

# Congestive Heart Failure (CHF): Electronic Medical Record (EMR) Operationalization of Ontario MOHLTC Guidelines

Results from the Deliver Primary Healthcare Information (DELPHI) Project



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# The DELPHI database

## Electronic Medical Records (“EMRs”)

- 31,736 Patients
- 10 Practice Sites
- 25 Family Physicians
  
- October 1, 2005 –  
September 30, 2008



# Congestive Heart Failure ("CHF")

➤ n=488  
CHF Patients

At least one:

- ✓ 428x Billing Code
- ✓ Problem List
- ✓ ICPC-2-R Heart Failure Diagnosis Code

Ontario  
Ministry of Health and Long-Term Care

New Chronic Disease Management  
Incentive:

➤ Congestive Heart Failure



\$125/patient

### Heart Failure Patient Care Flow Sheet

Patient Name: _____		Diagnosis: <input type="checkbox"/> Systolic Heart Failure (LVEF<40%) (consider referral for implantable cardioverter defibrillator (ICD) if LVEF<30%)		<input type="checkbox"/> Heart Failure with Preserved Systolic Function (PSF) (LVEF>40%) with no valvular abnormalities			
Annual Influenza Vaccine: (date) _____		Pneumococcal Vaccine: (date) _____		(Recommended for all individuals ≥65 years of age or those with high risk Medical conditions including chronic cardiac disease. A single re-immunization may be appropriate after 5 years.)			
<b>Initial Investigations to Assist Diagnosis</b>							
Echocardiography: consider within 1 <sup>st</sup> yr of diagnosis (date) _____		Laboratory Testing to Identify Systemic Disorders:					
Chest radiograph: <input type="checkbox"/> interstitial edema <input type="checkbox"/> cardiomegaly <input type="checkbox"/> pleural effusion (date) _____		If diagnostic suspicion is high consider: <input type="checkbox"/> CBC <input type="checkbox"/> electrolytes <input type="checkbox"/> renal function <input type="checkbox"/> urinalysis <input type="checkbox"/> glucose <input type="checkbox"/> lipids <input type="checkbox"/> liver enzymes <input type="checkbox"/> thyroid					
Electrocardiogram: (date) _____							
<b>Required Elements of Care</b>		<b>Date:</b>		<b>Date:</b>			
Physical Examination*	Weight to lbs						
	Symptoms of Heart Failure	<input type="checkbox"/> Fatigue	<input type="checkbox"/> Dyspnea at rest	<input type="checkbox"/> Fatigue	<input type="checkbox"/> Dyspnea at rest		
		<input type="checkbox"/> Dizziness and/or syncope	<input type="checkbox"/> Orthopnea	<input type="checkbox"/> Dizziness and/or syncope	<input type="checkbox"/> Orthopnea		
		<input type="checkbox"/> Dyspnea on exertion	<input type="checkbox"/> Paroxysmal nocturnal dyspnea	<input type="checkbox"/> Dyspnea on exertion	<input type="checkbox"/> Paroxysmal nocturnal dyspnea		
	NYHA Functional Capacity Classification <input type="checkbox"/>	<input type="checkbox"/> Class I	<input type="checkbox"/> Class II	<input type="checkbox"/> Class III	<input type="checkbox"/> Class IV		
	Blood Pressure / Heart Rate						
	JVP Elevation	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Yes	<input type="checkbox"/> No		
	Pitting Edema	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Yes	<input type="checkbox"/> No		
		Where: _____		Where: _____			
	Lung Crackles and/or wheezing						
Lab*	Signs of Pharmacological Intolerance (see reverse)						
	Na+			mmol/L	mmol/L		
	K+			mmol/L	mmol/L		
	Serum Creatinine ** ↓ <10 umol/L, ↓ < 90 umol/L						
	eGFR (caution if < 60 mL/min)						
Patient Self Management*	# ER visits for HF since last assessment						
	Education / self management training	<input type="checkbox"/> Patient medication use	<input type="checkbox"/> Daily weight monitoring Δ	<input type="checkbox"/> Patient medication use	<input type="checkbox"/> Daily weight monitoring Δ		
		<input type="checkbox"/> Salt / fluid vigilance Δ	<input type="checkbox"/> Exercise / activity	<input type="checkbox"/> Salt / fluid vigilance Δ	<input type="checkbox"/> Exercise / activity		
	Target Modifiable Risk Factors for Heart Failure and Coronary Artery Disease	<input type="checkbox"/> Hypertension	<input type="checkbox"/> Smoking	<input type="checkbox"/> Hypertension	<input type="checkbox"/> Smoking		
		<input type="checkbox"/> Diabetes	<input type="checkbox"/> Overweight / obesity	<input type="checkbox"/> Diabetes	<input type="checkbox"/> Overweight / obesity		
	<input type="checkbox"/> Hyperlipidemia		<input type="checkbox"/> Hyperlipidemia				
Collaborative Goal Setting	Indicate goal →						
Self Management Challenge	Indicate challenge →						
<b>NOTE: The CCS Guidelines are specific for the treatment of heart failure with systolic dysfunction and do not apply to patients with PSF. However, the following drug agents can be used to treat the underlying cause of heart failure with PSF. Please refer to recommendations on reverse.</b>							
Pharmacologic Management* For Systolic Heart Failure	First Line	ACE Inhibitor (ACEI) <input type="checkbox"/> Intolerant <input type="checkbox"/> Contraindicated	Target dose reached? <input type="checkbox"/> Yes <input type="checkbox"/> No	Agent / dose	Target dose reached? <input type="checkbox"/> Yes <input type="checkbox"/> No	Agent / dose	
		Beta (β) Blocker <input type="checkbox"/> Intolerant <input type="checkbox"/> Contraindicated	Target dose reached? <input type="checkbox"/> Yes <input type="checkbox"/> No	Agent / dose	Target dose reached? <input type="checkbox"/> Yes <input type="checkbox"/> No	Agent / dose	
		Angiotensin Receptor Blocker (ARB) if ACEI Intolerant	Target dose reached? <input type="checkbox"/> Yes <input type="checkbox"/> No	Agent / dose	Target dose reached? <input type="checkbox"/> Yes <input type="checkbox"/> No	Agent / dose	
	Symptom Relief	Loop Diuretic minimum effective dose			Agent / dose	Agent / dose	
		Spirolactone (LVEF<30%) Class III – IV Heart Failure			dose	dose	
		Digoxin if A-fib or advanced HF			dose	dose	
	Renal	Consider ASA			dose	dose	
		Anticoagulant therapy if A-fib present			dose	dose	

○ NYHA Classification: Class I – no symptoms; Class II – symptoms with ordinary activity; Class III – symptoms with less than ordinary activity; Class IV – symptoms at rest  
 \*\* An increase in serum creatinine up to 30% is not uncommon when an ACEI or ARB is introduced, stabilizes at <30% above baseline, may continue medication however closer long-term monitoring may be required.  
 Δ Essential for patients with fluid retention or congestion not easily controlled with diuretics, or in patients with significant renal dysfunction

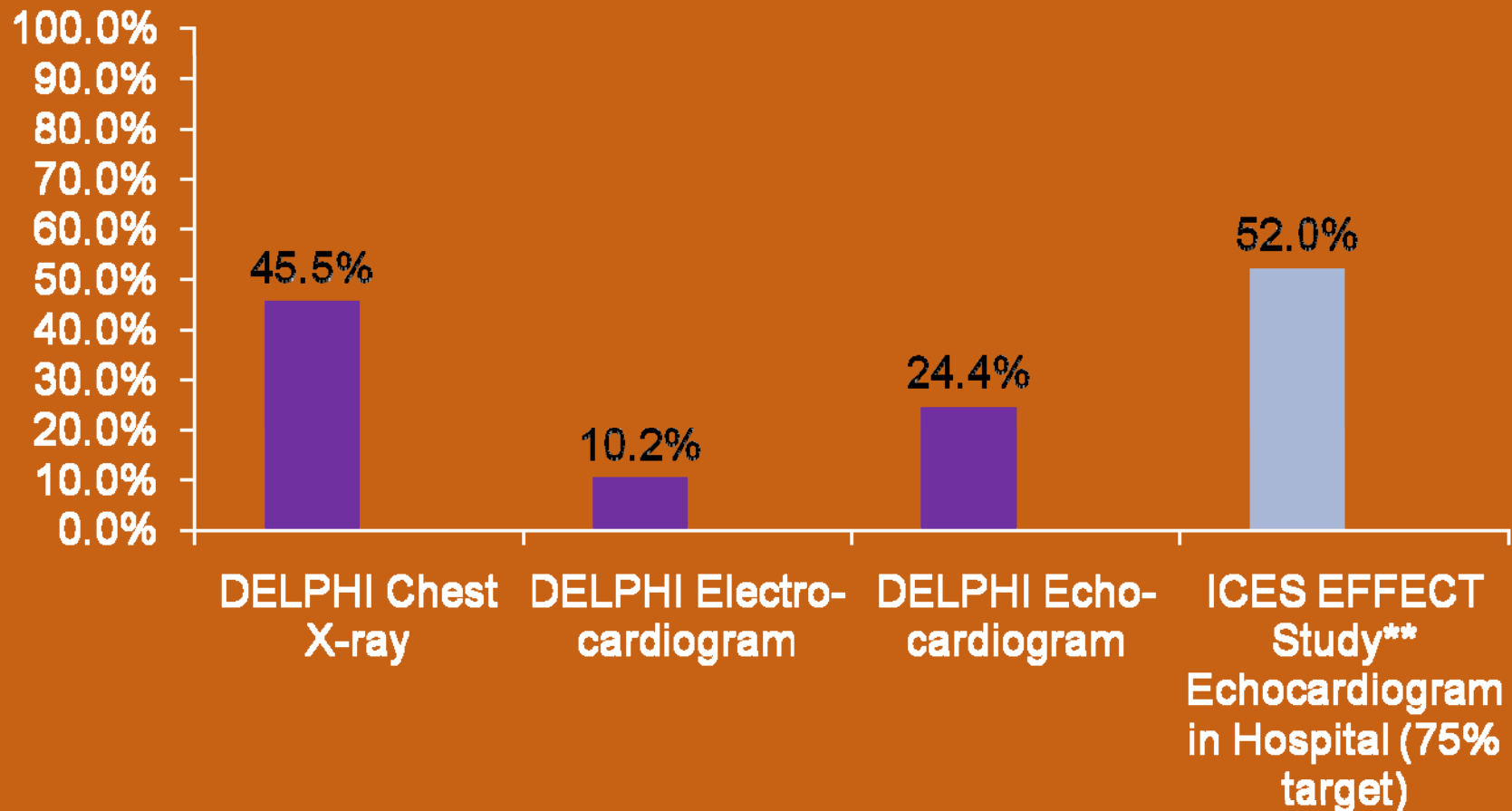
# Measurable Flow Sheet Items:

1)	Initial Investigations	Echocardiogram, Chest X-ray, Electrocardiogram
2)	Medications	ACE/ARB, Beta Blocker
3)	Laboratory Testing	Renal Dysfunction

## Items not operationalized:

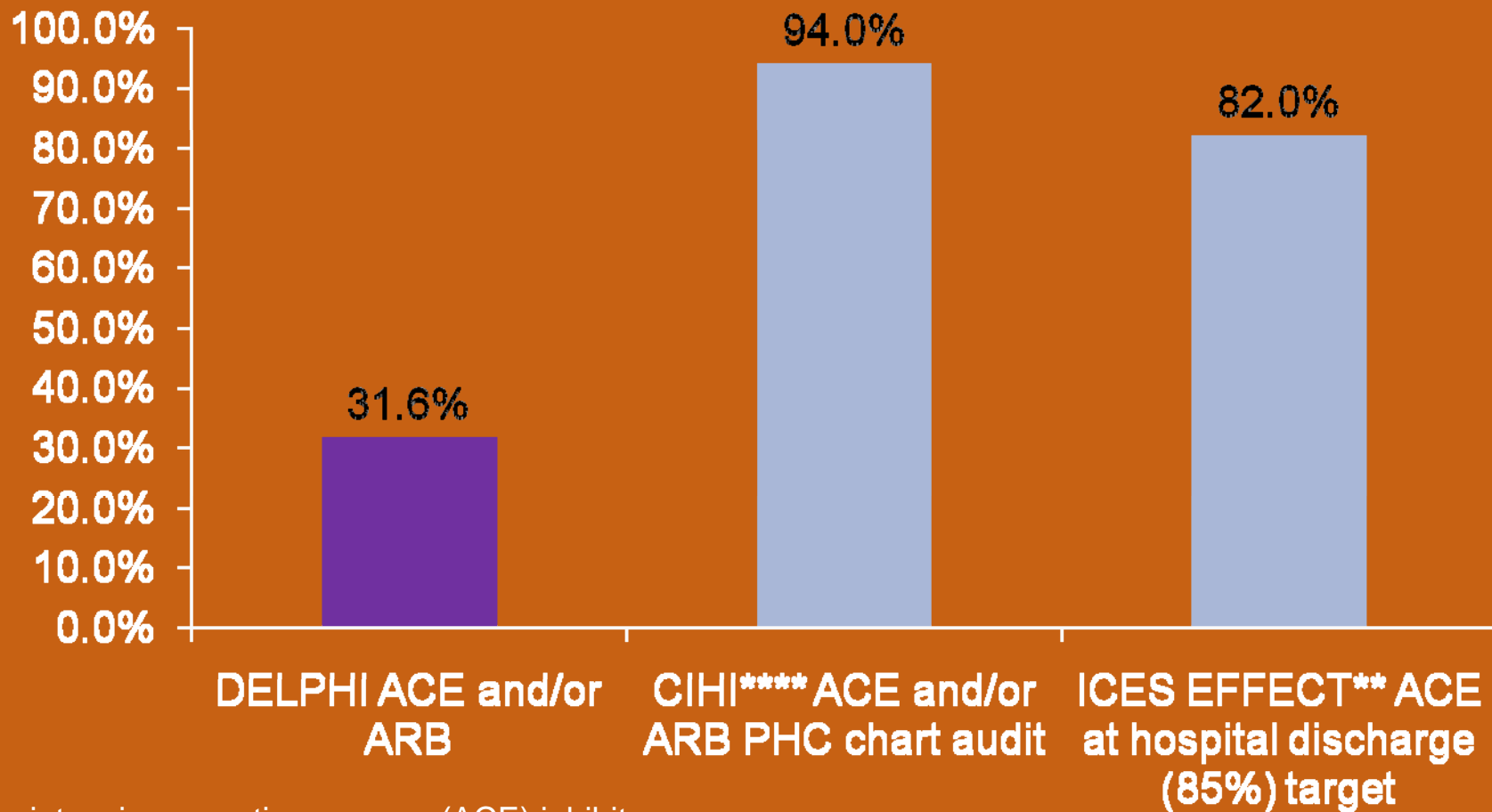
Patient Self-management	Goals, Challenges

# Initial Investigations to Assist Diagnosis



\*\* (Tu, J.V. EFFECT study; 2004)

# ACE/ARB Prescription

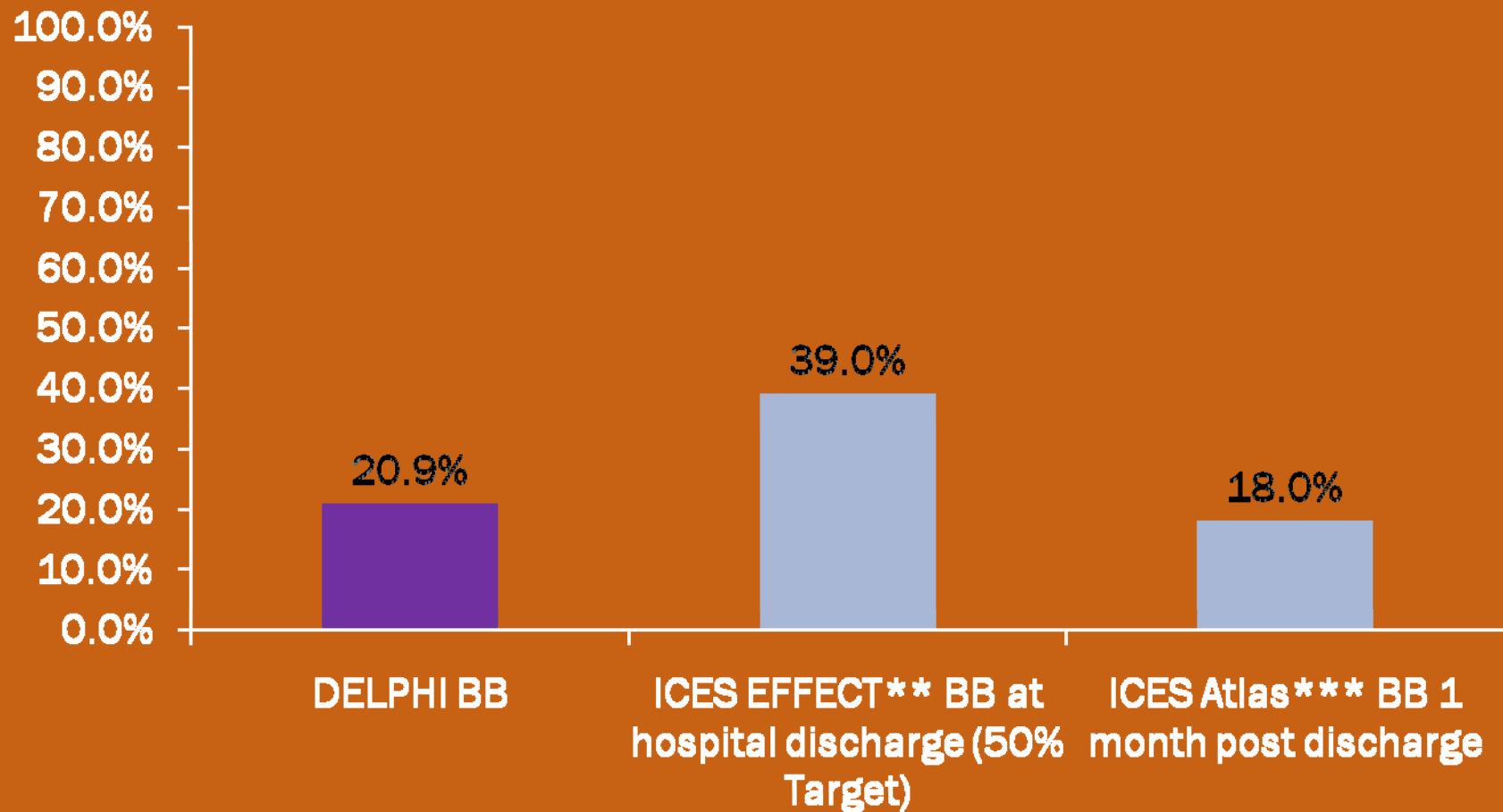


Angiotensin converting enzyme (ACE) inhibitor  
Angiotensin II receptor blocker (ARB)

\*\* (Tu, J.V. EFFECT Study; 2004)

\*\*\*\* (CIHI, 2008 – PHC Indicators Chartbook)

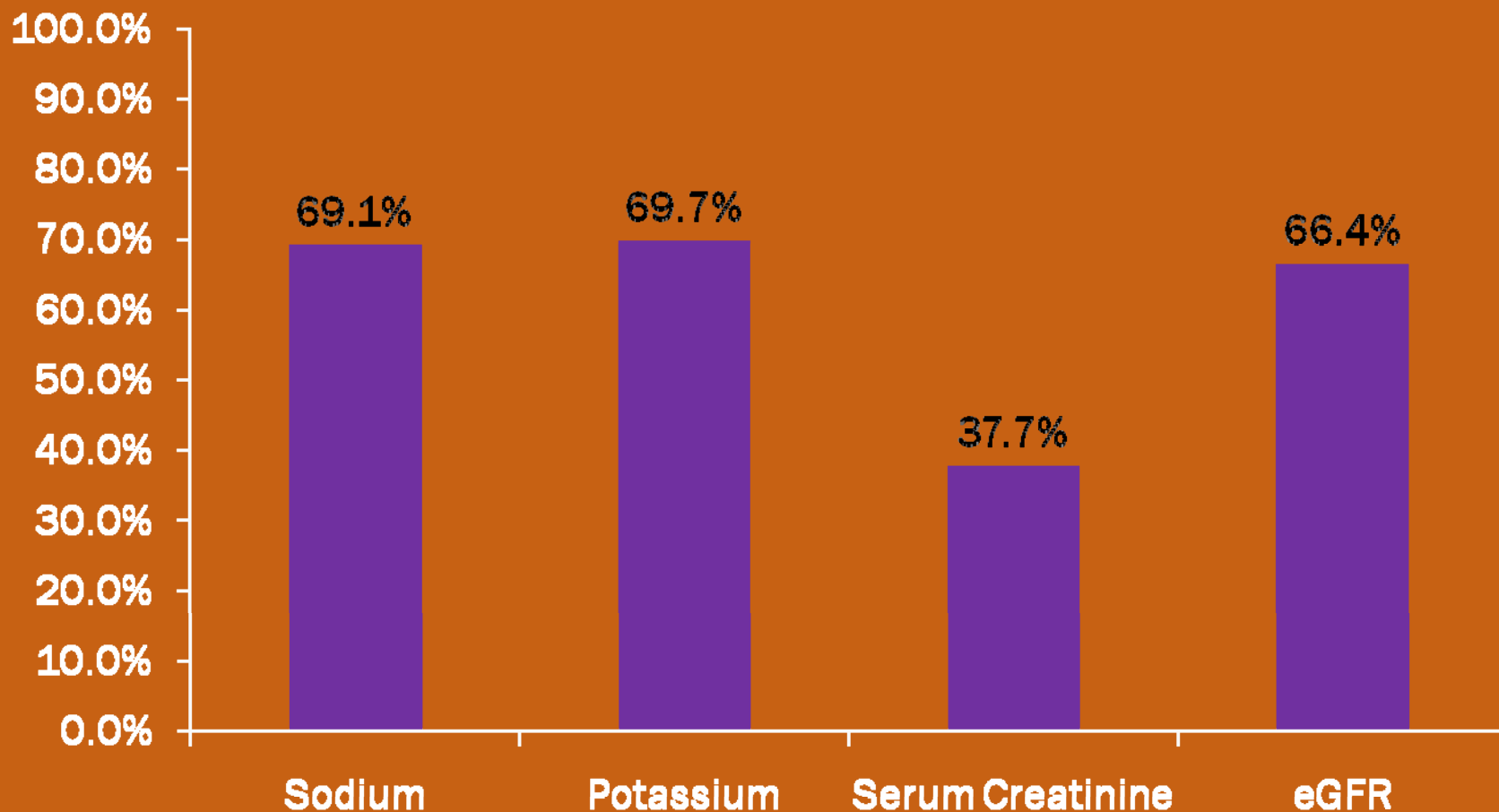
# Beta Blocker (BB) Prescription



\*\* (Tu, J.V. EFFECT Study; 2004)

\*\*\* (ICES Atlas ; 2006)

# Laboratory Testing for Renal Dysfunction



# Insights from physicians on the context of family practice....



Automatic download of test results.....



## Diagnosis by a specialist....

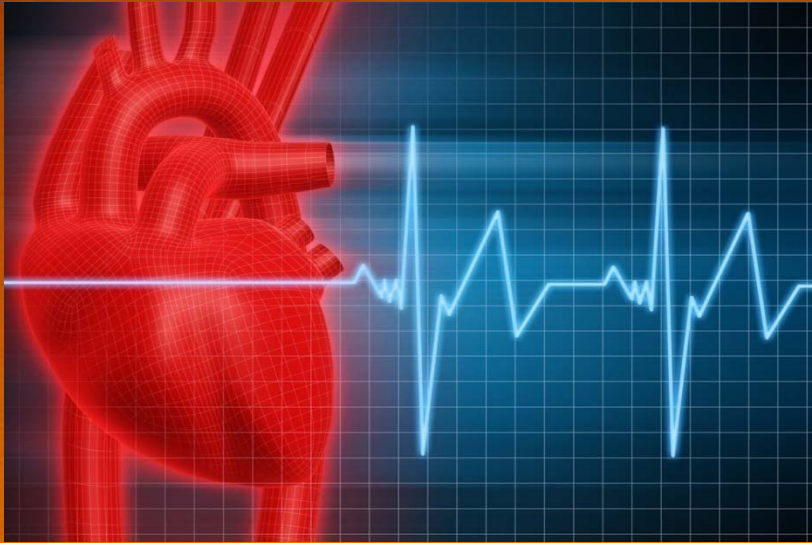


- Results from the specialist or hospital come back on PAPER

# The “Paperless” Office?



# Conclusion



- **Paper records and scanned attachments may contain additional data on required elements of CHF care**
- **EMRs may not have the complete picture**

# Acknowledgements

- The DELPHI project was funded by the Canada Foundation for Innovation, the Primary Health Care Transition Fund, and the Enhancing Quality Management in Primary Care Initiative of the Ministry of Health and Long-Term Care.
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