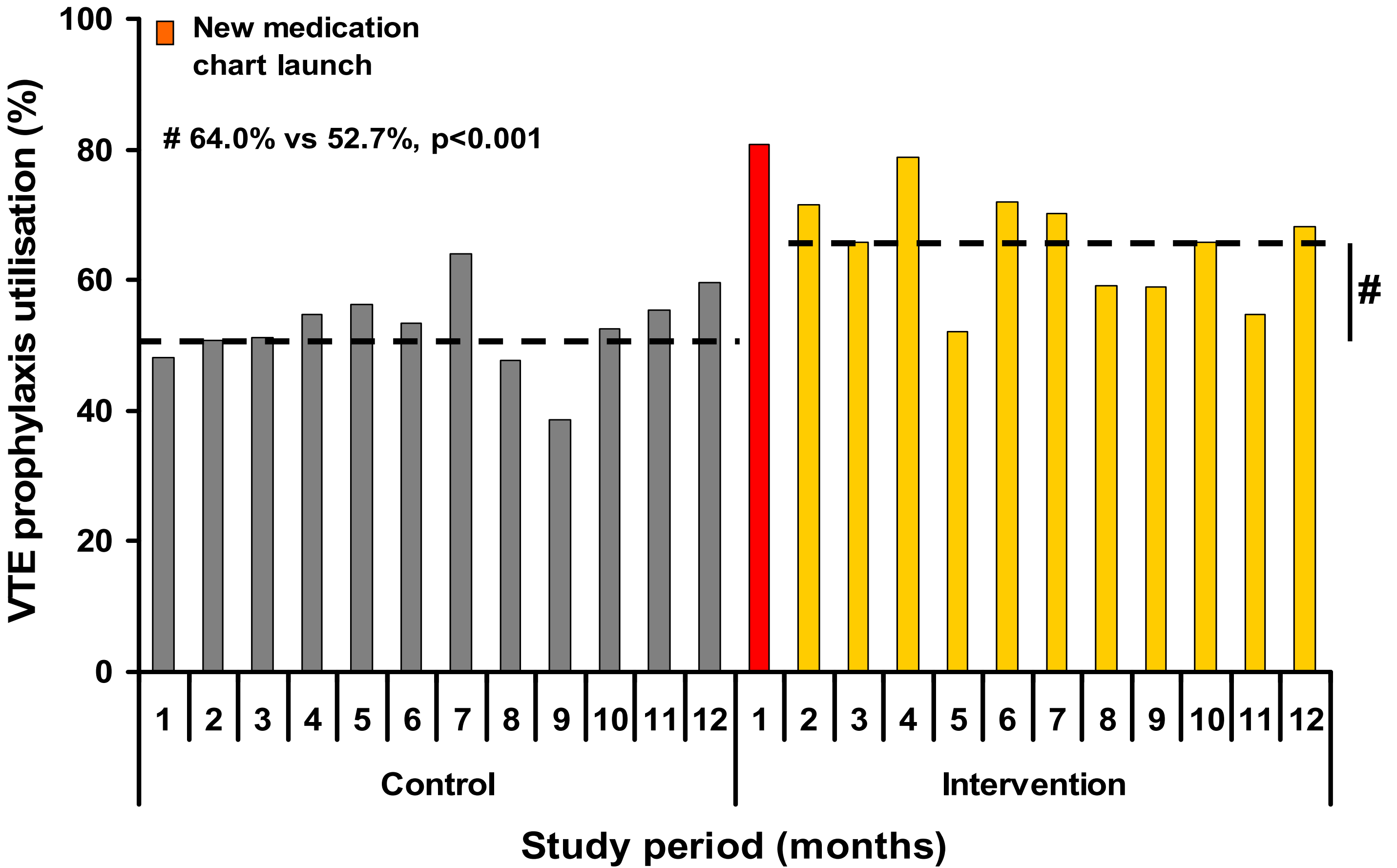
Medication chart intervention increases VTE prophylaxis utilisation on day of admission

Low risk patients





Medication chart intervention produces a lasting increase in VTE prophylaxis utilisation



Discussion: Study limitations

- Single centre study
- Not tertiary referral centre
- Limited VTE prophylaxis options
  - Chemical prophylaxis
    - Low molecular weight heparin
    - Unfractionated heparin
  - Mechanical prophylaxis
    - Thromboembolic Deterrent Stockings (TEDS)
- Study design
  - Not Randomised Control Trial
  - Assume random sampling over 2 year study period

Conclusions

- Medication chart intervention
  - VTE prophylaxis prescription prompt
  - Patient risk stratification instrument
  - Contra-indication screen instrument

1. Increases VTE prophylaxis uptake in acutely ill medical inpatients
2. Improves the timeliness of VTE prophylaxis prescription
3. Encourages appropriate VTE prophylaxis prescription according to patient's risk level as recommended by best-practice guidelines
4. Sustains a lasting increase in VTE prophylaxis utilisation

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