



HEALTH  
2006

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# A Sustainable Architecture for Electronic Clinical Decision Support for Vascular Diseases in Community Practices

## The COMPETE III Randomized Trial

May 2, 2006 3:30 – 4:30 pm

Sukhi Burgen / Karim Keshavjee for COMPETE III Team

Centre for Evaluation of Medicines,

St Joseph's Hospital & McMaster University

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# Introduction

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- Primary care in Canada is dominated by small, widely distributed practices
    - There has been increasing interest in use of technology in these settings –electronic medical record use is increasing in most jurisdictions in Canada
    - Results from our previous study show there is considerable interest from patients & physicians in clinical decision support systems (CDSS) interventions
  - CHALLENGE: Most practices have little or no technology support and providing advanced CDSS is difficult in these settings
  - SOLUTION: Develop a sustainable technical architecture and infrastructure for CDSS that is cost-effective and easy to manage and maintain
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# COMPETE III Team

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## ■ Investigators

- Dr Anne Holbrook (PI), Dr Bob Bernstein, Dr David Chan, Dr Greg Curnew, Dr Catherine Demers, Dr Lisa Dolovich, Dr Hertzell Gerstein, Dr Dereck Hunt, Dr Karim Keshavjee, Dr Victor Montori, Dr Lehana Thabane

## ■ Staff (Centre for Evaluation of Medicines)

- Sukhi Burgen (project manager)
- Sue Troyan (research coordinator)
- Elaine Lau (decision support specialist, clinical care coordinator)
- Imelda Esporlas-Jewer (clinical care coordinator)
- Shirley Marshall (research assistant)
- Jane Aitken, Brie Aitken (chart reviewers)
- Anita Diloreto (Admin and Finance Asst)
- Jennifer Biggs, Anita Jessup (Ottawa clinical care coordinators)

## ■ Students

- Ivan Shcherbatykh (PhD trainee)
  - Other undergrad, MSc, PhD, PharmD students
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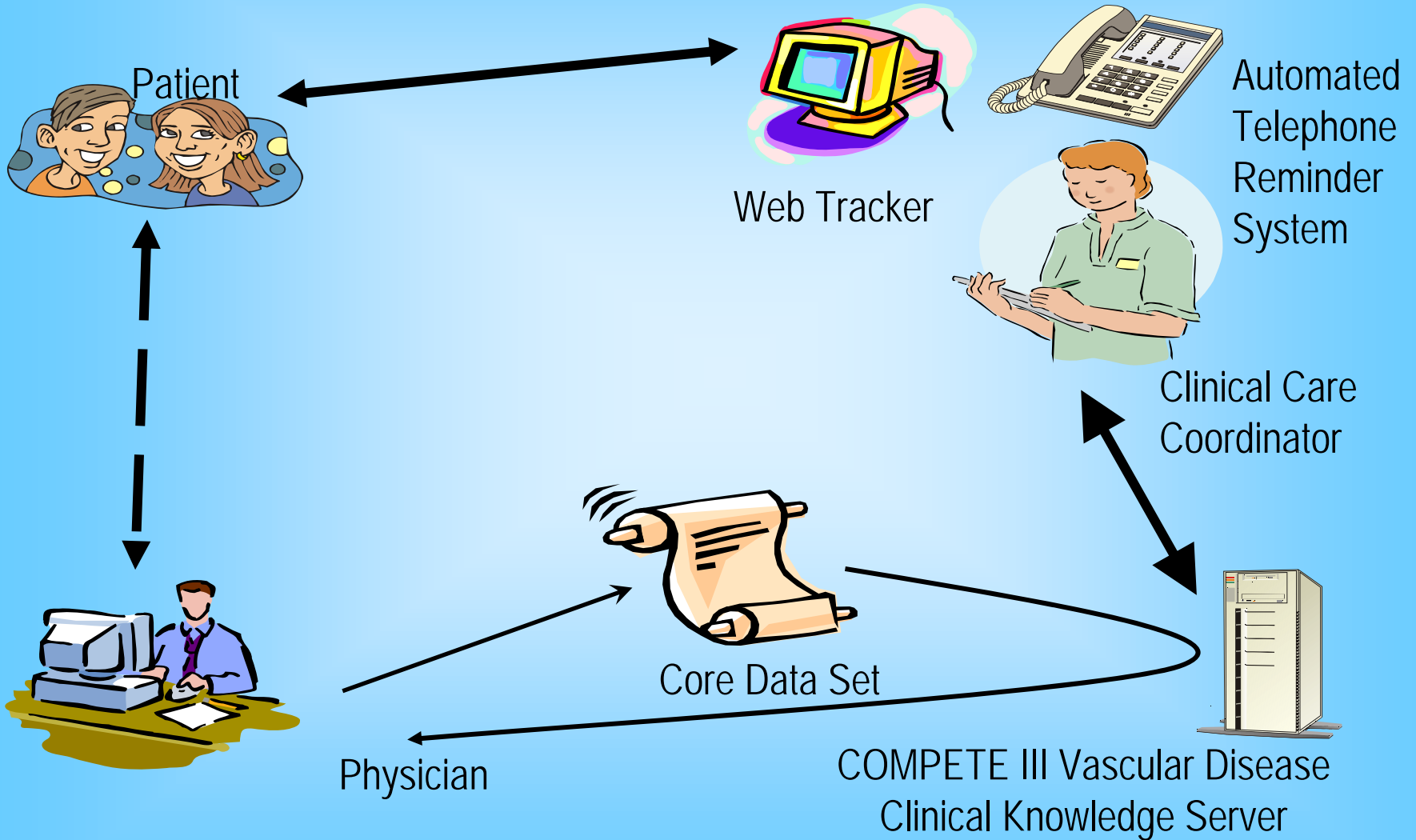


# COMPETE III Randomized Trial

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- 50 EMR-using physicians recruited from Hamilton, Niagara, Kitchener-Waterloo, Toronto & Ottawa regions
  
  - 5 EMRs
    - MacMedical
    - OSCAR
    - PEPPER
    - YorkMed-Purkinje
    - P&P
  
  - 1146 patients randomized
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# COMPETE CLINICAL ARCHITECTURE



# COMPETE III Vascular Tracker

VASCULAR TRACKER

	Patient Status		Target Value & Interval	Recommendation & Info
	Previous	Most recent		
FP Visit	Mar 15/05 <small>Mar 15/05</small>	Apr 12/05 <small>Apr 12/05</small>		<a href="#">Advice</a> <a href="#">Resources</a> <small>Recommended Meds</small> 3 mo.
A1c	0.09 <small>Jan 18/05</small>	0.07 <small>Jan 27/05</small>	< 0.07 3-6 mo.	<a href="#">Advice</a> <a href="#">Resources</a> <small>Recommended Meds</small> 3-6 mo.
Blood Pressure	126/79 <small>Feb 09/05</small>	190/100 <small>Apr 12/05</small>	< 130/80 3 mo.	<a href="#">Advice</a> <a href="#">Resources</a> <small>Recommended Meds</small> 3 mo.
LDL-cholesterol	4.5 <small>Jan 27/05</small>	5.0 <small>Feb 10/05</small>	< 2.5 mmol/L 6-12 mo.	<a href="#">Advice</a> <a href="#">Resources</a> <small>Recommended Meds</small> 6-12 mo.
Smoking	0 cigs/day <small>Mar 14/05</small>	15 cigs/day <small>Mar 15/05</small>	0 cigs/day 3 mo.	<a href="#">Advice</a> <a href="#">Resources</a> <small>Recommended Meds</small> 3 mo.
Weight (BMI / Waist circ / Waist:Hip ratio)	0.43 <small>Feb 10/05</small>	1.08 <small>Apr 12/05</small>	< 25 kg/m2 PT's target wt.=79kg / <102 cm / <0.95 3 mo.	<a href="#">Advice</a> <a href="#">Resources</a> <small>Recommended Meds</small> 3 mo.
Diet	N/A <small>N/A</small>	10fruits&vegs/day <small>Apr 12/05</small>	>=4 fruits&vegs/day 3 mo.	<a href="#">Advice</a> <a href="#">Resources</a> <small>Recommended Meds</small> 3 mo.
Exercise	40 <small>Jan 27/05</small>	50 <small>Apr 12/05</small>	> 240 min/wk 3 mo.	<a href="#">Advice</a> <a href="#">Resources</a> <small>Recommended Meds</small> 3 mo.
Psychosocial	Problem <small>Feb 09/05</small>	No Problem <small>Apr 12/05</small>	No Problem 3 mo.	<a href="#">Advice</a> <a href="#">Resources</a> <small>Recommended Meds</small> 3 mo.
ASA/Antiplatelet	Taking <small>Mar 15/05</small>	Taking <small>Apr 12/05</small>	Taking 3 mo.	<a href="#">Advice</a> <a href="#">Resources</a> <small>Recommended Meds</small> 3 mo.
Urine albumin (ACR/24hr UAE)	7.0 g/mol Cr <small>Jan 27/05</small>	2.1 g/mol Cr <small>Apr 12/05</small>	<2.0g/mol Cr <30mg/24hr 12 mo.	<a href="#">Advice</a> <a href="#">Resources</a> <small>Recommended Meds</small> 12 mo.
Eye exam	No Retinopathy <small>Jan 31/05</small>	Retinopathy <small>Apr 12/05</small>	No Retinopathy 6-12 mo.	<a href="#">Advice</a> <a href="#">Resources</a> <small>Recommended Meds</small> 6-12 mo.
Foot exam	No Vascular Abns. <small>Jan 31/05</small>	Vascular Abnormalities <small>Apr 12/05</small>	No Vasc. Abns. 12 mo.	<a href="#">Advice</a> <a href="#">Resources</a> <small>Recommended Meds</small> 12 mo.
Flu shot date	Not up-to-date <small>N/A</small>	N/A <small>N/A</small>		<a href="#">Advice</a> <a href="#">Resources</a> <small>Recommended Meds</small> 12 mo.
Medication Adherence	Adherent <small>Feb 09/05</small>	Non-adherent <small>Apr 12/05</small>	Adherent 3 mo.	<a href="#">Advice</a> <a href="#">Resources</a> <small>Recommended Meds</small> 3 mo.

BP is high. Records indicate patient is not on one of the recommended antihypertensive medications. Consider adding treatment.

LDL is high. Consider adding a statin. Monitor LFTs.

Smoking cessation is the key to vascular health. Cutting down is better than no change. Continue to reinforce importance of quitting and provide counseling if necessary.

Patients' physical activity levels have increased. Continue to encourage regular exercise – at least 30 minutes of aerobic exercise (brisk walking, cycling) each day, 3-5/week

Records indicate vascular abnormalities in the patient's feet. Optimize foot care and refer patient to foot specialist if required.

Patient may be at risk for medication non-adherence because of: doubts about medication efficacy or concerns about side effects and difficulty remembering to take the medication



# Technical Integration

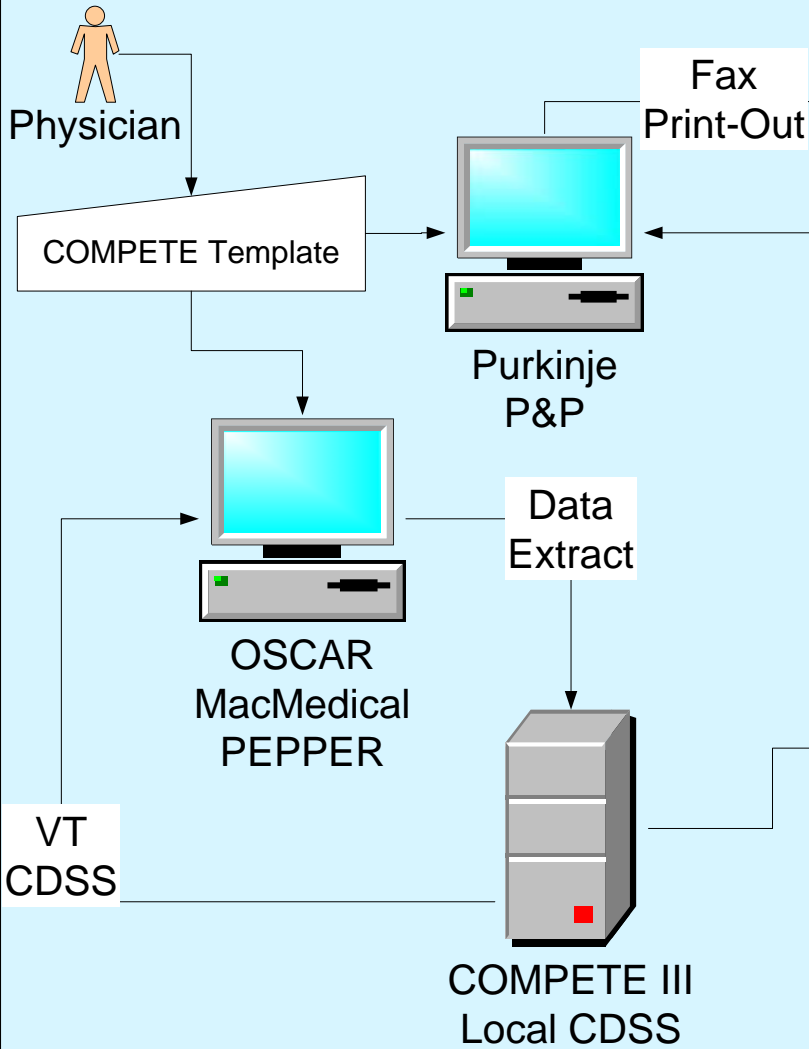
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## Multiple Data Sources

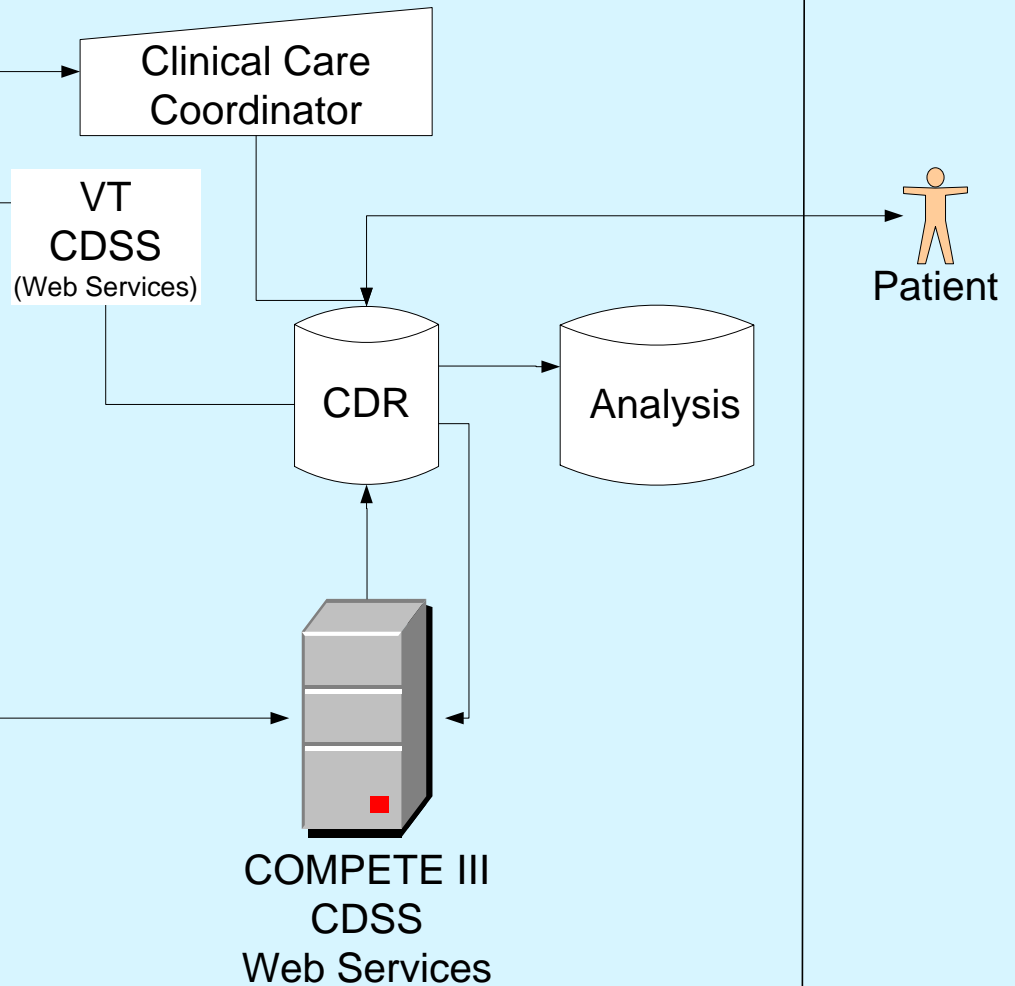
- Paper Charts
  - Web Forms
  - Computer-assisted interviewing
  - Fax Forms
  - EMR's
  - Clinical Care Coordinators
  - Physicians
  - Patients
  - Automated Telephone Response System - Tagge
-

# COMPETE III Technical Architecture

## Physician Practice



## COMPETE III Environment





# Features & Benefits

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- Open source architecture
    - XML - communication
    - Modular approach
  - Flexible local or Web services based solution
    - Local solution allows physician to control their own data
    - Local solution provides quick turnaround in environments where Internet service is poor
  - Portable & cost effective
  - Algorithms are table driven
    - Ease of sustainability
    - Project control over algorithms
    - Algorithms are transparent to clinicians –increasing their confidence in the guidelines
  - Physician comfort level on security and confidentiality
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# Outcomes

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- Solution is working well
  - Independent of EMR vendor
  - Affordable – runs on a small Linux server
  - Patients have access to their vascular tracker through the web
  - Before each physician visit, the patients are also provided with a paper copy of the color coded tracker
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# Conclusion

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- The use of modular architecture with open source components can be cost-effective even in small primary care practices.
  
  - Integration needs to
    - Preserve efficiency in the clinical work flow,
    - Ensure that the decision support is easy to use
    - Enhance decision-making in a significant way
    - And ensure that the system does not require extensive or frequent support.
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# Recommendation

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Open source clinical decision support architecture should be considered for chronic disease management in community practices to minimize implementation and operating costs, which are barriers to sustainability.

Further development and employment of data and communication standards will assist integration, which is key to e-health success.

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# Questions ?

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