Medication Chart Intervention Improves Prophylaxis Prescription in Patients at High Risk of Venous Thromboembolism

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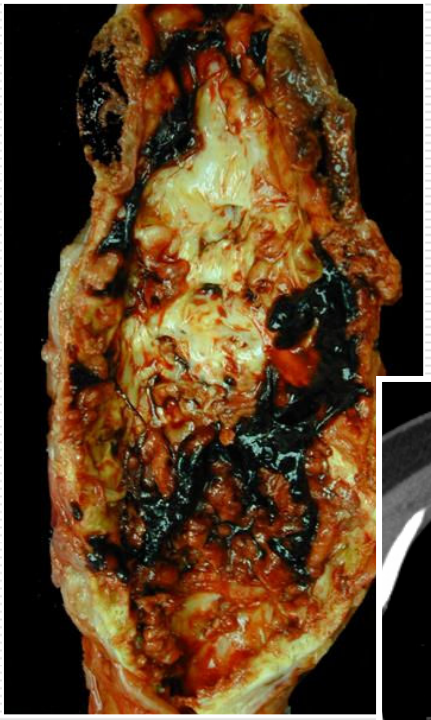
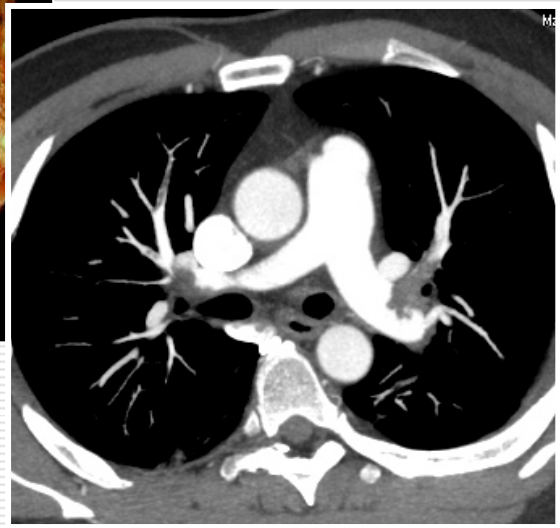
Venous Thromboembolism:
A Major Healthcare Problem

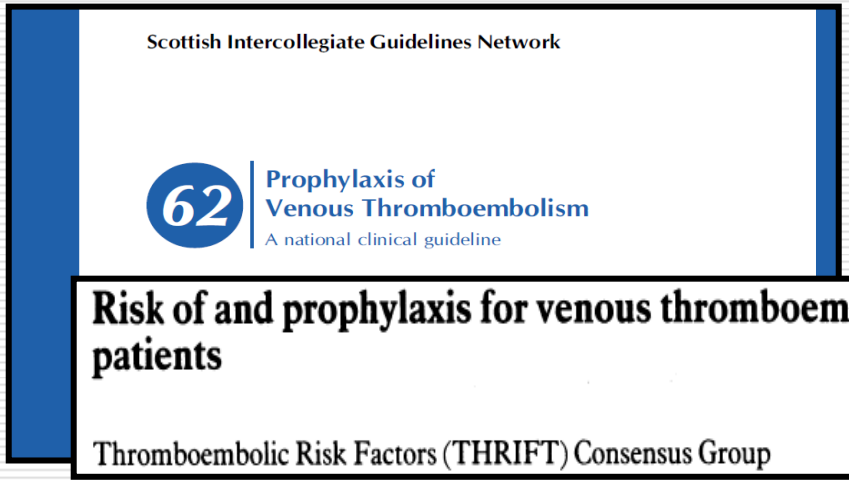
- Major cause of morbidity and mortality in hospitalised patients
- 1.0% VTE prevalence in High risk medical patients
- Overall mortality: 10.0%
- SINGLE MOST preventable cause of hospital mortality in Australia

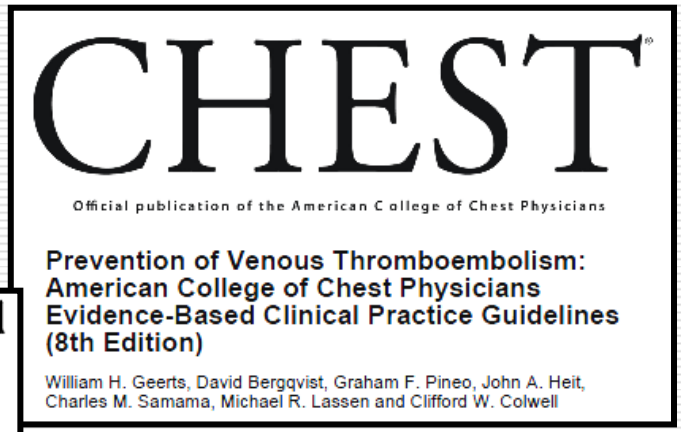




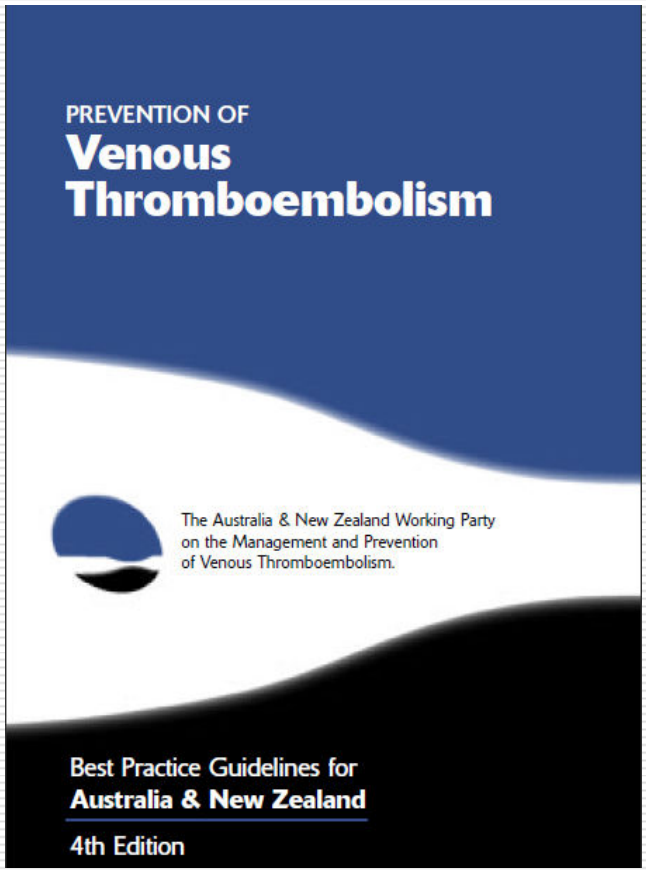
Venous Thromboembolism Prophylaxis

- 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





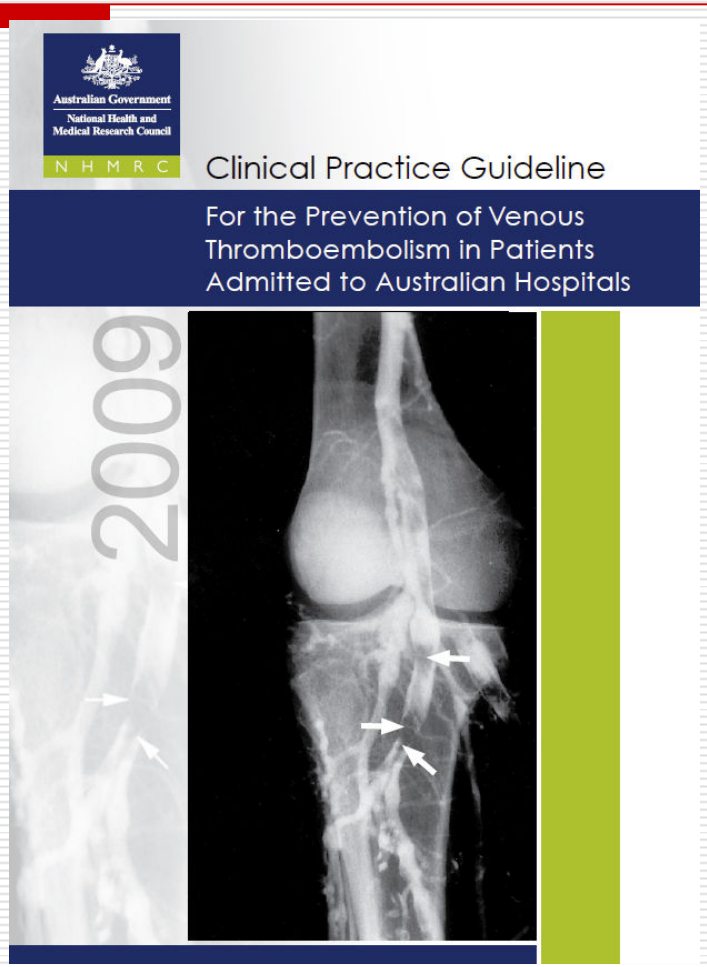
Australian & New Zealand Prophylaxis Guidelines



RISK	FEATURES	PROPHYLAXIS	DURATION	DOSAGE
HIGH	- Ischaemic stroke# - History of VTE - Active cancer - Decompensated cardiac failure - Acute on chronic lung disease* - Acute on chronic inflammatory disease - Age >60 years*	LMWH or LDUH	Until resolution of acute medical illness or until hospital discharge	Enoxaparin 40mg/day OR Dalteparin 5000U/day OR LDUH 5000U BD or TDS
LOW	None of above features	Nil		

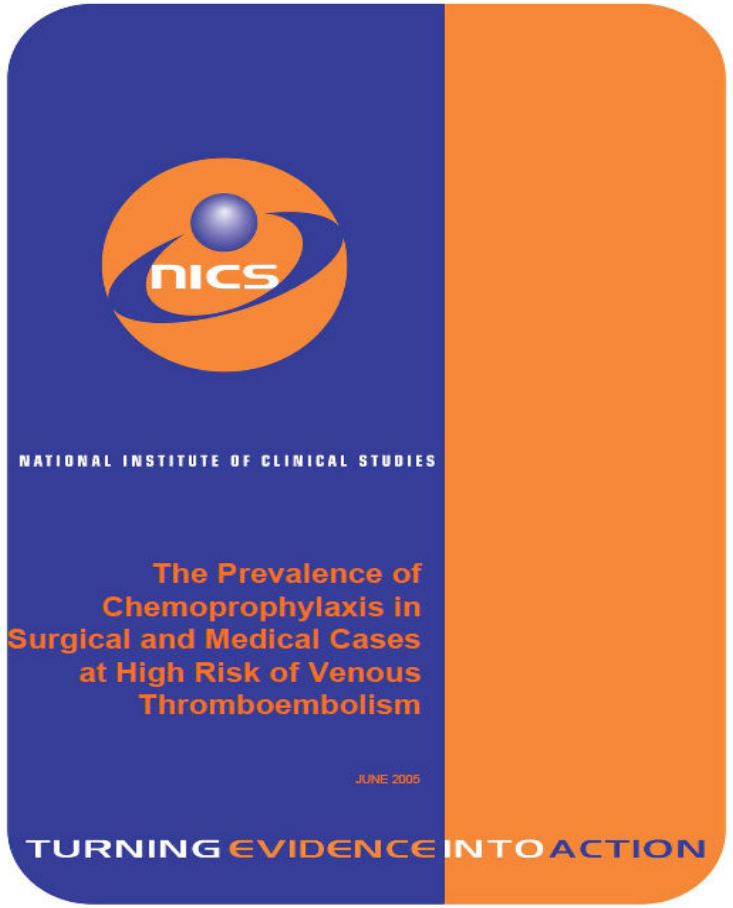
NHMRC
Clinical Practice Guidelines

- The Australian Government National Health and Medical Research Council
- First Clinical Practice Guideline
- Recommendations classified according to:
  - Surgical procedure
  - Medical condition
  - Cancer patients
  - Pregnancy and childbirth



Venous Thromboembolism Prophylaxis is Under-utilised in Australia

- 2001, cross sectional study
- 5 tertiary hospitals in Western Australia
- Mean prevalence of chemical prophylaxis in high risk patients: ~ 40%
  - Cancer patients: 11.3%
  - Acute respiratory disease: 22.8%
  - Age > 60: 19.2%



...And Globally

The under use of thromboprophylaxis in older medical in-patients: a regional audit

Q J Med (2007) 100, 685 - 689

A. SOUTH[1], E. IVESON[2], V. ALLGAR[3] and J. HARBISON[4] for the Geriatrics Registrars Research and Audit Network Yorkshire

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Multicenter evaluation of the use of venous thromboembolism prophylaxis in acutely ill medical patients in Canada

Thrombosis research (2007) 119, 145 - 155

Susan
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Venous thromboembolism risk and prophylaxis in the acute hospital care setting (ENDORSE study): a multinational cross-sectional study

*Alexander T Cohen, Victor F Tapson, Jean-Francois Bergmann, Samuel Z Goldhaber, Ajay K Kakkar, Bruno Deslandes, Wei Huang, Maksim Zayaruzny, Leigh Emery, Frederick A Anderson Jr, for the ENDORSE Investigators**

Summary

Background Information about the variation in the risk for venous thromboembolism (VTE) and in prophylaxis

Lancet 2008; 371: 387–94

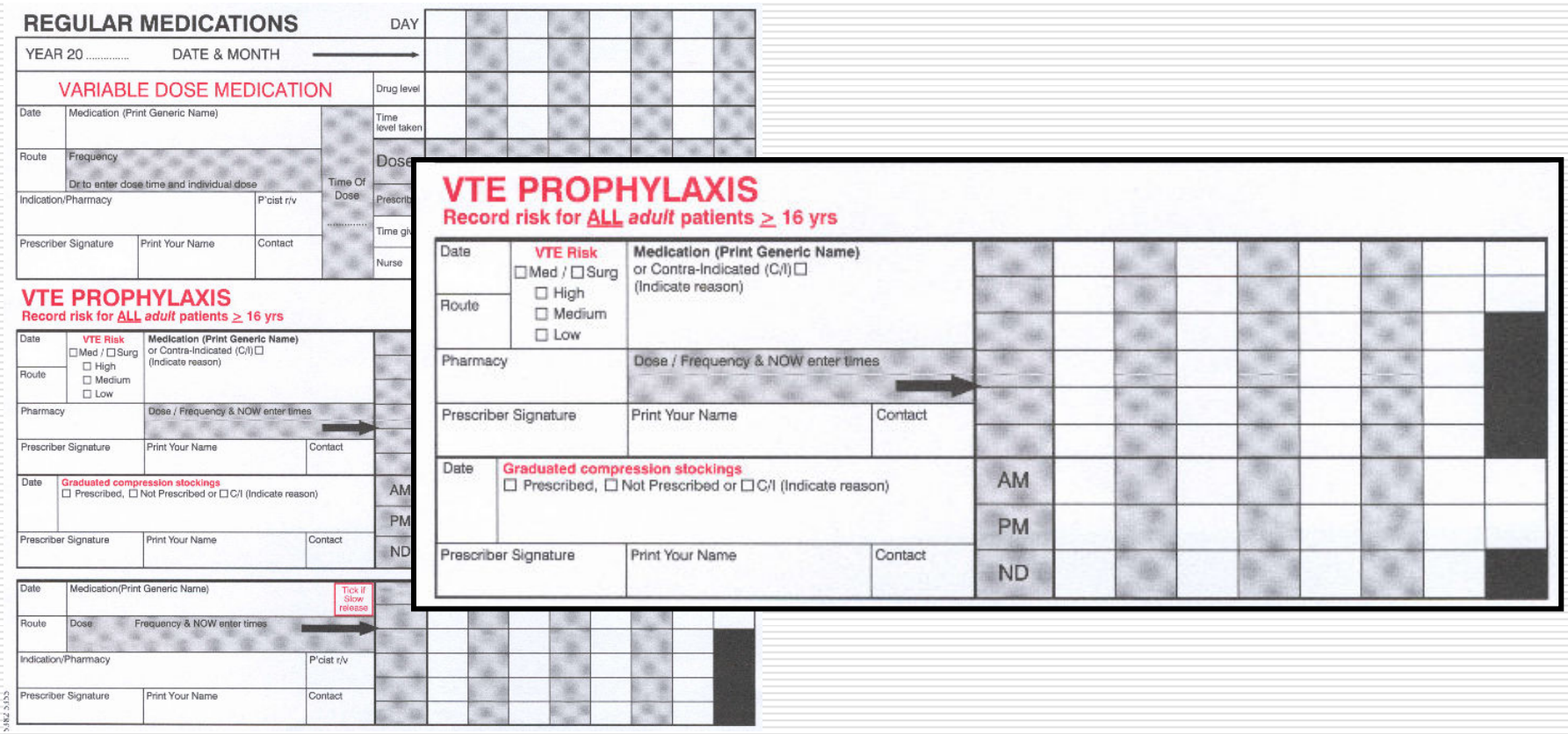
Venous Thromboembolism Prophylaxis: Existing Strategies

- 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

The Modified Medication chart:
A potential solution

- 3 instruments embedded into routine inpatient medication chart



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

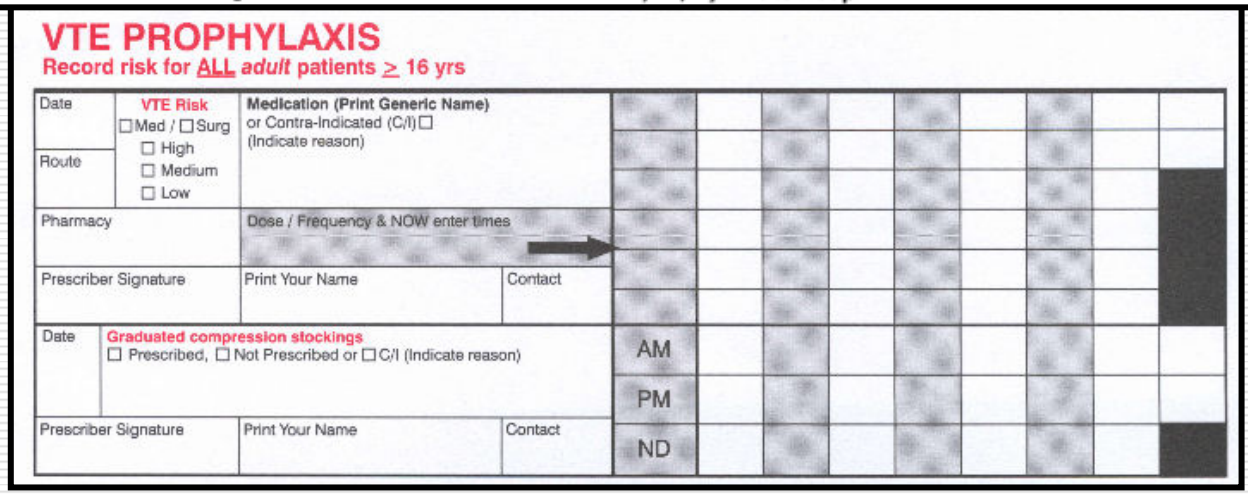
Risk Category	Surgical Risk Factors	Medical Risk Factors	Recommended Prophylaxis
High	• Orthopaedic surgery of pelvis, hip or lower limb • Multiple trauma • Major Surgery* and age > 60 years • Major Surgery* and age 40-60 years **with** medical risk factors	• Ischaemic stroke (NOT within first 48 hours) • 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



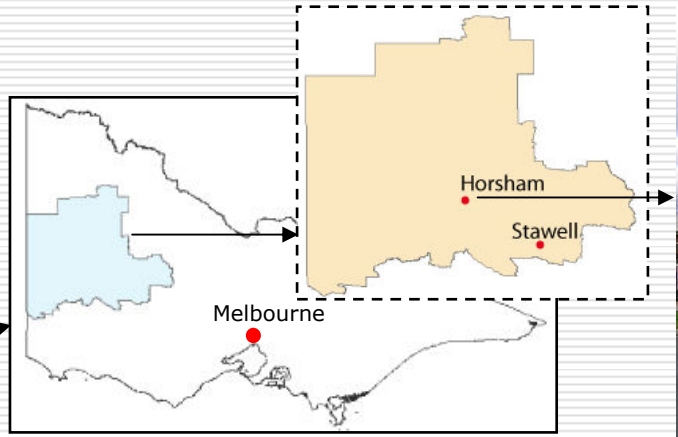
VTE PROPHYLAXIS

Record risk for 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						
Prescriber Signature		Print Your Name	Contact	ND						

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



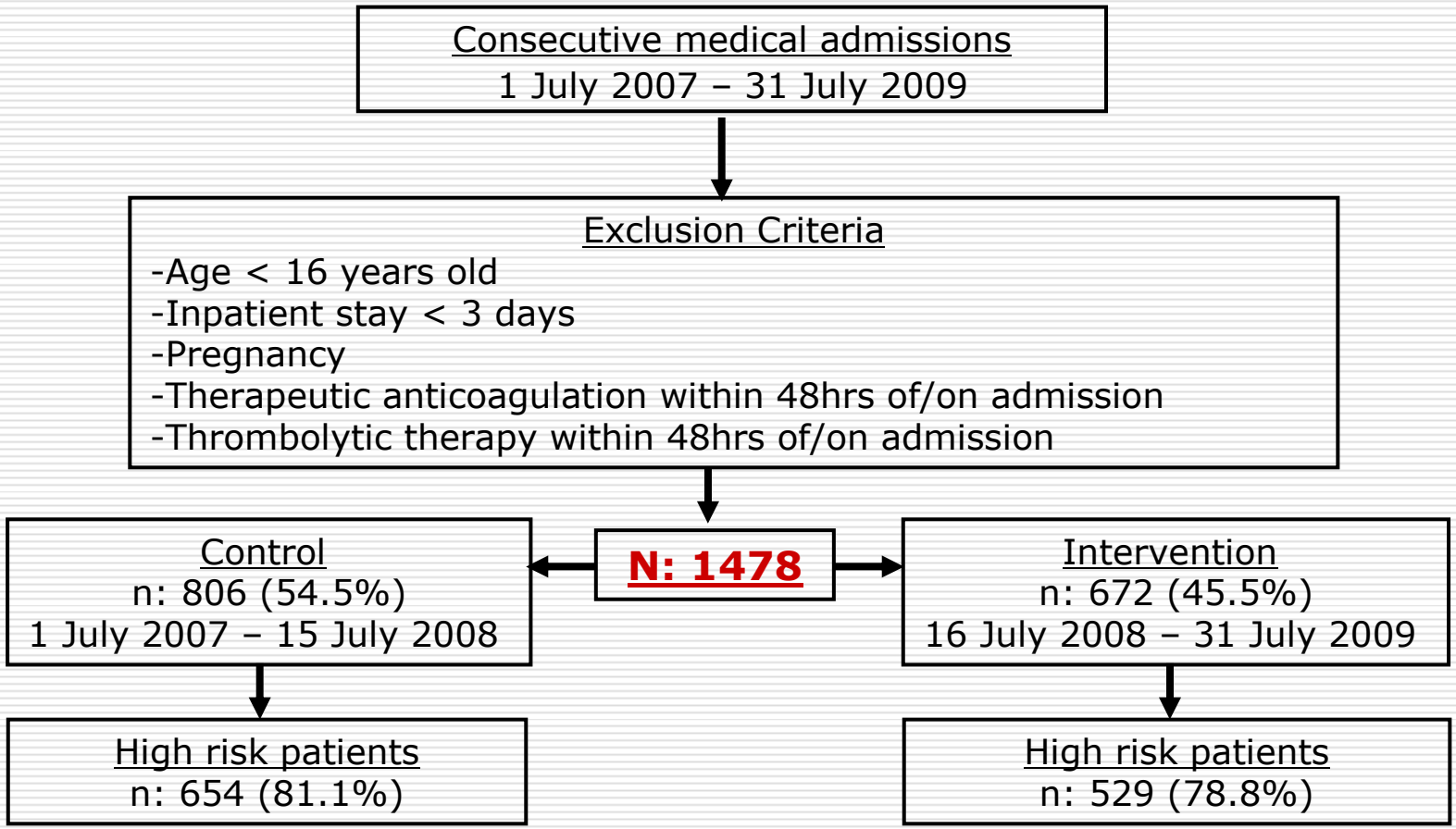
Study Objectives

- To demonstrated that medication chart intervention

1. Increases VTE prophylaxis utilisation in patients at high risk of VTE

2. Modifies VTE prophylaxis prescribing behaviour through increasing clinician's awareness of patient-specific VTE risk factors

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
  - ○ Once daily (d)
  - ○ Twice daily (bd)
  - ○ Three times daily (tds)
- ❑ Low molecular heparin (Enoxaparin/Clexane)
  - ○ Dose: 20mg/40mg
  - ○ Once daily (d)
  - ○ 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

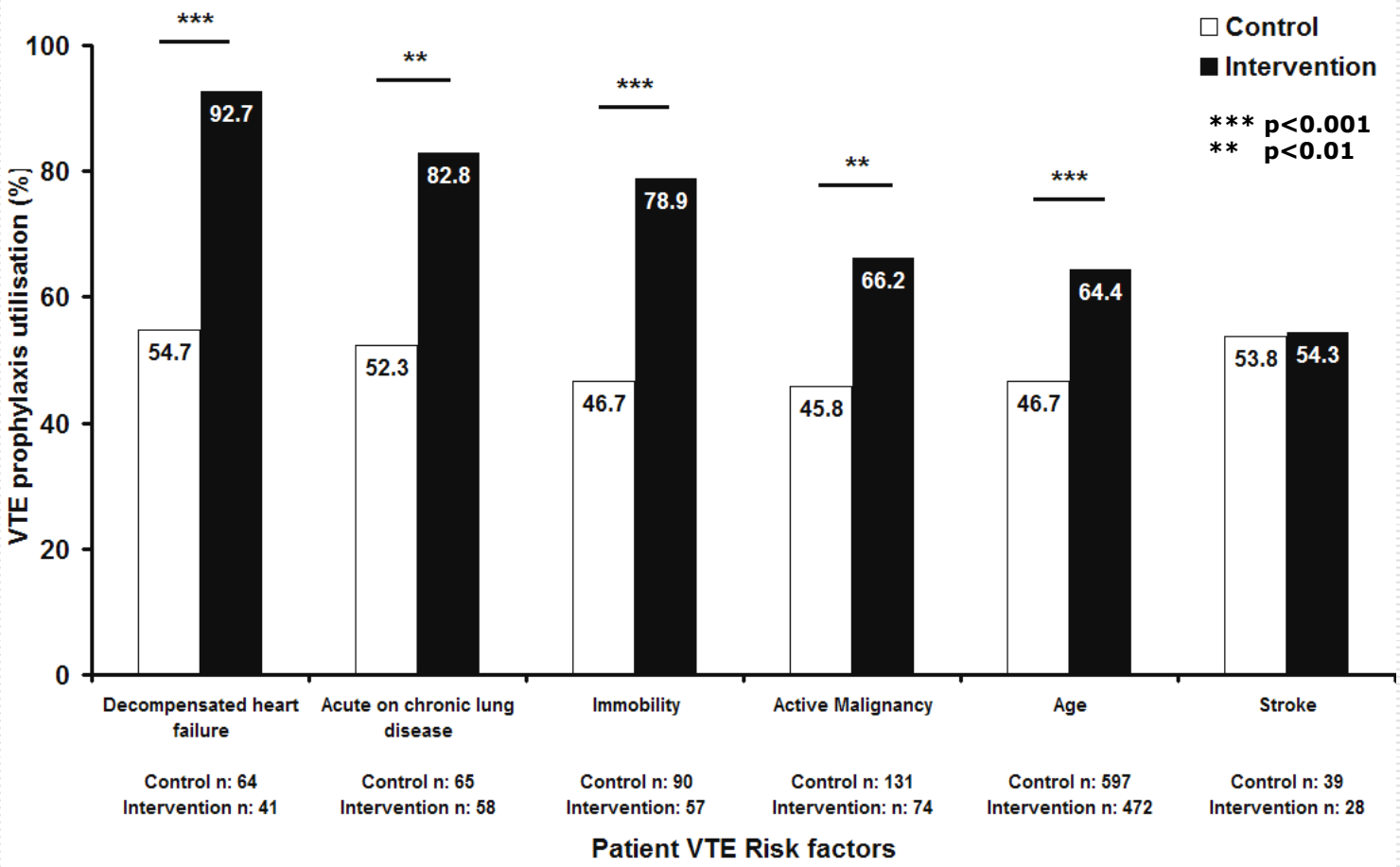
Study Population: Demographics

Patient Demographics	Control median (IQR)	Intervention median (IQR)	p-value
Age	77 (70 – 83)	78 (68 – 84)	0.974
Weight	70 (59 – 85)	69 (60 – 82)	0.881
Length of Stay	6 (4 – 9)	6 (4 – 9)	0.683
	Control n (%)	**Intervention n (%)**	**p-value**
Gender			
Female	361 (55.2)	290 (54.8)	0.897
Male	293 (44.8)	239 (45.2)	
Source of admission			
Emergency	591 (90.4)	482 (91.1)	0.688
Transfer	46 (7.0)	41 (7.8)	0.637
Elective	17 (2.6)	6 (1.1)	0.070
Discharge destination			
Home	464 (70.9)	390 (73.7)	0.289
Transfer	74 (11.3)	61 (11.5)	0.907
Nursing home	78 (11.9)	57 (10.8)	0.543
Death	38 (5.8)	21 (4.0)	0.148

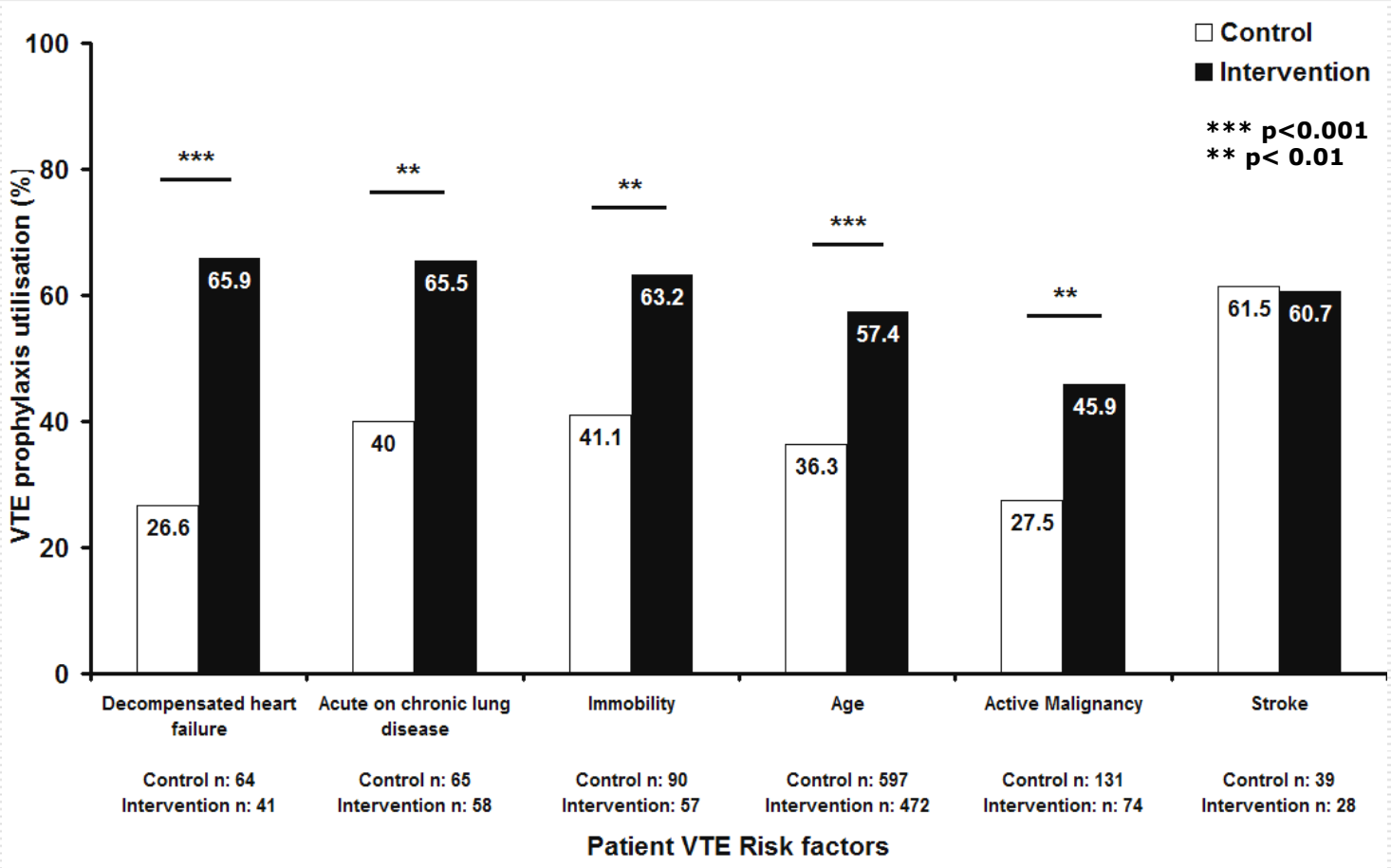
Study Population: Admission Diagnosis

Admission diagnosis	Control n (%)	Intervention n (%)	p-value
Respiratory conditions	112 (17.1)	114 (21.6)	0.054
Cardiovascular conditions	91 (13.9)	62 (11.7)	0.264
Oncology & haematological conditions	91 (13.9)	62 (11.7)	0.264
Discharge planning	79 (12.1)	64 (12.1)	0.992
Sepsis: Non-pulmonary source	60 (9.2)	49 (9.3)	0.958
Psychiatric conditions & Toxicology	23 (3.5)	13 (2.5)	0.292
Neurological conditions	64 (9.8)	49 (9.3)	0.761
Gastrointestinal & hepatobiliary conditions	38 (5.8)	35 (6.6)	0.567
Rheumatologic and inflammatory diseases	18 (2.8)	16 (3.0)	0.781
Endocrine & metabolic conditions	**10 (1.5)**	**22 (4.2)**	**0.006**
Renal conditions	18 (2.8)	16 (3.0)	0.781
Other medical conditions	50 (7.6)	27 (5.1)	0.078

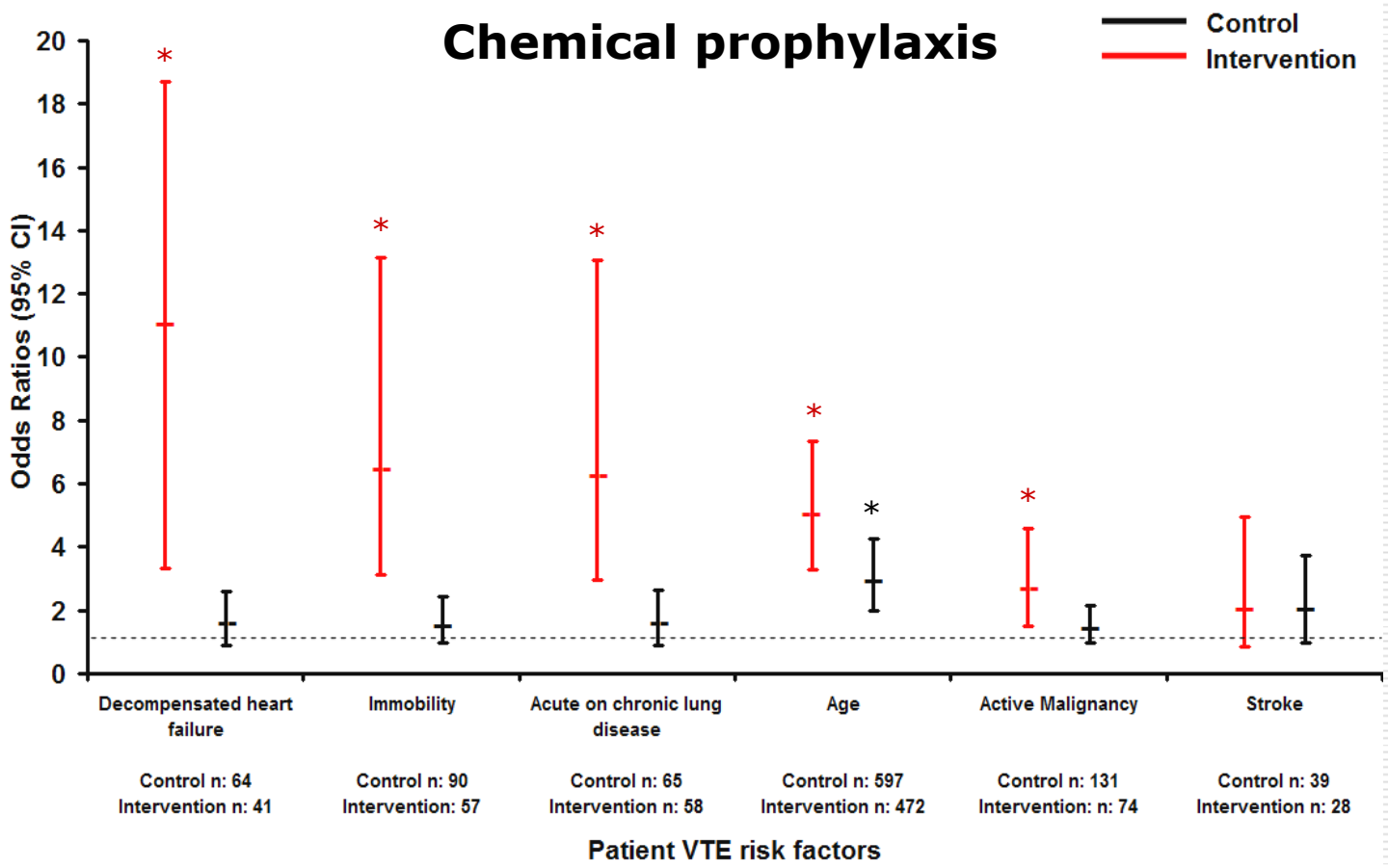
Medication Chart Intervention Increases Chemical VTE Prophylaxis in High Risk Patients



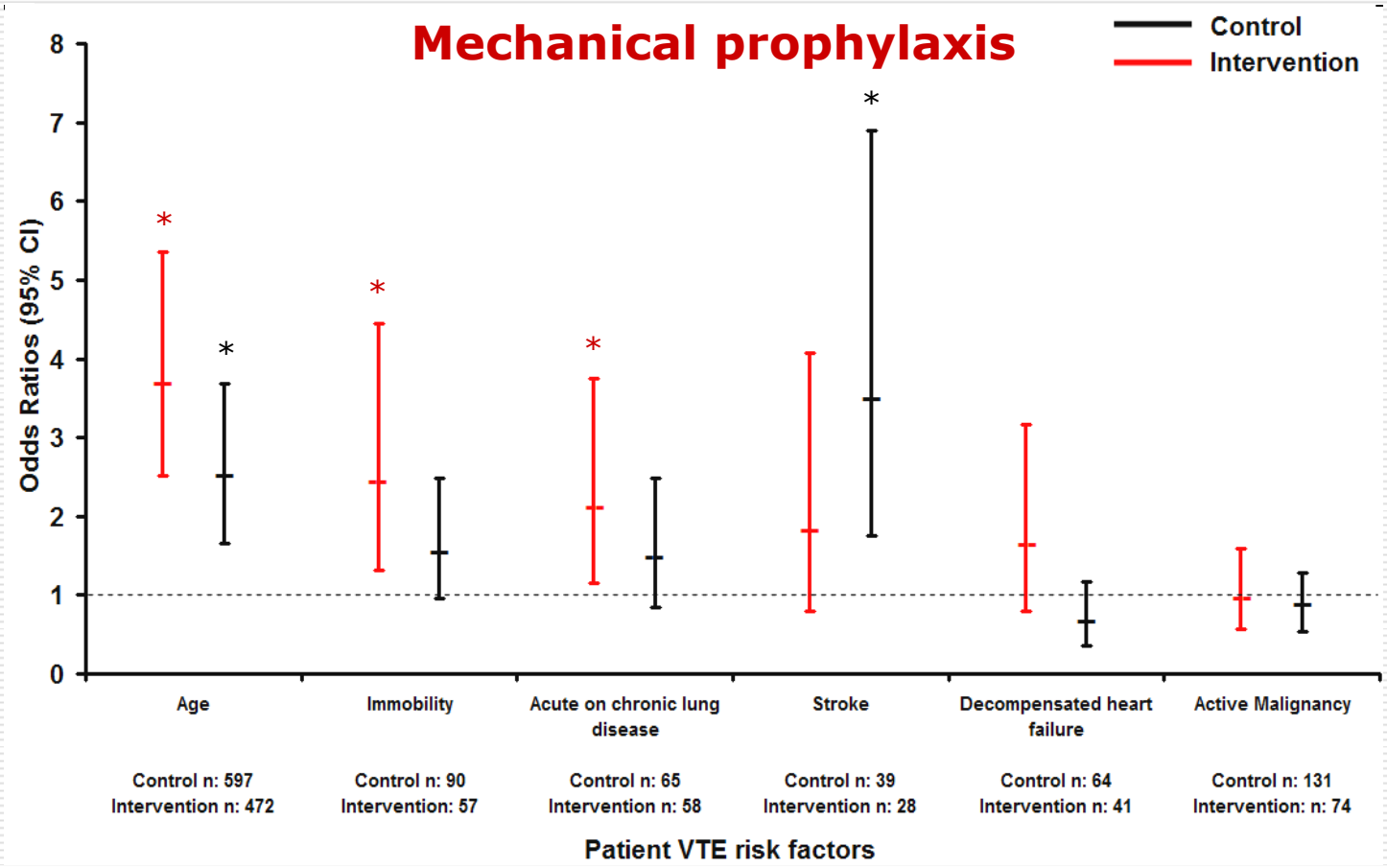
Medication Chart Intervention Increases Mechanical VTE Prophylaxis in High Risk Patients



Medication Chart Intervention Increases Awareness of Patient-Specific Risk Factors and Modifies VTE Prophylaxis Prescribing Behaviour



Medication Chart Intervention Increases Awareness of Patient-Specific Risk Factors and Modifies VTE Prophylaxis Prescribing Behaviour



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 utilisation in patients at high risk of VTE

2. Modifies VTE prophylaxis prescribing behaviour through increasing clinician's awareness of patient-specific VTE risk factors

Acknowledgements

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A/Prof. Christopher MacIsaac

Mr. Tim Spelman

	Assessable medical patients	At-risk medical patients	At-risk medical patients receiving any prophylaxis	At-risk medical patients receiving ACCP-recommended prophylaxis*	Assessable surgical patients	At-risk surgical patients	At-risk surgical patients receiving any prophylaxis	At-risk surgical patients receiving ACCP-recommended prophylaxis*
Algeria	440	200 (46%)	62 (31%)	53 (27%)	446	265 (59%)	183 (69%)	183 (69%)
Australia	834	406 (49%)	208 (51%)	172 (42%)	496	398 (80%)	325 (82%)	287 (72%)
Bangladesh	1081	483 (45%)	24 (5%)	15 (3%)	962	465 (48%)	2 (0·4%)	1 (0·2%)
Brazil	655	299 (46%)	181 (61%)	176 (59%)	640	421 (66%)	214 (51%)	192 (46%)
Bulgaria	1477	611 (41%)	285 (47%)	194 (32%)	1333	906 (68%)	621 (69%)	598 (66%)
Colombia	543	215 (40%)	137 (64%)	137 (64%)	218	157 (72%)	76 (48%)	67 (43%)
Czech Republic	1389	478 (34%)	259 (54%)	210 (44%)	945	591 (63%)	498 (84%)	437 (74%)
Egypt	530	168 (32%)	63 (38%)	55 (33%)	478	227 (47%)	86 (38%)	80 (35%)
France	1927	701 (36%)	432 (62%)	375 (53%)	917	718 (78%)	542 (75%)	511 (71%)
Germany	1160	479 (41%)	370 (77%)	337 (70%)	1210	838 (69%)	790 (94%)	772 (92%)
Greece	898	347 (39%)	133 (38%)	113 (33%)	947	525 (55%)	390 (74%)	376 (72%)
Hungary	865	266 (31%)	86 (32%)	75 (28%)	435	253 (58%)	220 (87%)	219 (87%)
India	948	424 (45%)	95 (22%)	81 (19%)	1110	680 (61%)	126 (19%)	111 (16%)
Ireland	255	109 (43%)	55 (50%)	51 (47%)	297	175 (59%)	142 (81%)	112 (64%)
Kuwait	324	197 (61%)	73 (37%)	66 (34%)	161	74 (46%)	45 (61%)	43 (58%)
Mexico	307	118 (38%)	80 (68%)	61 (52%)	531	362 (68%)	193 (53%)	154 (43%)
Pakistan	565	213 (38%)	86 (40%)	70 (33%)	748	330 (44%)	46 (14%)	33 (10%)
Poland	1581	514 (33%)	239 (46%)	179 (35%)	1092	597 (55%)	404 (68%)	396 (66%)
Portugal	870	335 (39%)	205 (61%)	193 (58%)	762	525 (69%)	319 (61%)	310 (59%)
Romania	3272	1168 (36%)	284 (24%)	213 (18%)	2461	1609 (65%)	1019 (63%)	1011 (63%)
Russia	1959	718 (37%)	159 (22%)	141 (20%)	2829	1470 (52%)	487 (33%)	380 (26%)
Saudi Arabia	154	92 (60%)	61 (66%)	57 (62%)	313	192 (61%)	132 (69%)	62 (32%)
Slovakia	1260	462 (37%)	280 (61%)	217 (47%)	1003	636 (63%)	517 (81%)	487 (77%)
Spain	2069	1140 (55%)	803 (70%)	731 (64%)	996	738 (74%)	612 (83%)	605 (82%)
Switzerland	847	179 (21%)	144 (80%)	109 (61%)	1153	780 (68%)	663 (85%)	631 (81%)
Thailand	823	406 (49%)	15 (4%)	15 (4%)	1001	618 (62%)	4 (0·6%)	1 (0·2%)
Tunisia	673	313 (47%)	95 (30%)	92 (29%)	212	95 (45%)	75 (79%)	74 (78%)
Turkey	1211	288 (24%)	113 (39%)	111 (39%)	490	318 (65%)	126 (40%)	124 (39%)
United Arab Emirates	170	121 (71%)	49 (40%)	40 (33%)	169	125 (74%)	57 (46%)	54 (43%)
UK	2751	1123 (41%)	509 (45%)	414 (37%)	2091	1350 (65%)	1095 (81%)	1003 (74%)
USA	5196	2720 (52%)	1752 (64%)	1292 (48%)	4061	3165 (78%)	2543 (80%)	2244 (71%)
Venezuela	322	194 (60%)	82 (42%)	74 (38%)	320	239 (75%)	57 (24%)	55 (23%)
Total	37356	15487 (42%)	7419 (48%)	6119 (40%)	30827	19842 (64%)	12609 (64%)	11613 (59%)

Data are N or n (%). *When assessing whether prophylaxis was compliant with the ACCP recommendations, only the type of prophylaxis was

ENDORSE Study, Lancet 2008, 371: 387-94

Table 5: Patients at risk for VTE and prophylaxis use by country