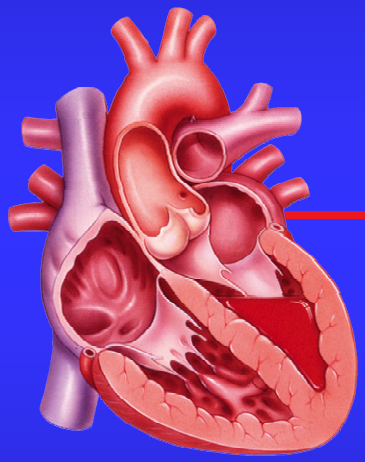
The Role of Information Technology in Disease Management: A Case for Heart Failure

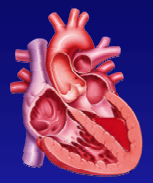


Teresa De Peralta, MSN, APN-C

Heart Failure Product Workflow Consultant

Medtronic

Minneapolis, MN



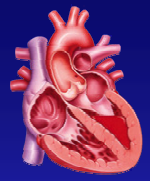
Quotes From Yesterday

“

We need to focus on the people who have the disease and not on the disease people have.”

“How many patient lives did you touch today?”

“We have opportunities to have a more complete picture of the patient.”



Population Management

Level 1 – Chronic Care Management

With the right support patients can take active care In their treatment to prevent complications and disease Progression

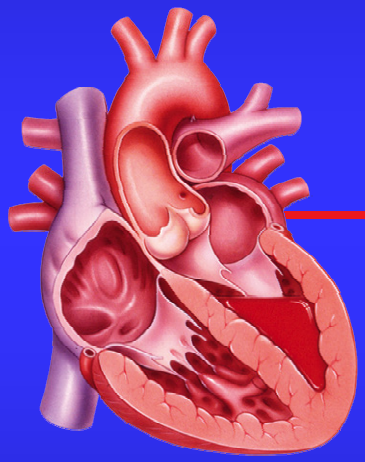
Level 2 – High Risk Patient Care Mgt

Disease/care management using evidence-based care protocols for specific disease

CHF Patients

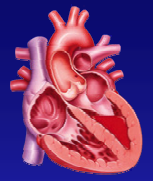
Level 3 – Highly Complex Pt Case Mgt

Patient co-morbidities require special case management, usually by a nurse.



It is important to have the right information and knowledge in order to be able to identify those who are at most risk.

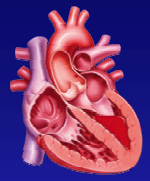
Information is power when it is accessible and actionable by those who need it – when they need it.



What programs will help deliver good chronic disease management?

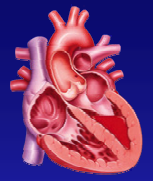
- Better integration of health and social care
  - Multi-disciplinary team approach *
- Quality outcomes framework
  - JCAHO Core measures *
- Development in IT
  - Remote monitoring *
- Developing new roles and new ways of working
  - Integration of HF & EP Clinics *
- Role of Allied Health Professionals
  - NPs, Pas , RNs, VNA *
- Practitioners with special interests & expertise
  - HF cardiologists, nurses *

* CHF application



Essential Components of good disease management

- Use of information systems to access key data on individuals and population
  - HF Registries
  - Integrated information systems (Paceart, CareLink, CardioSight, EMR)
- Stratifying patients at risk
  - ACC/AHA Stages of HF
  - Risk stratification protocols
    - ADHERE Registry, Seattle Heart Model
- Involving patients in their own care
- Coordinating care (case managers, special clinics)



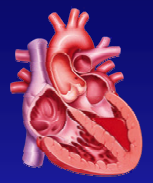
Essential Components of good disease management…cont'd

- Integrating specialist and generalist care
- Integrating care across organizational boundaries
- Reduce healthcare utilization
  - Minimize unnecessary visits and admissions
  - Provide care in the least intensive setting

Good chronic disease management can make a REAL DIFFERENCE

- Help prevent disease progression / deterioration
- Help prevent crises
- Help patient attain a good quality of life

Burden of Heart Failure Disease

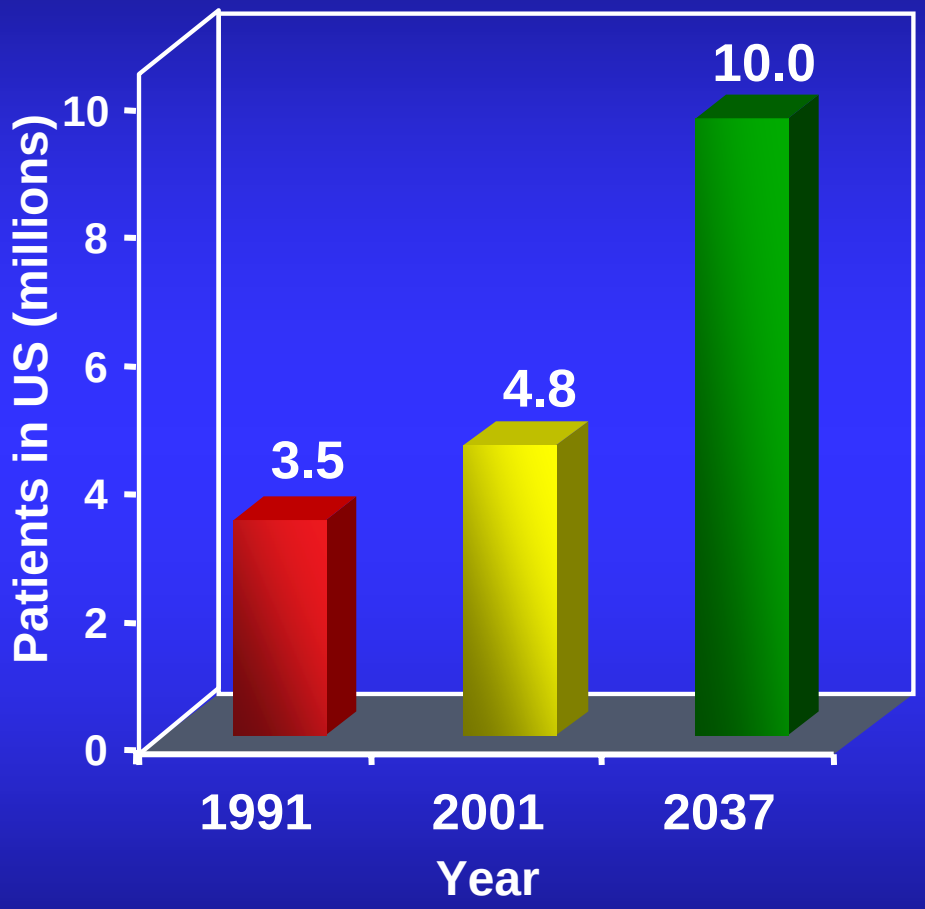


Heart Failure Defined

"Heart failure is a complex clinical syndrome that can result from any structural or functional cardiac disorder that impairs the ability of the ventricle to fill with or eject blood."

Hunt SA et al. *Circulation*. 2001;104:2996

Epidemiology of Heart Failure in the United States

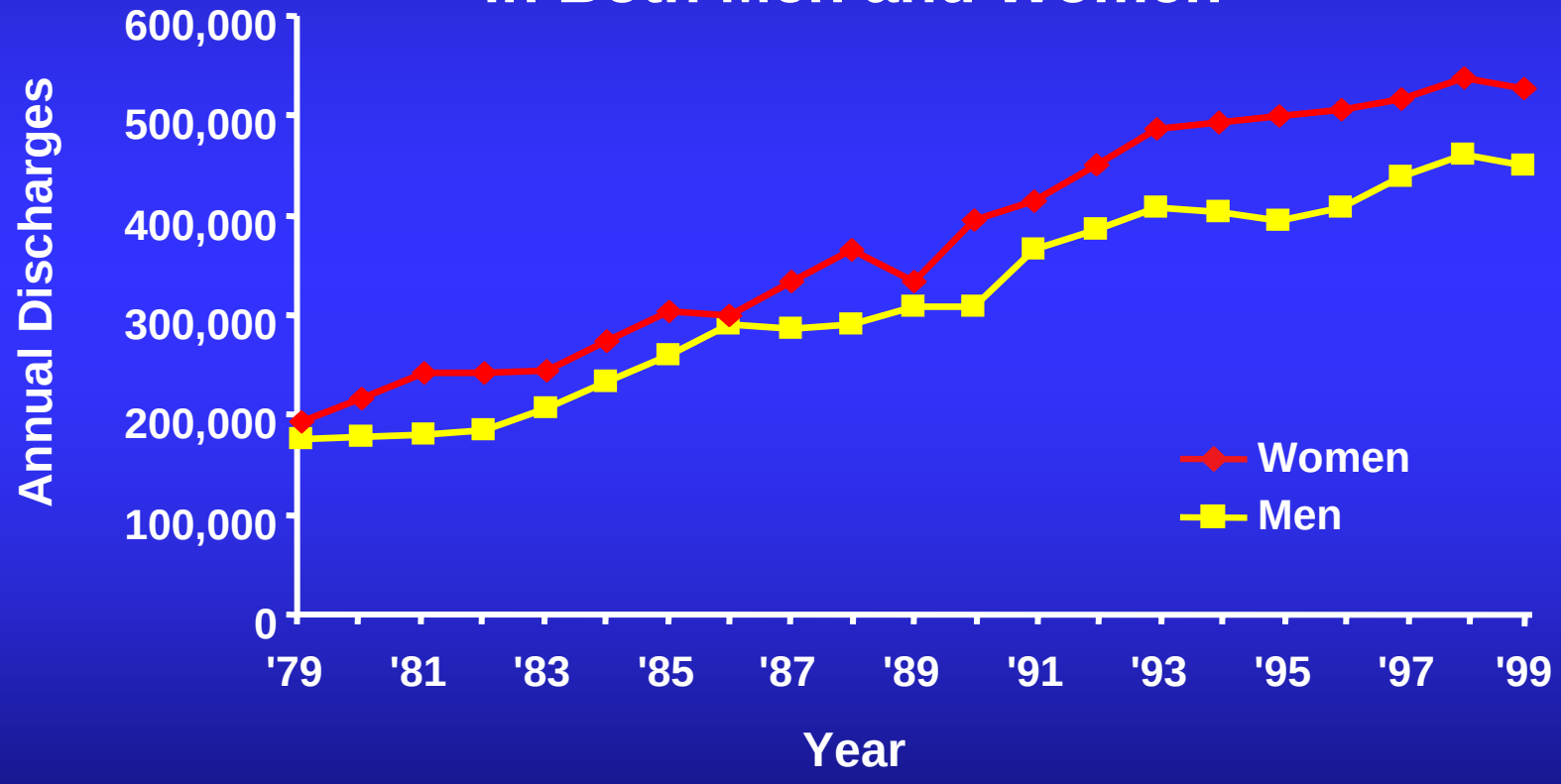


- 4.79 million patients[1]; estimated 10 million in 2037[2]
- Incidence: about 550,000 new cases each year[1]
- Prevalence is 2% in persons aged 40 to 59 years, progressively increasing to 10% for those aged 70 years and older[3]
- Sudden cardiac death is 6 to 9 times higher in the heart failure population[1]

1. American Heart Association. *2002 Heart and Stroke Statistical Update.* 2001.
2. Croft JB et al. *J Am Geriatr Soc.* 1997;45:270–275.
3. National Heart, Lung, and Blood Institute. *Congestive Heart Failure Data Fact Sheet*. Available at: http://www.nhlbi.nih.gov/health/public/heart/other/CHF.htm.

Heart Failure Hospitalizations

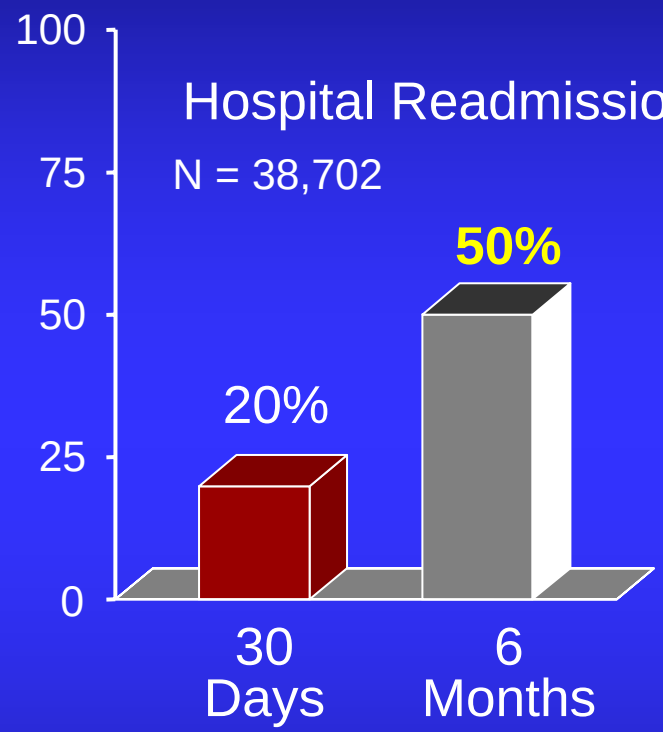
The Number of Heart Failure Hospitalizations Is Increasing in Both Men and Women

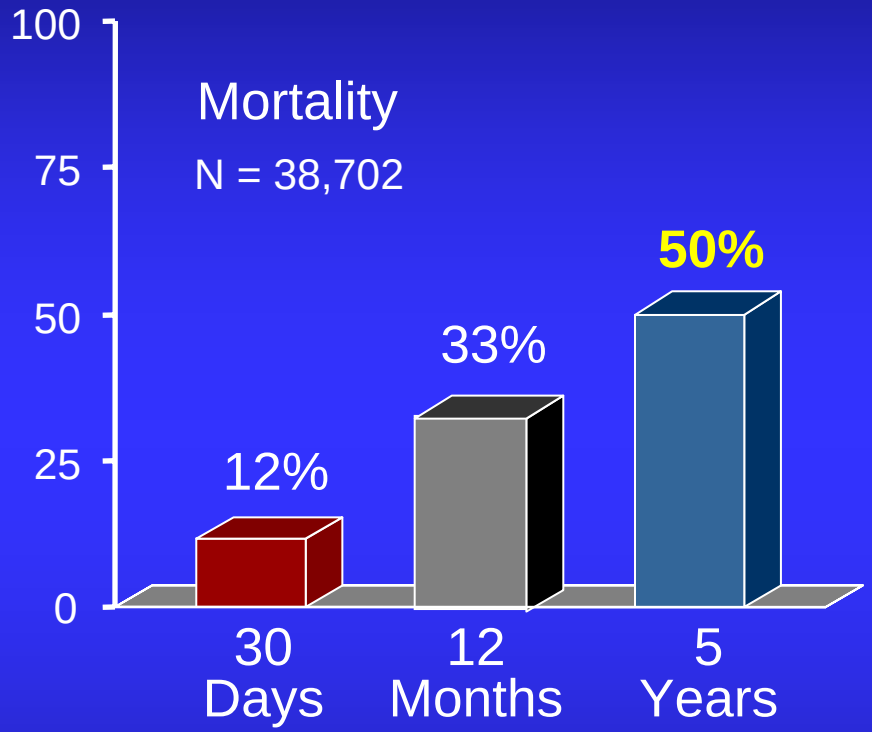


CDC/NCHS: hospital discharges include patients both living and dead.

American Heart Association. *2002 Heart and Stroke Statistical Update*. 2001.

Outcomes in Patients Hospitalized with Heart Failure



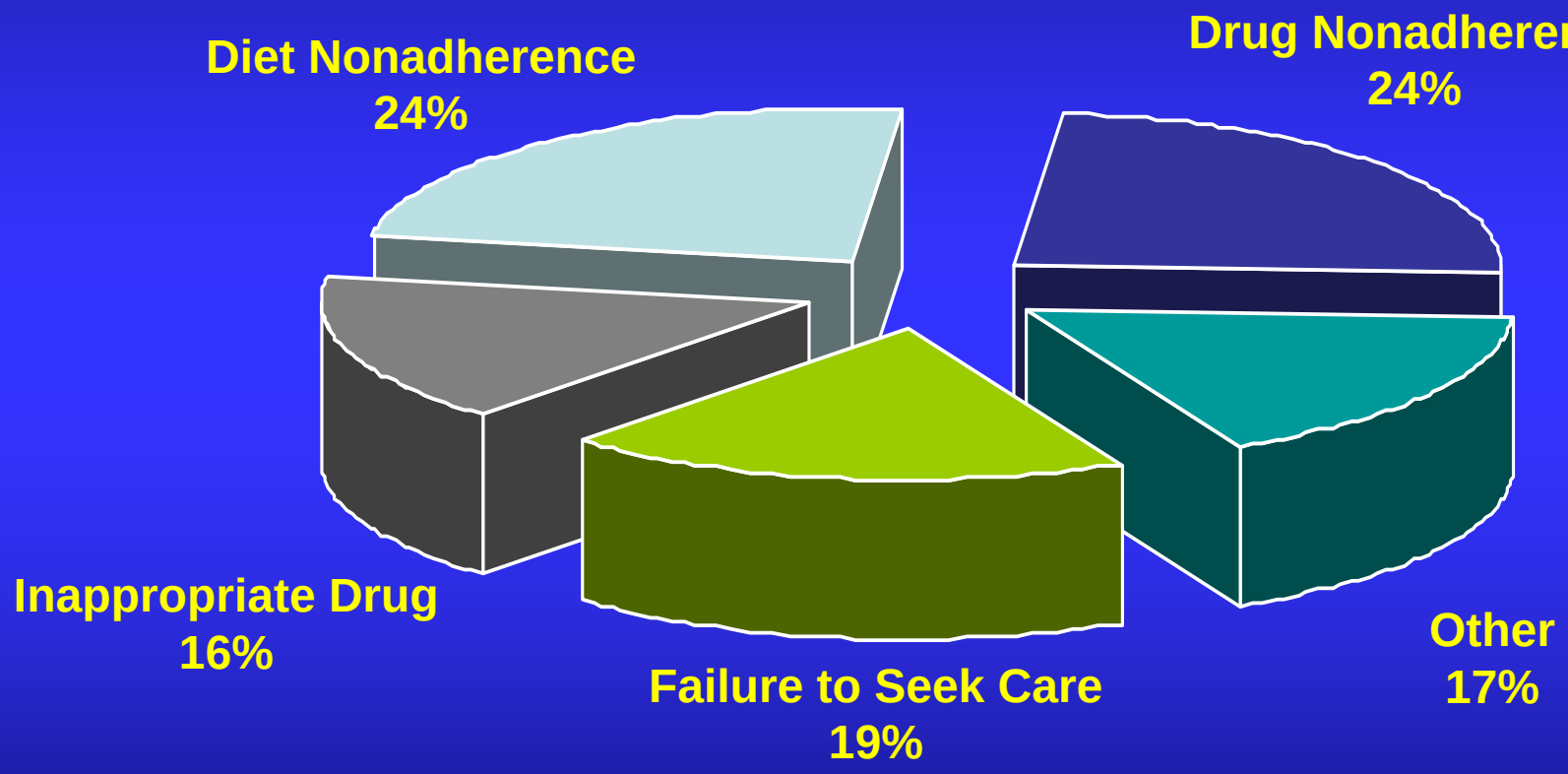


Median length of hospital stay: 6 days

We have better interventions but have a long way to go

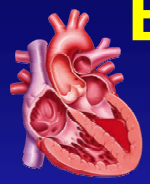
References: Aghababian RV. *Rev Cardiovasc Med.* 2002;3(suppl 4):S3-S9.
Jong P et al. *Arch Intern Med.* 2002;162:1689-1694.

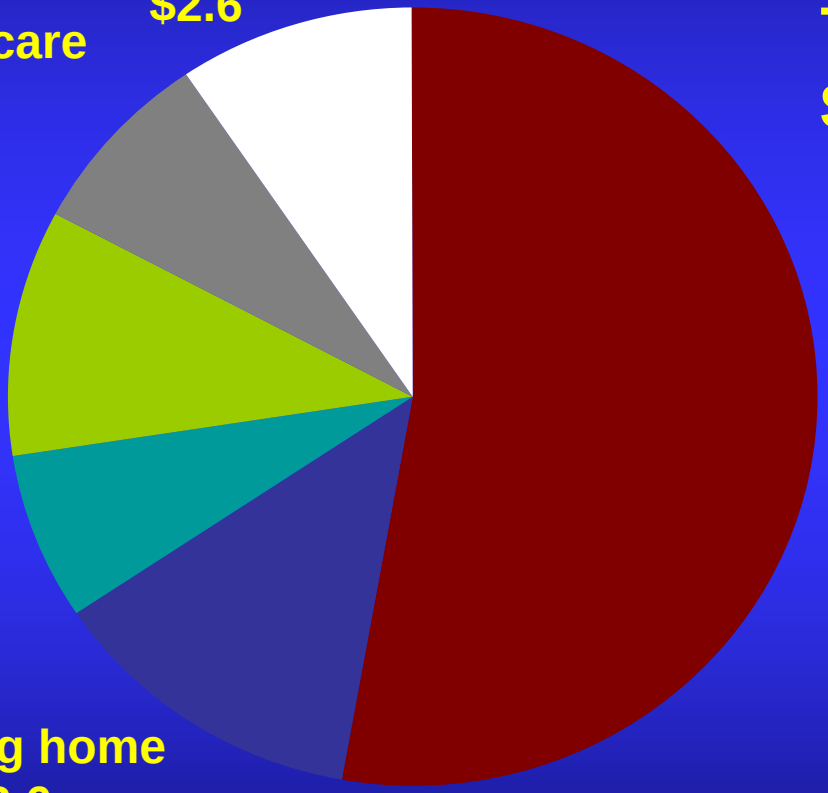
Causes of Hospital Readmission for HF



Vinson J et al. *J Am Geriatr Soc.* 1990;38:1290

Estimated Direct and Indirect Costs of Heart Failure in the US

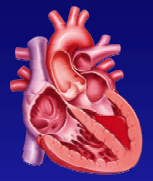




Total cost: $27.9 Billion

* Lost future earnings of persons who will die in 2005, discounted by 3%.

Reference: American Heart Association. Heart Disease and Stroke Statistics – 2005 Update.



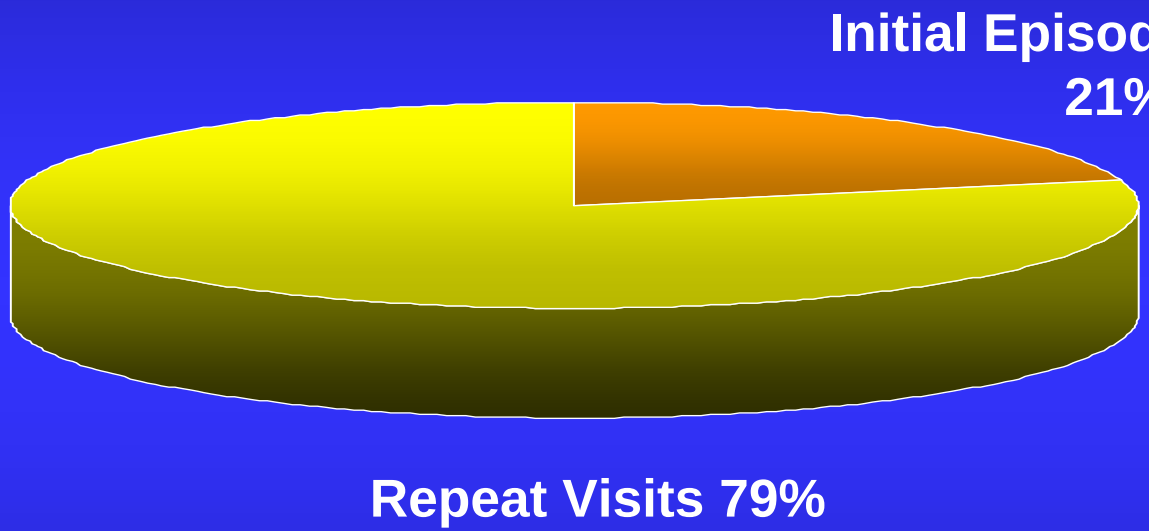
Top Five Medicare DRGs: On Average, Hospitals Lose Money

DRG Description	1999	2000	2001	2002
Heart failure and shock	+	+	+	–
Simple pneumonia and pleurisy	+	+	–	–
Chronic obstructive pulmonary disease	+	+	+	–
Major joint and limb reattach (low extremity)	+	+	+	–
Intracranial hemorrhage and stroke with infarction	+	–	–	–

+ Reimbursement is greater than cost
– Reimbursement is less than cost

Hospital Visits for Congestive Heart Failure

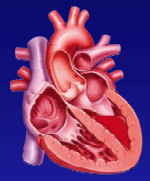
Emergency Department Presentations



Approximately 80% of ED visits for HF result in hospitalizations

*Requires full evaluation for reversible causes of heart failure.

Aghababian RV. *Rev Cardiovasc Med.* 2002;3(suppl 4):S3–S9.



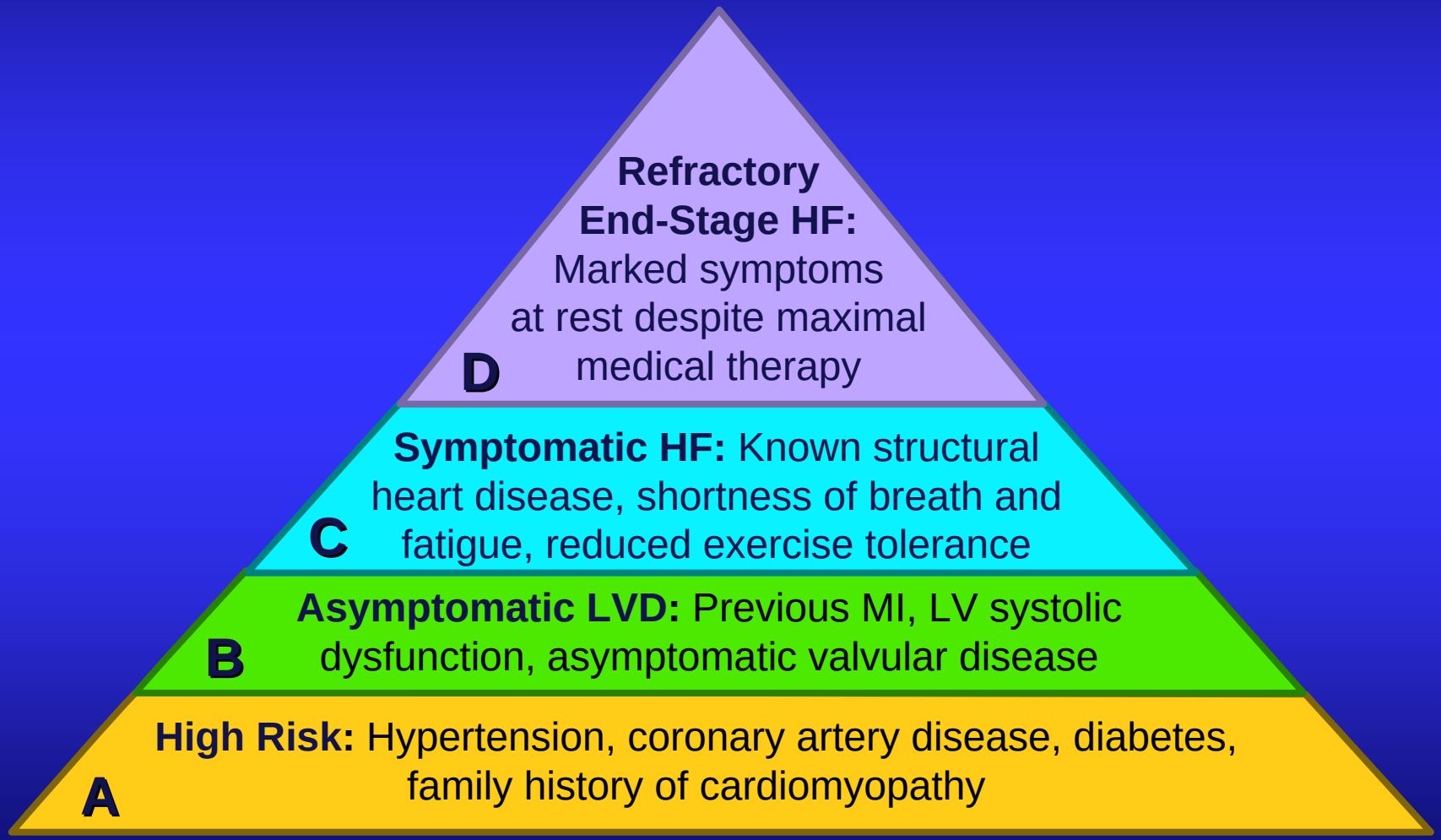
JCAHO Core Measures

Hospital Core Performance Measures/ORYX

- Complete discharge instructions in the medical record
- Appropriate use of ACE inhibitors at discharge
- LVEF evaluated before or during admission or planned after discharge
- Smoking cessation advice/counseling

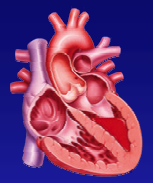
Heart failure (HF) measures. JCAHO Web site. Available at: http://www.jcaho.org/accredited+organizations/hospitals/oryx/core+measures/ information+on+final+specifications.htm#Heart. Accessed January 2003.

Disease Progression of HF: ACC/AHA HF Stages



Yancy CW, Strong M. *Prim Care Spec Ed.* 2002;6:15

ACC / AHA Heart Failure Guidelines



At Risk for Heart Failure

Stage A
At high risk for HF but without structural heart disease or symptoms of HF.

e.g.: Patients with:
-hypertension
-atherosclerotic disease
-diabetes
-metabolic syndrome

or

Patients
-using cardiotoxins
-with HFx CM

Therapy Goals
-Treat hypertension
-Encourage smoking cessation
-Treat lipid disorders
-Encourage regular exercise
-Discourage alcohol intake, illicit drug use
-Control metabolic syndrome

Drugs
-ACEI or ARB in appropriate patients (see text) for vascular disease or diabetes

Structural Heart Disease

Stage B
Structural heart disease but without symptoms of HF.

e.g.: Patients with:
-previous MI
-LV remodeling including LVH and low EF
-asymptomatic valvular disease

Therapy Goals
-All measures under stage A

Drugs
-ACEI or ARB in appropriate patients (see text)
-Beta-blockers in appropriate patients (see text)

Devices in Selected Patients
-Implantable defibrillators

Development of Symptoms of HF

Heart Failure

Stage C
Structural heart disease with prior or current symptoms of HF.

e.g.: Patients with:
-known structural heart disease

and

-shortness of breath and fatigue, reduced exercise tolerance

Therapy Goals
-All measures under stages A and B
-Dietary salt restriction

Drugs for Routine Use
-Diuretic for fluid retention
-ACEI
-Beta-blockers

Drugs in Selected Patients
-Aldosterone antagonist
-ARBs
-Digitalis
-Hydralazine/nitrates

Devices in Selected Patients
-Biventricular pacing
-Implantable defibrillators

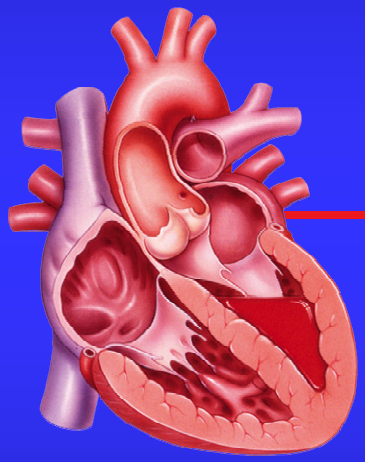
Refractory Symptoms of HF at Rest

Stage D
Refractory HF requiring specialized interventions.

e.g.: Patients who have marked symptoms at rest despite maximal medical therapy (e.g., those who are recurrently hospitalized or cannot be safely discharged from the hospital without specialized interventions)

Therapy Goals
-Appropriate measures under stages A, B, C
-Decision re: appropriate level of care

Options
-Compassionate end-of-life care/hospice
-Extraordinary measures
•heart transplant
•chronic inotropes
•permanent mechanical support
•experimental surgery or drugs

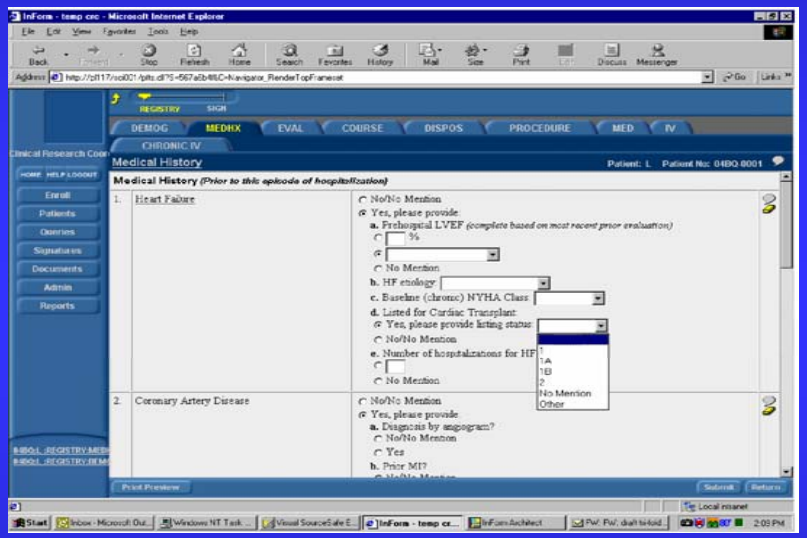


The Role of Registries in Heart Failure

Acute Decompensated Heart Failure National Registry (ADHERE®)

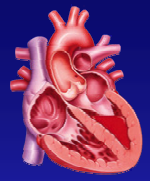
ADHERE® Registry

- ADHERE Core Module
  - Largest US HF registry
  - Multicenter
  - Observational
  - Open label
  - Web based



- Registry of US patients treated in hospitals for ADHF

Fonarow GC for ADHERE Scientific Advisory Committee. *Rev Cardiovasc Med.* 2003;4(suppl 7):S21

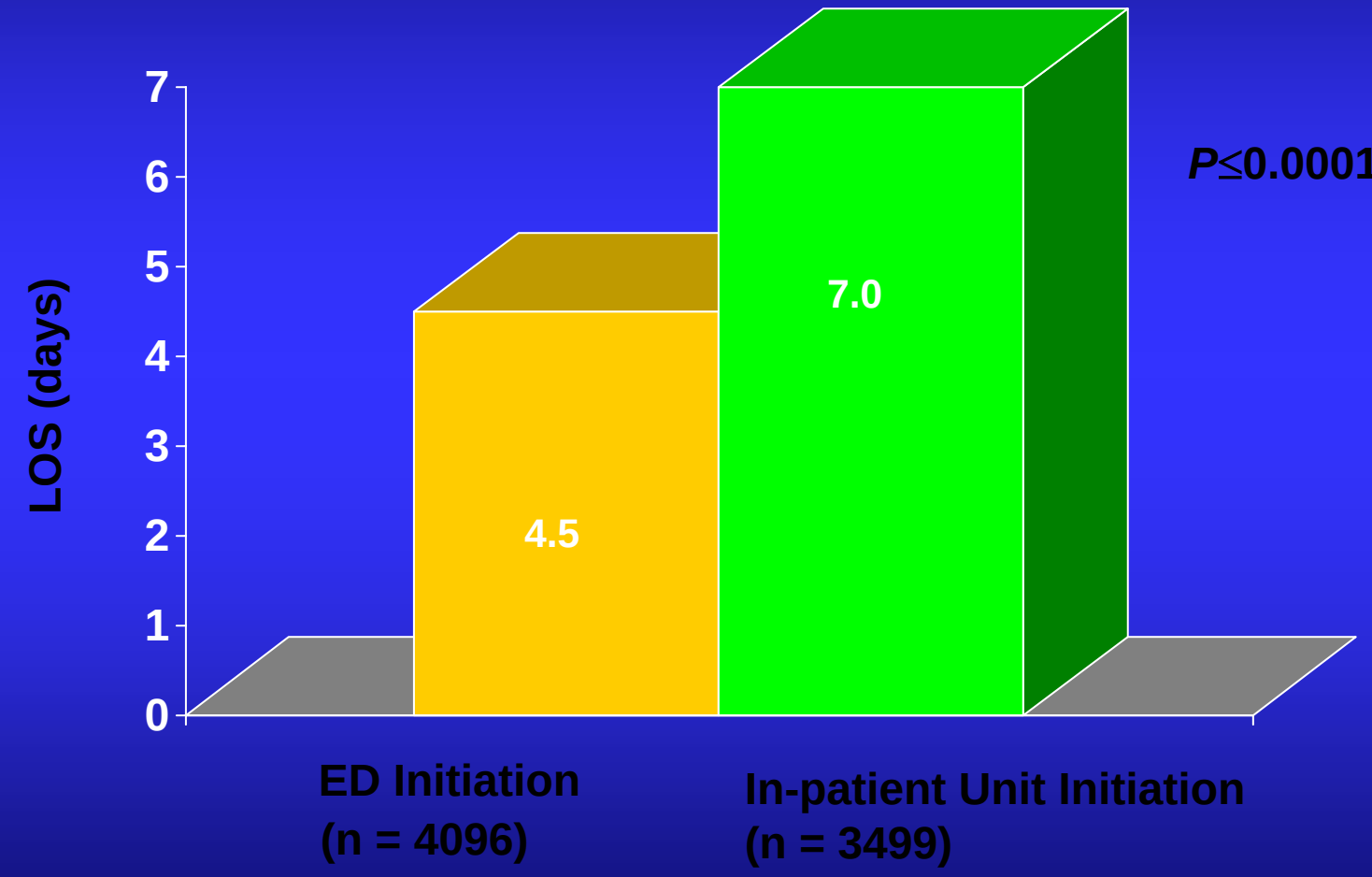


Goals of ADHERE® Registry

- Describe demographics and clinical characteristics of patients hospitalized with ADHF
- Characterize current management of hospitalized patients with ADHF
- Define treatment strategies associated with best clinical outcomes and most efficient use of resources
- Assist in evaluating and improving quality of care

Fonarow GC for ADHERE Scientific Advisory Committee. *Rev Cardiovasc Med.* 2003;4(suppl 7):S21

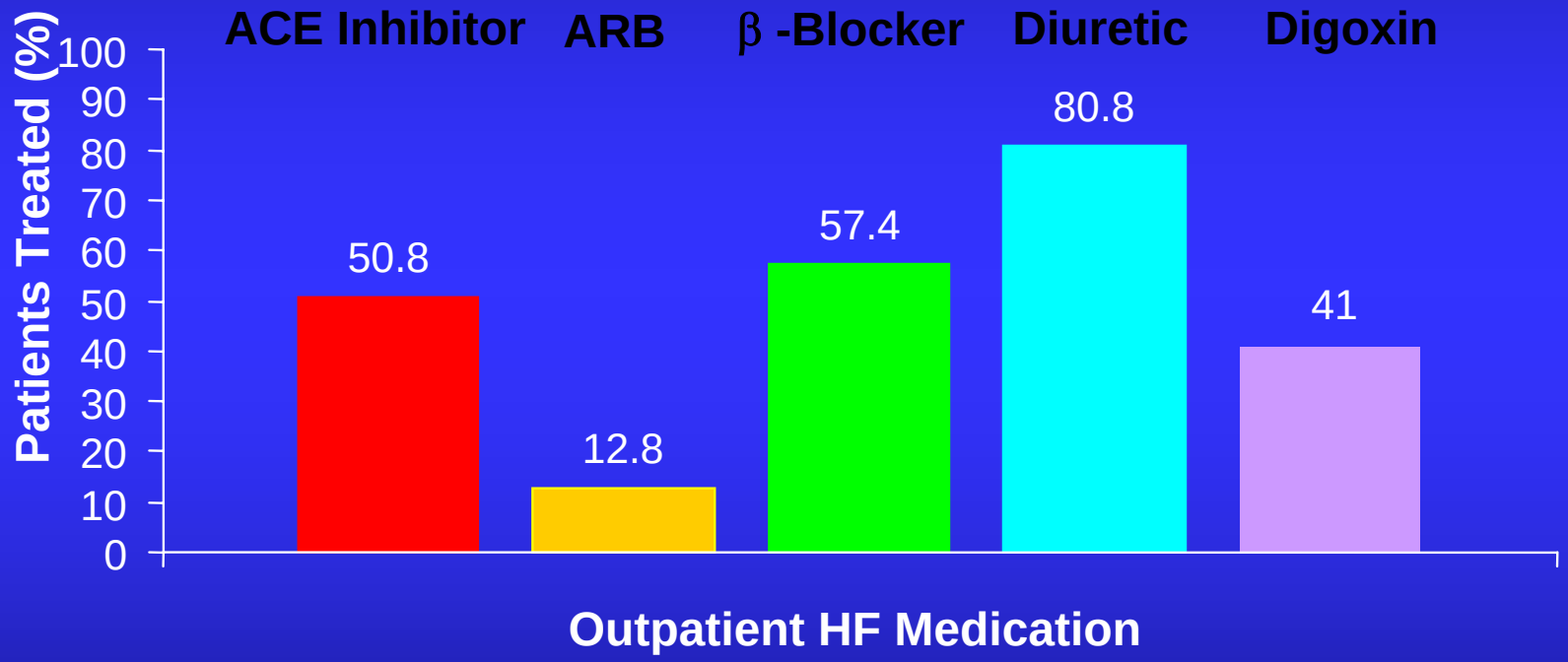
Impact of ED vs In-patient Initiation of IV Vasoactive Therapy on LOS



Peacock WF et al. *Ann Emerg Med*. 2003;42:92

Utilization of Evidence-Based Therapies in HF

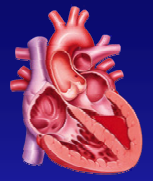
History of HF and LVEF Documented and ≤0.40*



*Excludes patients with documented contraindications

2300/7883 patients hospitalized with HF; prior known dx of systolic dysfunction HF; outpatient medical regimen

ADHERE™ Registry Report Q1 2002 (4/01–3/02) of 180 US Hospitals. Presented at the HFSA Satellite Symposium, September 23, 2002



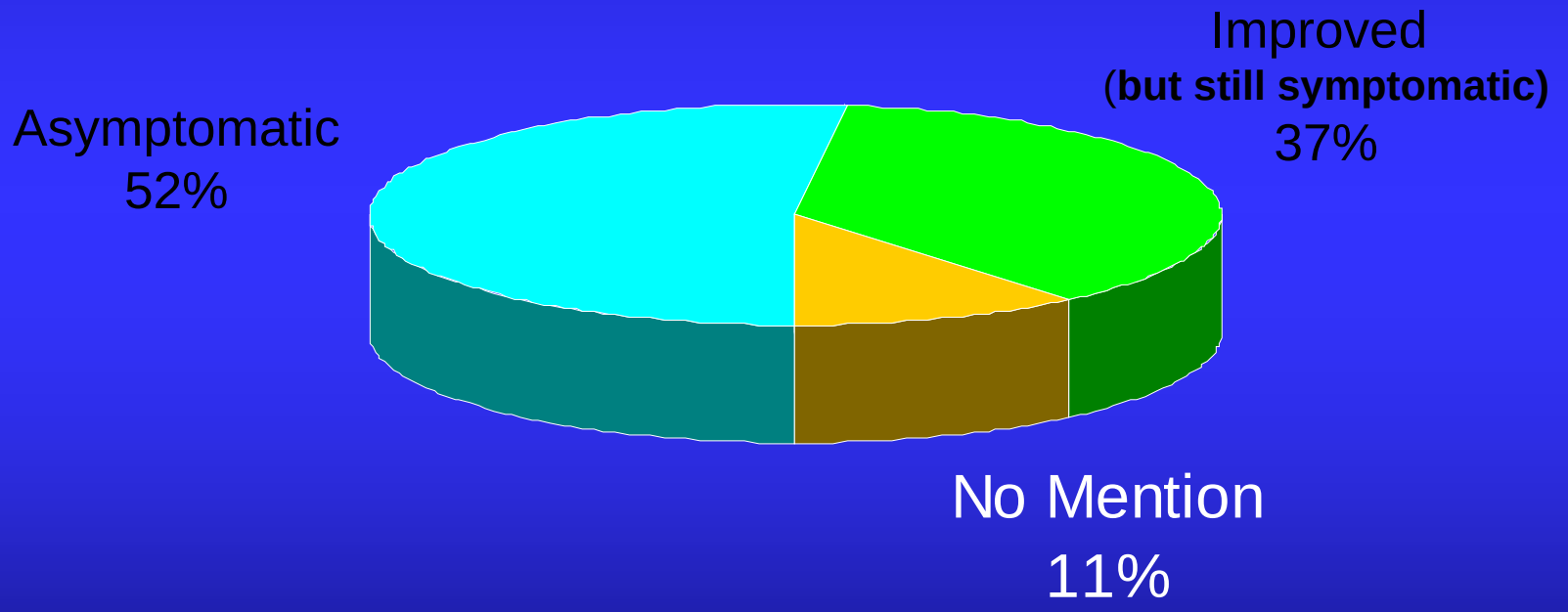
ADHERE® Quality of Care
Conformity to JCAHO HF Performance Indicators

	All Patients (N = 105,381)	Patients at Academic Hospitals (n = 34,346)	Patients at Non-Academic Hospitals (n = 71,035)	*P* value
HF-1 (%) Discharge Instruction	**32.3**	**21.9**	**37.8**	**<0.0001**
HF-2 (%) LV Function	82.7	84.0	82.0	<0.0001
HF-3 (%) Discharge ACE-I Rx	66.1	70.3	63.7	<0.0001
JCAHO HF-4 (%) Smoking Cessation Counseling	40.0	33.1	44.0	<0.0001

All Enrolled Discharges (N = 105,388) October 2001–January 2004

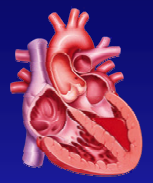
Clinical Status at Time of Discharge

All Enrolled Discharges* (N = 105,388) October 2001–January 2004



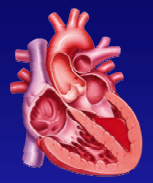
49% of patients discharged from the hospital Are still symptomatic or have no mention of Improvement of symptoms

*Who were discharged home (including home with additional and/or outpatient care)



OPTIMIZE HF REGISTRY

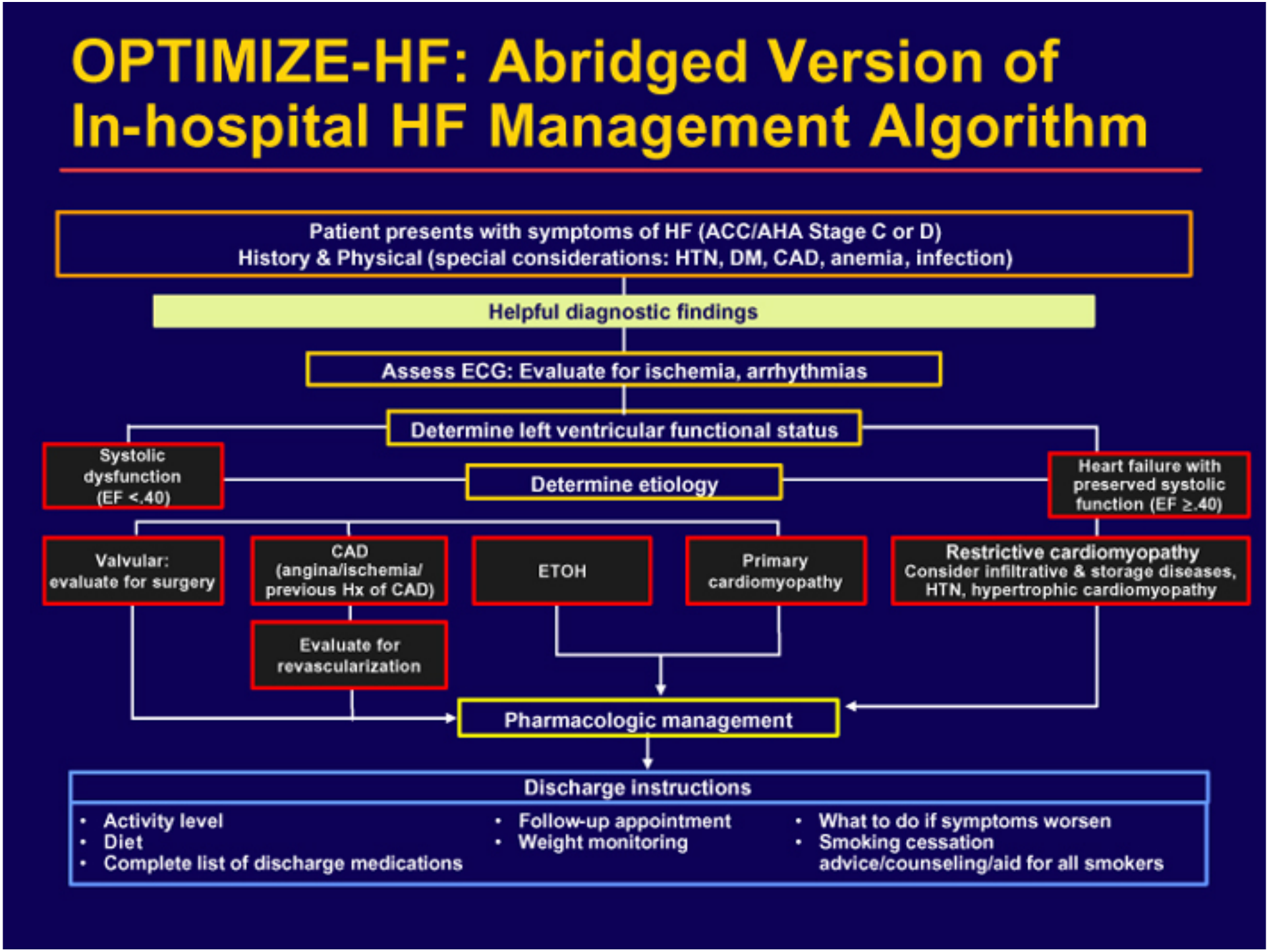
- Web-based registry
  - Data on medications on admission, hospitalization progress, discharge
  - JCAHO Core Measures
- Process of Care Improvement



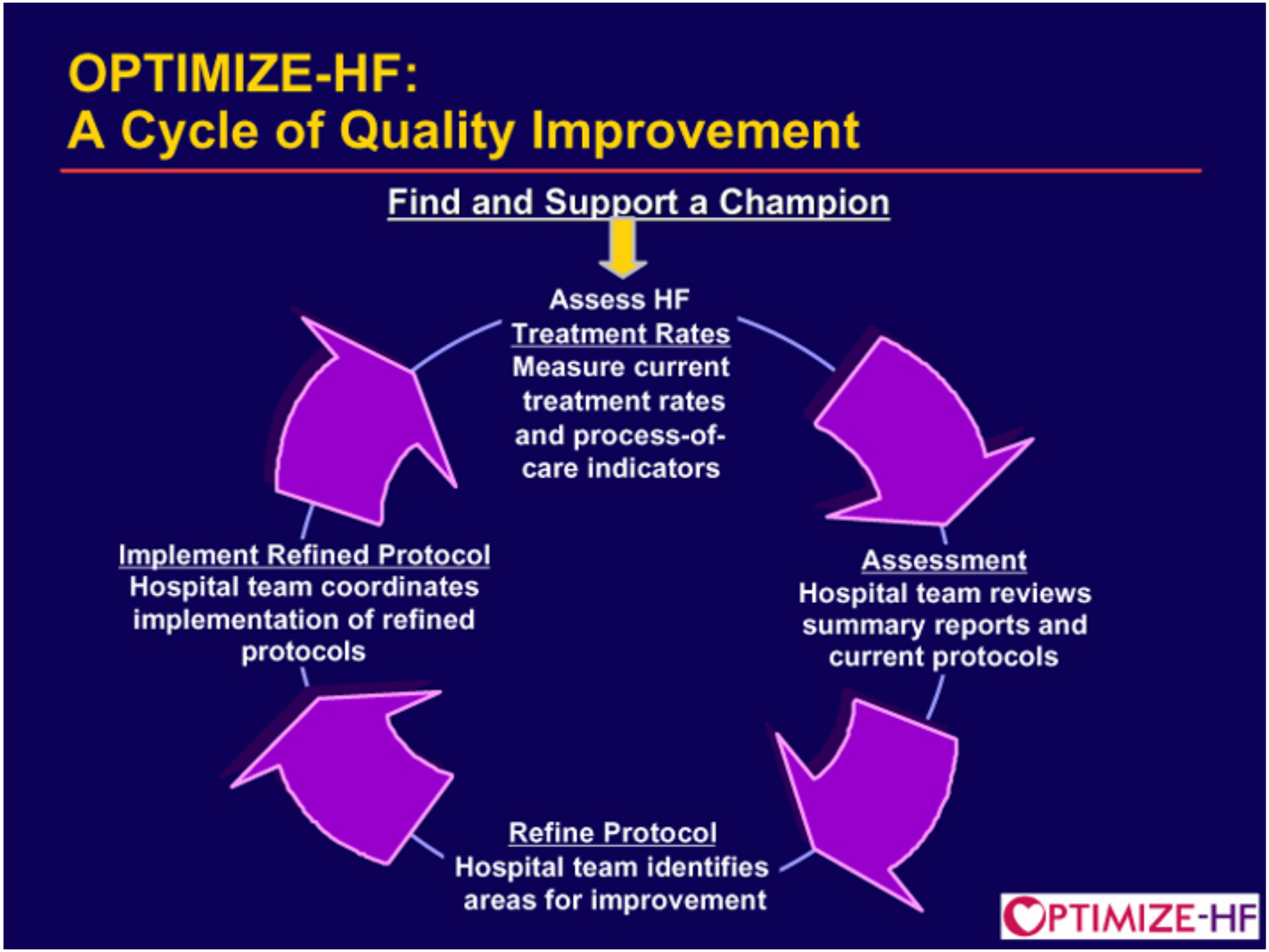
Objectives of OPTIMIZE HF

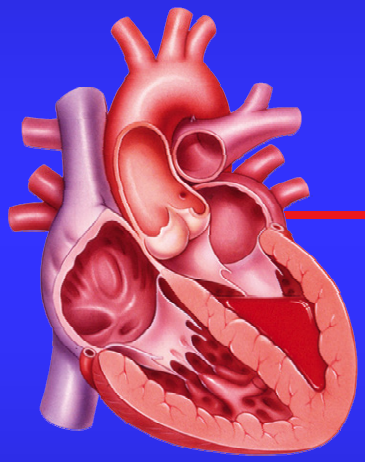
- Improve medical care and education of hospitalized HF patients
- Increase and speed up adoption of HF guidelines by initiating therapies prior to discharge
- Increase understanding to barriers to utilization of ACE inhibitors and Beta-blockers in HF patients

OPTIMIZE-HF: Abridged Version of In-hospital HF Management Algorithm



OPTIMIZE-HF:
A Cycle of Quality Improvement





The Challenge….
Data Access
Data interpretation
Making Clinical Decision
Documentation

The Medtronic Solution

MEDTRONIC CARELINK® NETWORK

Giving Patients the Freedom to LIVE | LIFE

*i*Solutions

information for Better Life

*i*nformation should be part of the Solution

iSolutions offer simple, elegant means for accessing and organizing cardiac device data for optimal and efficient patient care.

- **Medtronic CareLink® Network**
- **Medtronic Paceart® System**
- **Medtronic CardioSight® Service**
- **Medtronic CareLink® Programmer**

Rising complexity

Today's EP clinic is more complex than ever before:

Escalating patient volumes

Calls for Electronic Medical Records (EMRs) and other technological advances

Increasing device complexity

Staff constraints (e.g., nursing shortages)

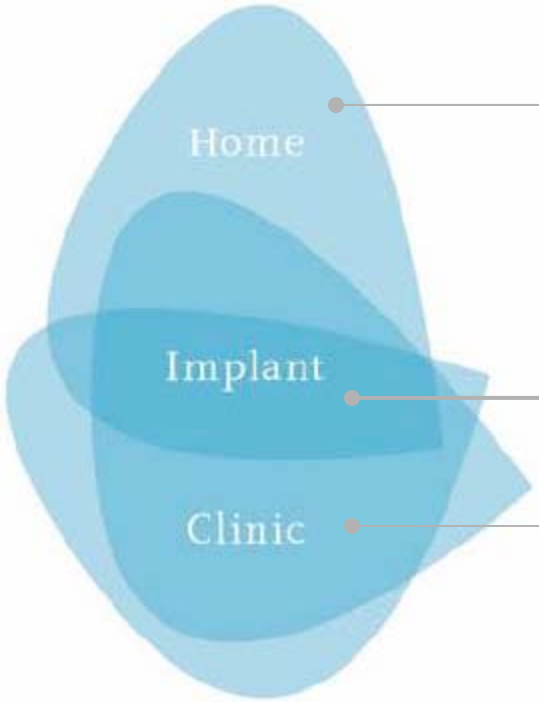
Competitive pressures

Unscheduled and missed appointments

Patients (and families) who demand convenience and continuity of care

MEDTRONIC CARELINK® NETWORK
Remote Monitoring. Closer Connections.

Complex clinic environments



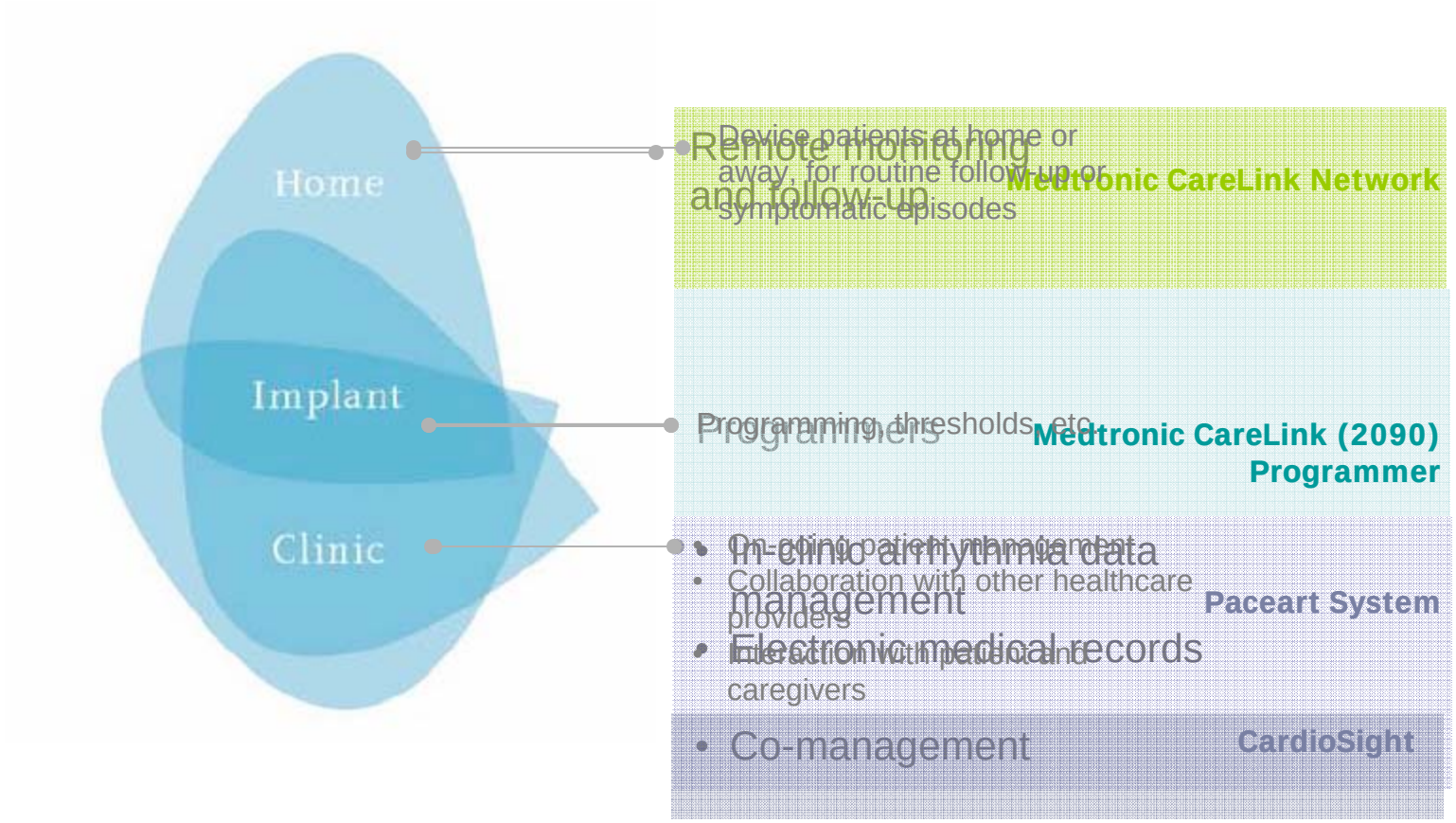
Device patients at home or away, for routine follow-up or symptomatic episodes

Programming, thresholds, etc.

- On-going patient management
- Collaboration with other healthcare providers
- Interaction with patient and caregivers

Complex clinic environments

Medtronic *i*Solutions



The Need

Multiple Access Options

Electrophysiologist

Implants & follows device, arrhythmias

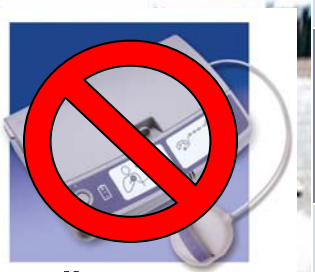
Programmer

CareLink

Gap: Access to valuable HF data

HF Physician/Cardiologist

Manages patient's HF disease



No (or limited) access

MEDTRONIC CARELINK® NETWORK

Remote Monitoring. Closer Connections.

Medtronic CareLink® Network

Taking remote monitoring to the **next level**

Customer Presentation

MEDTRONIC CARELINK® NETWORK

Giving Patients the Freedom to LIVE | LIFE

What is the Medtronic CareLink® Network?

The nation's leading remote monitoring service, serving over 1000 clinics and 110,000 patients around the country

A work flow efficiency tool that has been shown to reduce ICD follow-up time by as much as 65%[1]

Remote follow-up system that provides **comprehensive device data** comparable to an in-office interrogation

1 Falk D., Straub K. Practice efficiency improvements resulting from the use of Medtronic CareLink® Network remote monitoring service, Fairfield, Iowa: Human Factors International, July 2004

MEDTRONIC CARELINK® NETWORK
Remote Monitoring. Closer Connections.

The Medtronic CareLink Monitor

Portable monitor used by patients to send data for:

- Routine follow-up
- Symptomatic episodes
- Post-shock events

Extremely user-friendly

- One-button operation
- Sound and light cues are intuitive
- A standard telephone line is the only requirement
- Connect from home or while traveling (within the United States)
- Now offering “hands-free” wireless capability on new ICD and CRT-D devices

The new Medtronic CareLink Monitor featuring Conexus™ Wireless Telemetry

Medtronic CareLink Network

1 While at home, work, or traveling in the United States, the patient holds the mouse-like antenna of the Medtronic CareLink Monitor over the implanted cardiac device.

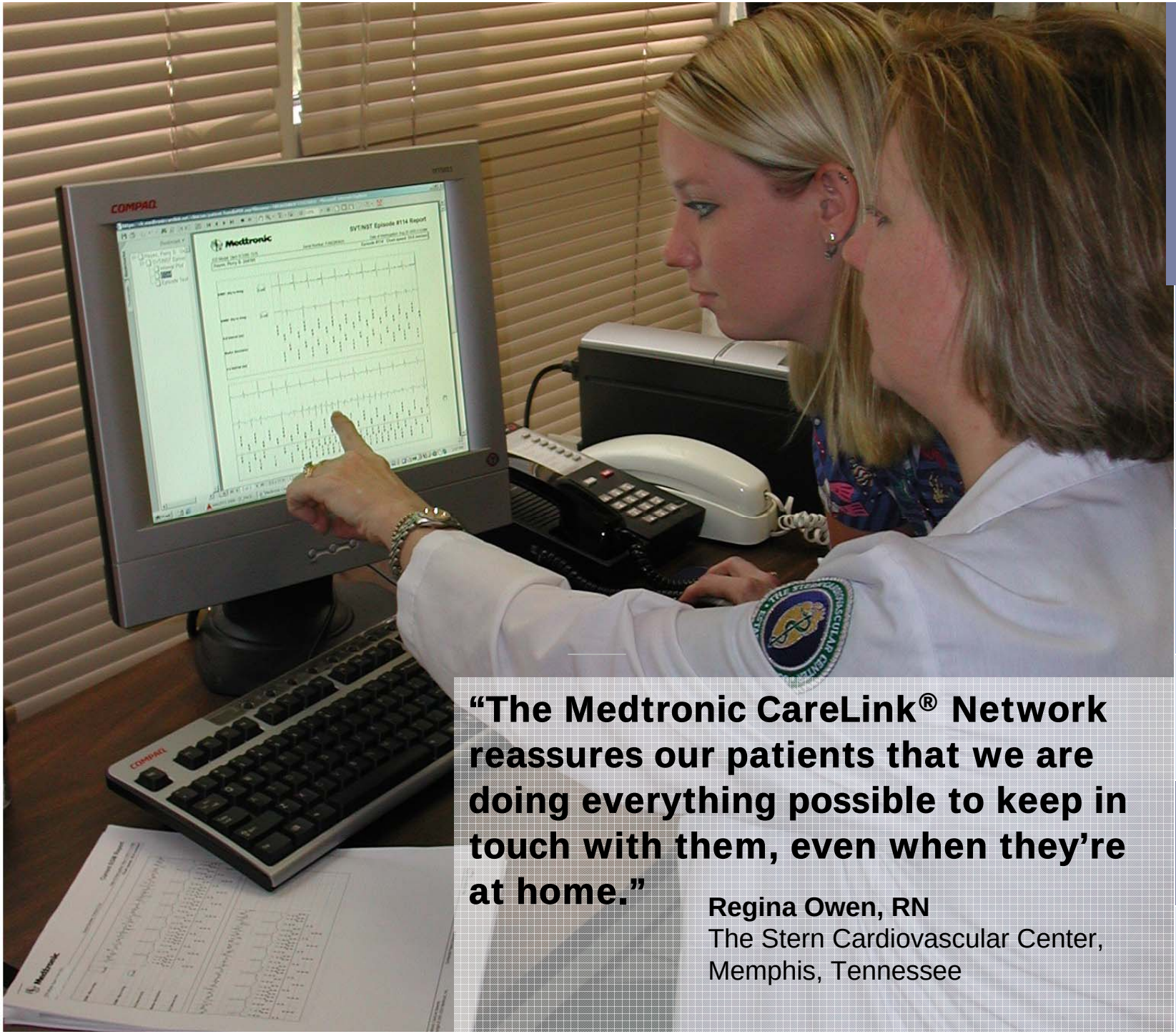
2 Data are transferred from the patient's implanted device to the monitor.

Data are sent from the Medtronic CareLink Monitor to a secure server via a standard phone line.

3 The clinician reviews the patient's device data on the Medtronic CareLink Clinician Website.

"Before I had the monitor, I would have been quite concerned about traveling far from home and my clinic. Having the monitor with me and knowing I could be 'connected' with my clinic within minutes made me feel much better. **We've been to Disney, and Palm Springs, and the Medtronic CareLink Monitor always comes along**."

Dawn Yasik, age 34
InSync Maximo® patient on the Medtronic CareLink Network since 2003



“The Medtronic CareLink® Network reassures our patients that we are doing everything possible to keep in touch with them, even when they’re at home.”

Regina Owen, RN
The Stern Cardiovascular Center,
Memphis, Tennessee

CareLink for Pacemakers

The advent of wireless...

Routine device follow-up occurs while the patient sleeps, and continual automatic monitoring assures confidence for clinicians and patients.

- "Hands-free transmissions" for the patient
- Alleviates compliance issues
- Streamlines workflow by eliminating scheduling headaches

Medtronic CareLink® Wireless Programmer with High Speed Connectivity

Wireless communication enabled programmer

- Uses an RF band designated for medical device communication
- High-speed access to up-to-date device software
- All the functionality of the previous 2090 programmer

Seamless connection to Paceart Systems

- Seamlessly and automatically transfers data into the Paceart data management system
- May eliminate errors related to manual data entry

The Medtronic CareLink Programmer is a wireless communication-enabled programmer that provides technological solutions for customizing patient care and data management.

Advantages of wireless

Better able to accommodate changing needs and schedules of both patients and of clinicians.

Easier for clinician to set up a scheduling routine that fits into current practice methods. Scheduling becomes automated, saving time for the clinic.

Automatic prescheduled checks may improve patient care and convenience while reducing compliance issues

Medtronic CareAlert monitoring may provide early detection and the opportunity to intervene sooner with proactive care

MEDTRONIC CARELINK® NETWORK
Remote Monitoring. Closer Connections.

Automatic Follow-Up (wireless)

AUTOMATIC FOLLOW-UP

1 Using the secure Medtronic CareLink Clinician Website, clinic staff can preschedule up to six automatic device checks for each patient – without having to make appointments or coordinate calendars with patients.

2 The device automatically "wakes up" at the scheduled time and communicates with the Medtronic CareLink Monitor, which is plugged into a standard phone line and an electrical outlet. Data are transmitted wirelessly from the device to the monitor as the patient sleeps.

3 Data are sent automatically from the Medtronic CareLink Monitor via the phone line.

4 The clinician reviews the patient's device data on the secure website.

Medtronic CareAlert Monitoring featuring Conexus™ Wireless Telemetry

CONTINUAL MONITORING FOR MEDTRONIC CAREALERT™ STATUS

1 The implanted cardiac device detects a problem such as AT/AF or a device integrity issue. If the patient's device is programmed to notify the clinician of Medtronic CareAlert status, the heart device automatically establishes wireless communication with the Medtronic CareLink Monitor, which is plugged into a standard phone line.

2 Device data are sent automatically from the monitor to a secure server via the phone line.

3 The clinician receives the alert via pager or voice message and checks the Medtronic CareLink Clinician Website for detailed information.

4 The clinician reviews the Medtronic CareAlert information and calls the patient to provide further instructions.

Medtronic CareAlert Monitoring
(wireless)

Hand-held pager

Available Medtronic CareAlert Monitoring:

Programmable Alerts

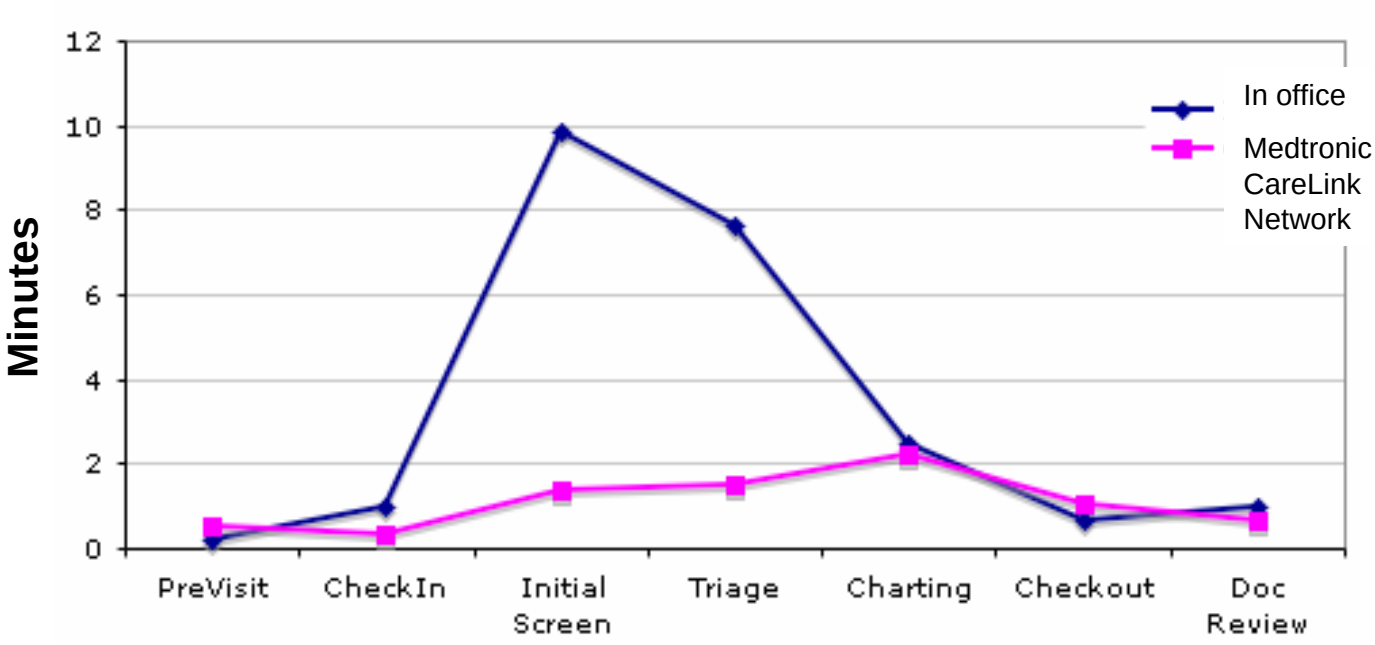
1. Daily AT AF Burden > Threshold
2. Fast Ventricular Rate during AT/AF
3. Number of Shocks delivered in an episode
4. All Therapies in a Zone Exhausted
5. VF Detection Therapy Off
6. Low Battery Voltage Recommend Replacement
7. Excessive Charge Time (End of Service)
8. Atrial Pacing (Impedance out of range)
9. RV Pacing (Impedance out of range)
10. LV Pacing (Impedance out of range)
11. Ventricular Defib (Impedance out of range)
12. SVC (HVX) Defib (Impedance out of range)

Non-Programmable Alerts

1. Electrical Reset
2. Pacing Mode DOO VOO AOO
3. Active Can Off without SVC
4. Charge Circuit Timeout

Proven efficiency gains

A study conducted by Human Factors International[1] showed that device checks with the Medtronic CareLink® Network can be done in under 8 minutes—**one-third the time** of a typical in-office device check.



[1] Falk D, Straub K. Practice Efficiency Improvements Resulting From the Use of Medtronic CareLink Network Remote Monitoring Service. Fairfield, Iowa: Human Factors International, July 2004.

Committed to privacy and security

Medtronic has taken extensive measures to ensure that Medtronic CareLink® Network conforms to HIPAA regulations pertaining to both privacy and security of electronic Personal Health Information (ePHI)

MEDTRONIC CARELINK® NETWORK
Remote Monitoring. Closer Connections.

Edit View Favorites Tools Help

Back Search Favorites

C:\CLC 4.0 prototype\EnTrQuickLook.htm Go

Medtronic MEDTRONIC CARELINK® NETWORK Log OFF

Patient List | Clinic Admin | My Profile | Patient Web Site | Contact Medtronic | Site Help

Quick Look- Smith, Clyde R.

ends
ess, Phone, etc.

Transmission:
ent EGM
k Look™
diac Compass™
odes
Histograms
nters
ery & Lead Status
d Trends
ent Alert
meters
ent Info

orts:
Print
Print This Page
Print My Reports
> Set up My Reports

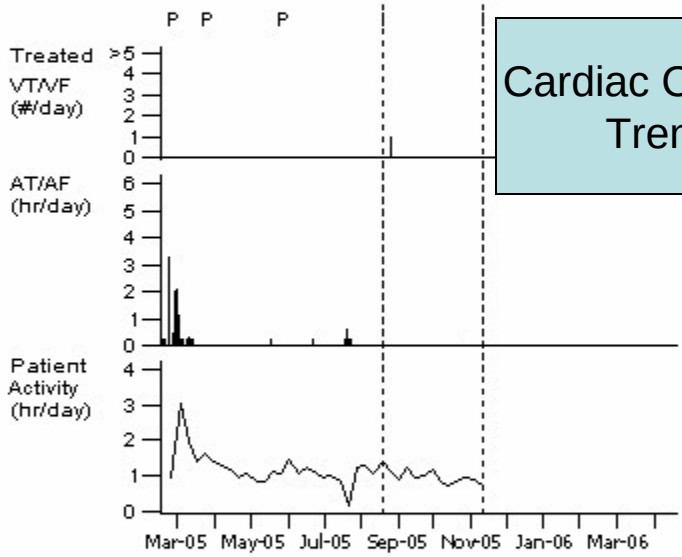
Important Medical Record Information

Device: EnTrust™ D153ATG Serial Number: PNR123456Q Date of Interrogation: 10-Nov-2005 18:50:09

Clinical Status	Since 19-Aug-2005
Treated	
VF	0
FVT	1
VT	0
AT/AF	0
Monitored	
VT (Off)	
VT-NS (>4 beats, >150 bpm)	5
SVT: VT/VF Rx Withheld	0
AT/AF	0
Time in AT/AF	<0.1 hr/day (<0.1%)
Functional	**Last Week**
Patient Activity	0.7 hr/day

Tachycardia counters

Cardiac Compass Trends (Feb-2005 to Nov-2005)



Cardiac Compa Trends

Therapy Summary	VT/VF	AT/AF
Pace-Terminated Episodes	1 of 1	0
Shock-Terminated Episodes	0	0
Total Shocks	0	0
Aborted Charges	0	0

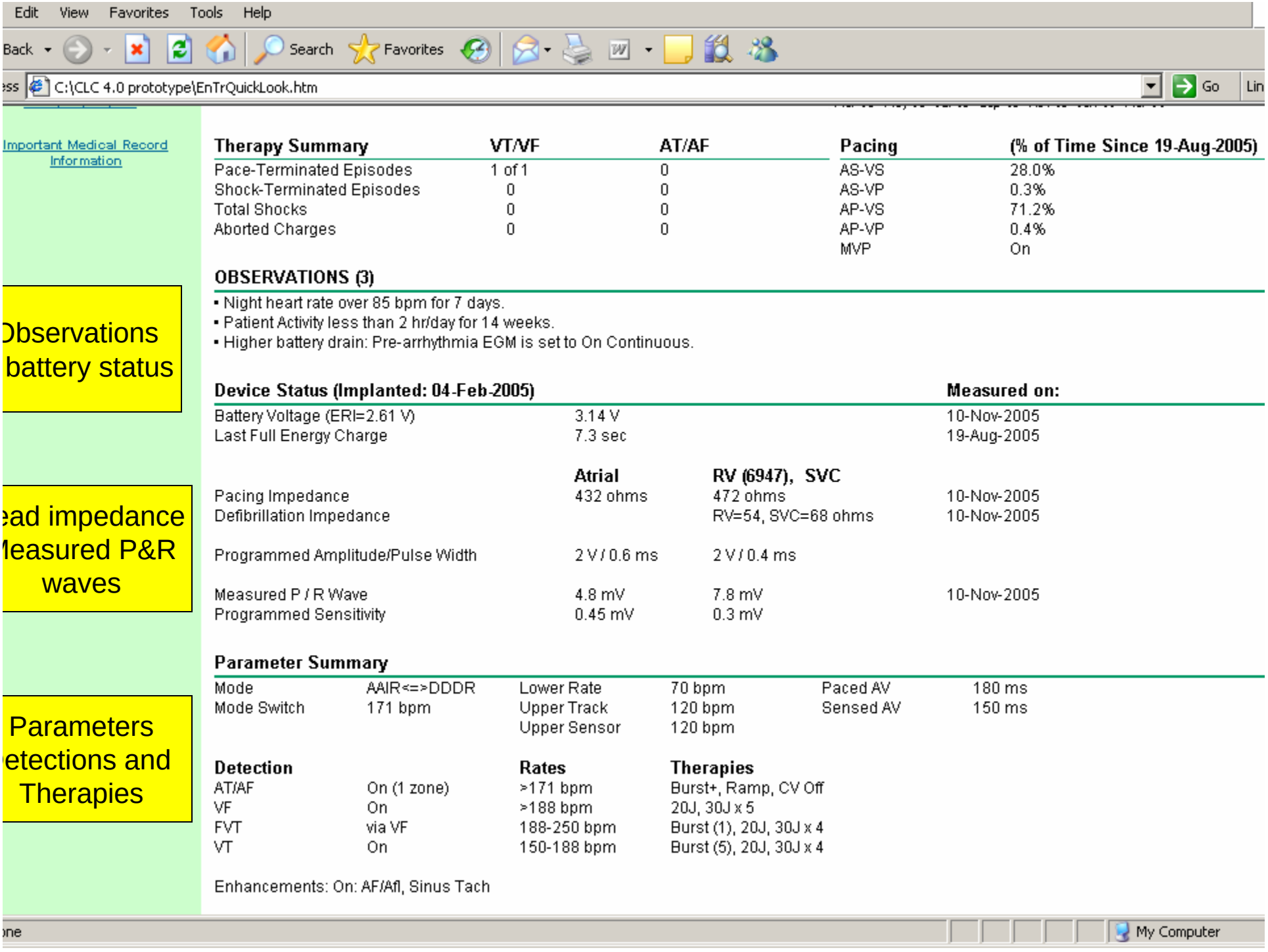
Pacing	(% of Time Since 19-Aug-2005)
AS-VS	28.0%
AS-VP	0.3%
AP-VS	71.2%
AP-VP	0.4%
MVP	On

Percent Paced

OBSERVATIONS (3)

- Night heart rate over 85 bpm for 7 days.
- Patient Activity less than 2 hr/day for 14 weeks.
- Higher battery drain: Pre-arrhythmia EGM is set to On Continuous

My Computer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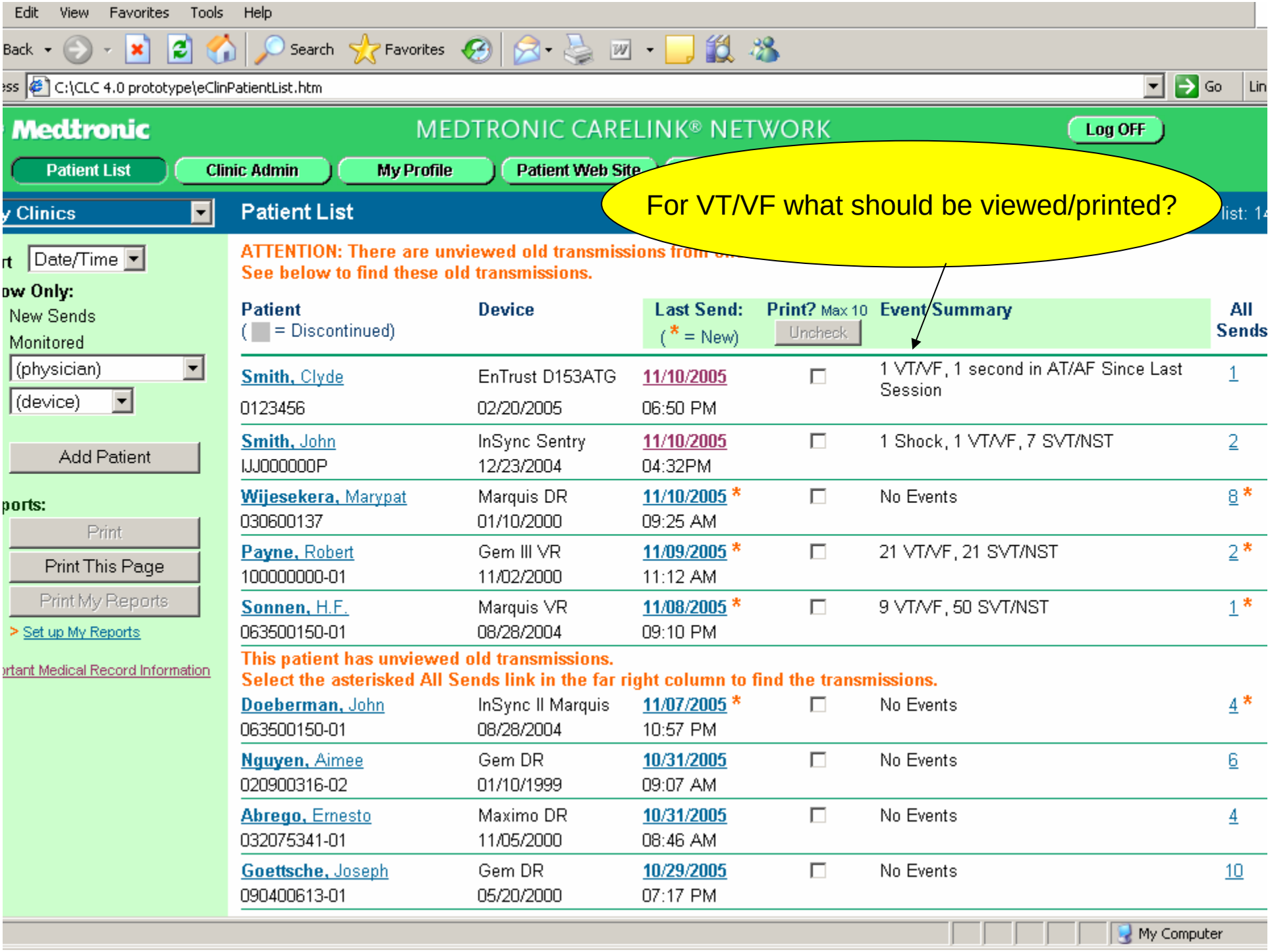
Go
Important Medical Record Information
Therapy Summary VT/VF AT/AF
Pace-Terminated Episodes 1 of 1 0
Shock-Terminated Episodes 0 0
Total Shocks 0 0
Aborted Charges 0 0
Pacing (% of Time Since 19-Aug-2005)
AS-VS 28.0%
AS-VP 0.3%
AP-VS 71.2%
AP-VP 0.4%
MVP On
OBSERVATIONS (3)
• Night heart rate over 85 bpm for 7 days.
• Patient Activity less than 2 hr/day for 14 weeks.
• Higher battery drain: Pre-arrhythmia EGM is set to On Continuous.
Observations battery status
Device Status (Implanted: 04-Feb-2005) Measured on:
Battery Voltage (ERI=2.61 V) 3.14 V 10-Nov-2005
Last Full Energy Charge 7.3 sec 19-Aug-2005
Atrial RV (6947), SVC
Pacing Impedance 432 ohms 472 ohms 10-Nov-2005
Defibrillation Impedance RV=54, SVC=68 ohms 10-Nov-2005
Programmed Amplitude/Pulse Width 2 V / 0.6 ms 2 V / 0.4 ms
Measured P / R Wave 4.8 mV 7.8 mV 10-Nov-2005
Programmed Sensitivity 0.45 mV 0.3 mV
ead impedance Measured P&R waves
Parameter Summary
Mode AAIR<=>DDDR Lower Rate 70 bpm Paced AV 180 ms
Mode Switch 171 bpm Upper Track 120 bpm Sensed AV 150 ms
Upper Sensor 120 bpm
Detection Rates Therapies
AT/AF On (1 zone) >171 bpm Burst+, Ramp, CV Off
VF On >188 bpm 20J, 30J x 5
FVT via VF 188-250 bpm Burst (1), 20J, 30J x 4
VT On 150-188 bpm Burst (5), 20J, 30J x 4
Enhancements: On: AF/Afl, Sinus Tach
Parameters etections and Therapies
My Computer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Medtronic
MEDTRONIC CARELINK® NETWORK
Log OFF
Patient List
Clinic Admin
My Profile
Patient Web Site
For VT/VF what should be viewed/printed?
Clinics
Patient List
Date/Time
Only:
New Sends
Monitored
(physician)
(device)
Add Patient
ports:
Print
Print This Page
Print My Reports
Set up My Reports
rtant Medical Record Information
ATTENTION: There are unviewed old transmissions from
See below to find these old transmissions.
Patient
(= Discontinued)
Device
Last Send:
(* = New)
Print? Max 10
Uncheck
Event Summary
All Sends
Smith, Clyde
0123456
EnTrust D153ATG
02/20/2005
11/10/2005
06:50 PM
1 VT/VF, 1 second in AT/AF Since Last Session
1
Smith, John
IJJ000000P
InSync Sentry
12/23/2004
11/10/2005
04:32PM
1 Shock, 1 VT/VF, 7 SVT/NST
2
Wijesekera, Marypat
030600137
Marquis DR
01/10/2000
11/10/2005 *
09:25 AM
No Events
8 *
Payne, Robert
100000000-01
Gem III VR
11/02/2000
11/09/2005 *
11:12 AM
21 VT/VF, 21 SVT/NST
2 *
Sonnen, H.F.
063500150-01
Marquis VR
08/28/2004
11/08/2005 *
09:10 PM
9 VT/VF, 50 SVT/NST
1 *
This patient has unviewed old transmissions.
Select the asterisked All Sends link in the far right column to find the transmissions.
Doeberman, John
063500150-01
InSync II Marquis
08/28/2004
11/07/2005 *
10:57 PM
No Events
4 *
Nguyen, Aimee
020900316-02
Gem DR
01/10/1999
10/31/2005
09:07 AM
No Events
6
Abrego, Ernesto
032075341-01
Maximo DR
11/05/2000
10/31/2005
08:46 AM
No Events
4
Goettsche, Joseph
090400613-01
Gem DR
05/20/2000
10/29/2005
07:17 PM
No Events
10
My Computer

Heart Failure Management Report

ICD Model: InSync Sentry 7297 Serial Number: Date of Visit:

Date of Birth EF, on - - - Hospit
History Implant Physic

Clinical Status (Aug 30, 2005 to Sep 09, 2005)

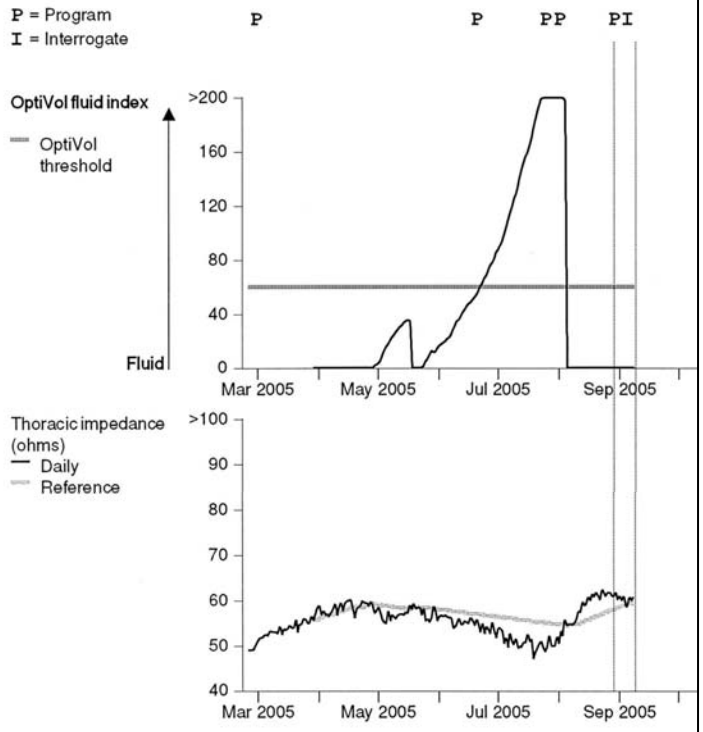
VT/VF	0 episodes	V. Pacing (V. beats)	99.5 %
AT/AF	0 episodes	Atrial Pacing	49.5 %
Time in AT/AF	0.0 hr/day (0.0 %)		

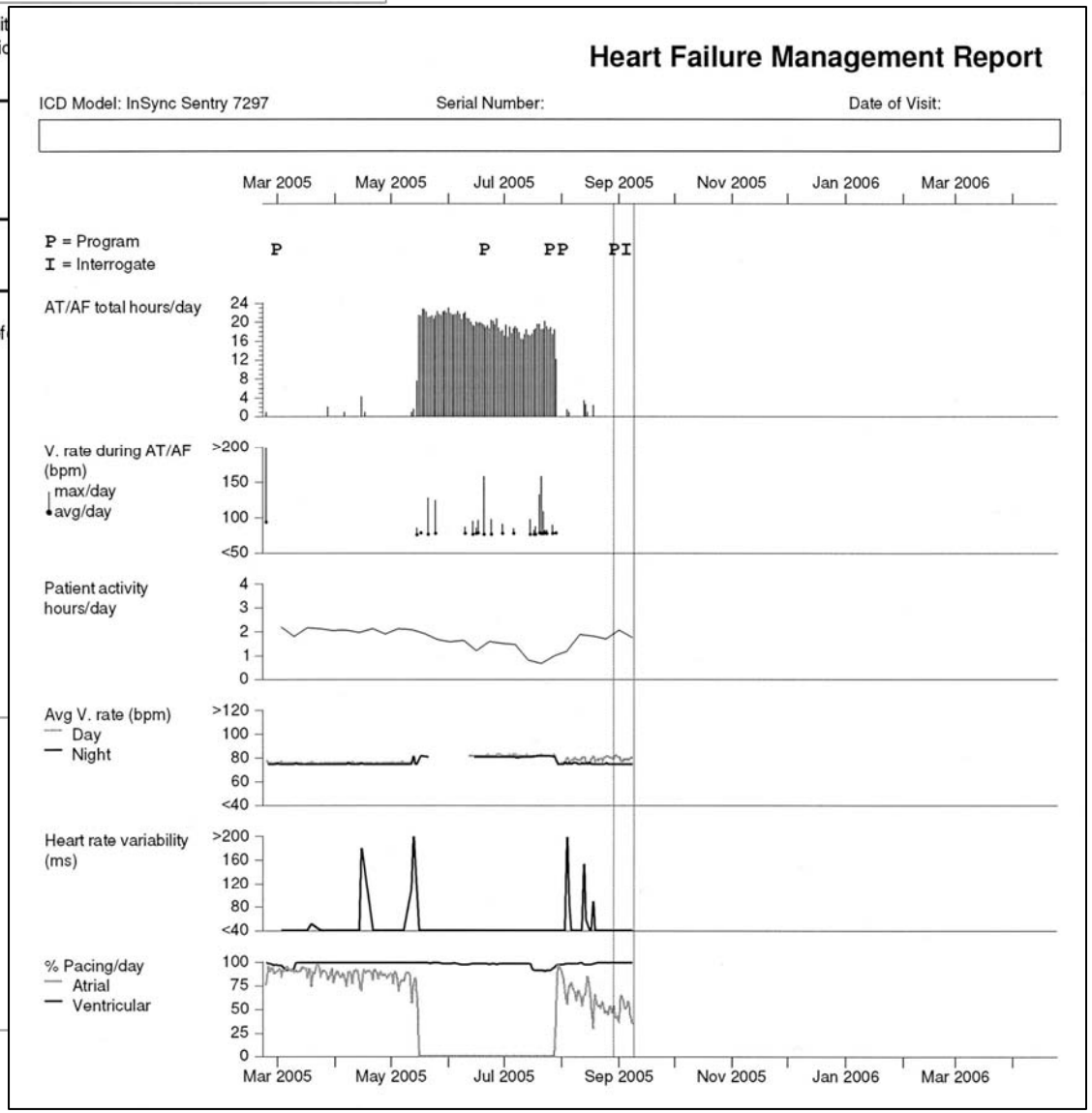
Observations (1) (Aug 30, 2005 to Sep 09, 2005)

- Patient activity averaged < 2 hr/day last week.

OptiVol Fluid Trends (Feb 2005 to Sep 2005)

OptiVol fluid index is an accumulation of the difference between the daily and ref





Heart Failure Management Report

ICD Model: InSync Sentry 7297 Serial Number: Date of Visit: Jul 22, 2005

Date of Birth		EF, on	20 % Dec 1,
History	Heart Failure	Implant	Mar 2, 2005

Clinical Status (Jun 21, 2005 to Jul 22, 2005)

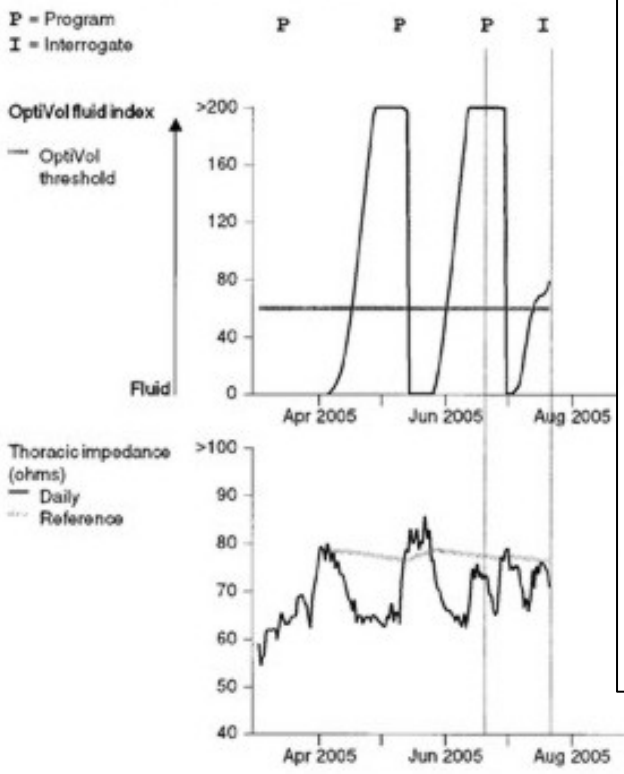
VT/VF	0 episodes	V. Pacing (V. beats)
AT/AF	0 episodes	Atrial Pacing
Time in AT/AF	0.0 hr/day (0.0 %)	

Observations (3) (Jun 21, 2005 to Jul 22, 2005)

- Possible fluid accumulation, Jul 21, 2005.
- V. Pacing (V. beats) less than 90%.
- Patient activity averaged < 2 hr/day last week.

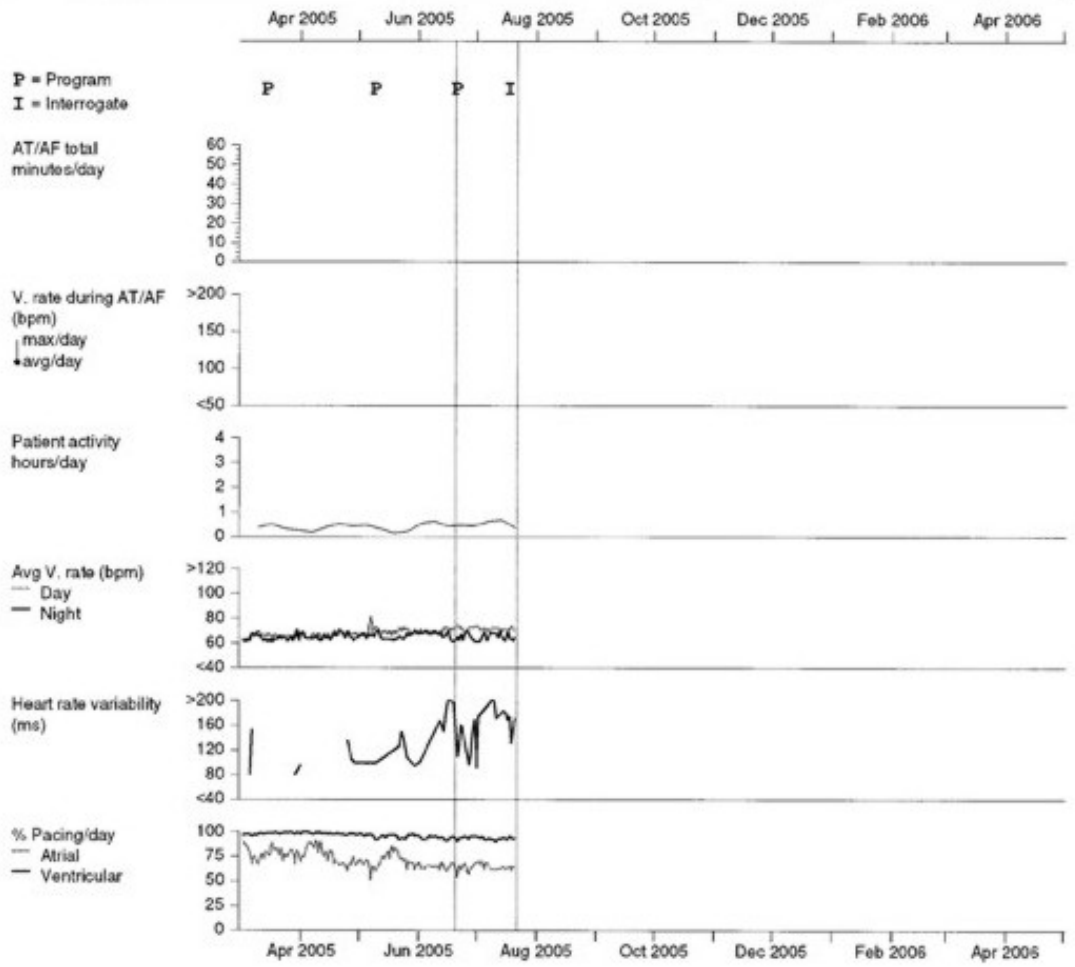
OptiVol Fluid Trends (Mar 2005 to Jul 2005)

OptiVol fluid index is an accumulation of the difference between the



Heart Failure Management Report

ICD Model: InSync Sentry 7297 Serial Number: Date of Visit: Jul 22, 2005



CHF CareLink frequency

Establish standard frequency for follow-up

- Monthly for routine Optivol HF monitoring?
- Increased transmissions for symptomatic or those patients with frequent fluid overload events

Develop protocol for communicating the frequency guidelines between HF and EP staff

Decide how the HF patient will be informed of the CareLink transmission frequency.

MEDTRONIC CARELINK® NETWORK

Giving Patients the Freedom to LIVE | LIFE

CardioSight™ Service

CardioSight Service offers heart failure clinics with direct access to exclusive, device-derived information tailored to the management of heart failure

Timely, direct access designed for clinicians who treat heart failure to enable them to respond quickly to significant clinical events.

Unique insights to help guide patient care

- Simple one touch operation
- Secure report delivery in minutes

CardioSight Service provides access to exclusive 90-day trended information in the Heart Failure Management or Cardiac Compass® Trends Report for many of Medtronic's ICD and CRT-D devices

CardioSight Reader

- Simple, one-touch operation
- Read-only access
- Clinic-based
- Reader works with multiple patients
- Requires standard telephone line

CardioSight Core Value: Direct Access, Unique Insight

Direct Access

Tool designed for the cardiology clinician to access relevant data for improved care and clinic efficiency

Unique Insight

Clinically relevant trend data, aligned across time. Indicators of the progression of heart failure include:

- OptiVol™ Fluid Trends
- AT/AF burden
- Heart rate variability
- Day and night heart rate

CardioSight Service Overview

1 Under a clinician's instruction at the clinic, the patient places the mouse-like antenna of the CardioSight Reader over the implanted device. Data are transferred to the reader.

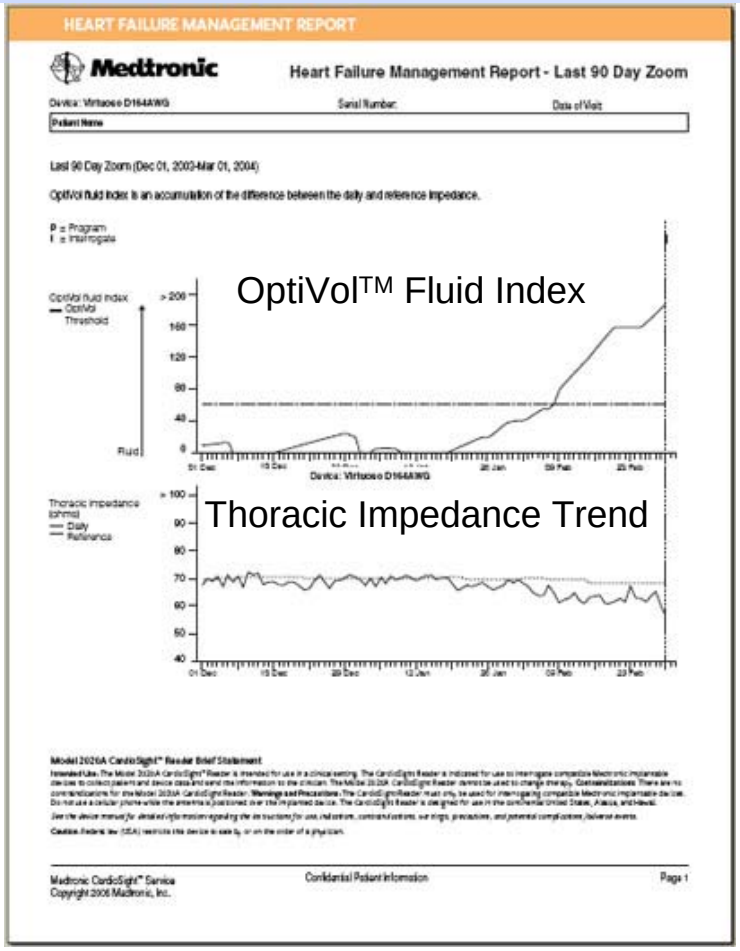
2 The reader transfers device data to a secure server via a standard analog phone line.The server then generates a Heart Failure Management or Cardiac Compass® Trends report. The report is sent to the clinician via fax with a privacy cover page.

3 The clinician reviews the cardiac trends (including OptiVol™ Fluid Trends if the device supports this feature) to help assess the patient's status.

Fax Machine

- Compatible with standard fax machines
- Each report comes with a privacy cover sheet and back sheet
- Fax can be sent to computer by using fax software

The Heart Failure Report
Cardiac Compass & OptiVol


HEART FAILURE MANAGEMENT REPORT

Medtronic

Heart Failure Management Report - Last 90 Day Zoom

Device: Virtuoso D164AWG | Serial Number: | Date of Visit

Patient Name

Last 90 Day Zoom (Dec 01, 2003-Mar 01, 2004)

OptiVol fluid index is an accumulation of the difference between the daily and reference impedance.

P = Program
I = Interrogate

OptiVol fluid index
OptiVol Threshold
Fluid

OptiVol™ Fluid Index

Device: Virtuoso D164AWG

Thoracic Impedance (ohms)
Daily
Reference

Thoracic Impedance Trend

Model 2026A CardioSight™ Reader Brief Statement

Medtronic CardioSight™ Service
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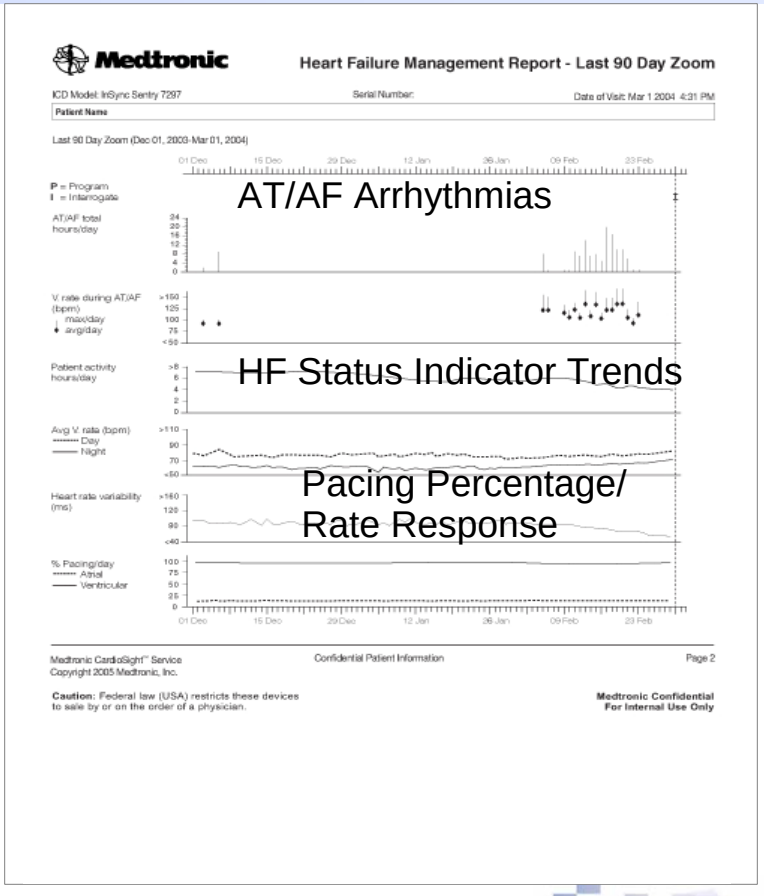
Confidential Patient Information

Page 1


Medtronic

Heart Failure Management Report - Last 90 Day Zoom

ICD Model: InSync Sentry 7297 | Serial Number: | Date of Visit: Mar 1 2004 4:31 PM

Patient Name

Last 90 Day Zoom (Dec 01, 2003-Mar 01, 2004)

P = Program
I = Interrogate

AT/AF Arrhythmias

AT/AF total hours/day

V. rate during AT/AF (bpm)
max/day
avg/day

HF Status Indicator Trends

Patient activity hours/day

Avg V. rate (bpm)
Day
Night

Pacing Percentage/
Rate Response

Heart rate variability (ms)

% Pacing/day
Atrial
Ventricular

Medtronic CardioSight™ Service
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Confidential Patient Information

Page 2

Caution: Federal law (USA) restricts these devices to sale by or on the order of a physician.

Medtronic Confidential
For Internal Use Only

MEDTRONIC CARELINK® NETWORK

Giving Patients the Freedom to LIVE | LIFE

Paceart® System

Paceart is the leading in-clinic arrhythmia data management system.

Paceart System organizes relevant information:

- Stores programmed device parameters
- Summarizes patient session data into concise, convenient reports.
- Offers advanced TTM technologies.
- Creates key correspondence.
- Schedules patient follow-ups.
- Speeds records processing.
- Assists in charge and billing management

Adaptable solutions

- One system, many devices
- EMR Interoperability

Today, Paceart systems are installed in over 1,000 clinics managing more than 1.5 million patients with implanted cardiac devices

Many Information Systems May Co-Exist Due To Complex Information Needs in Healthcare Provider Settings

An **Electronic Health Record (EHR**) is an electronic record of patient health information in multiple encounters and can combine multiple specialties, e.g. immunization, labs, radiology, etc. with key features including orders, prescription writing, charting, workflow management, clinical alerts, and decision support

A **Practice Management System** (PMS) is a specialized system for scheduling and billing which may be part of the HER or a separate system.

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Giving Patients the Freedom to LIVE | LIFE

Many Information Systems May Co-Exist Due To Complex Information Needs in Healthcare Provider Settings

Remote device follow-up systems such as Medtronic CareLink Network store a patient's device data collected remotely.

Medtronic Paceart System is a specialized device clinic workflow and information management application that complements other healthcare information systems.

Health Level Seven (HL7) is the name of an organization that has developed a messaging standard (also known as HL7) which facilitates sharing of data across healthcare information systems.

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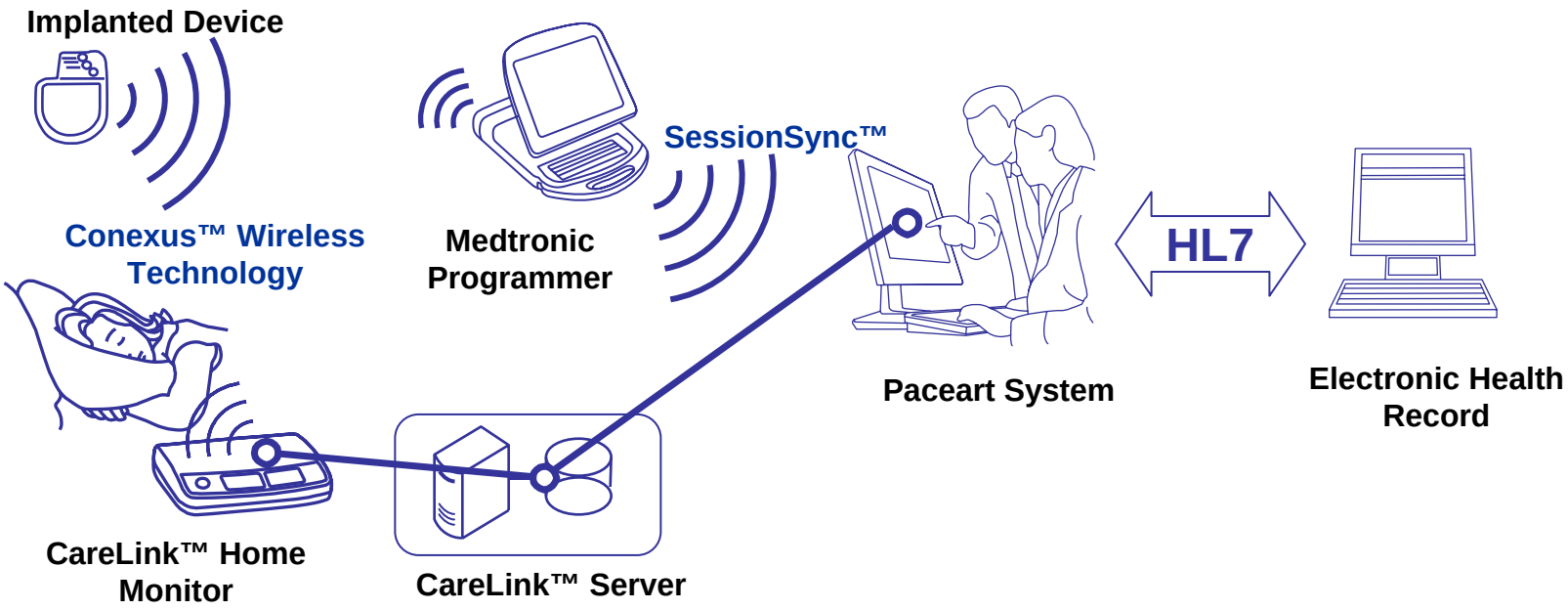
Giving Patients the Freedom to LIVE | LIFE

HL7 CONNECTS DEVICE DATA TO THE EHR



MEMBER 2007
ANSI Accredited Standards Developer

DATA INTEGRATION ENHANCES WORKFLOW

Eliminate Duplicate Data	▪ Eliminates Double Registration and Scheduling in Paceart and PMS
Reduce Data Entry Burden	▪ Reduces amount of scanning ▪ Reduces manual entry of data and potential for errors
Data Access	▪ Make vital device information more widely available to clinicians in the EHR, including ER, anesthesiology, surgery, etc.
Database Development	▪ Getting discrete data elements into the EHR makes the transition from “document management” to a “data management” model
Workflow Coordination	▪ Improve coordination of Paceart based device clinic workflow with other aspects of clinic workflow in PMS and EHR

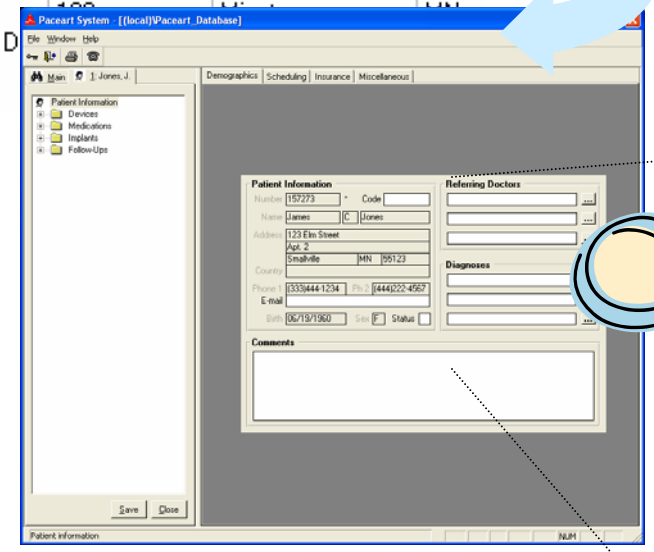
PATIENT RECORD OF JAMES JONES IN PACEART HAS BEEN POPULATED BY INFORMATION RECEIVED VIA HL7

Medtronic
Alleviating Pain · Restoring Health · Extending Life

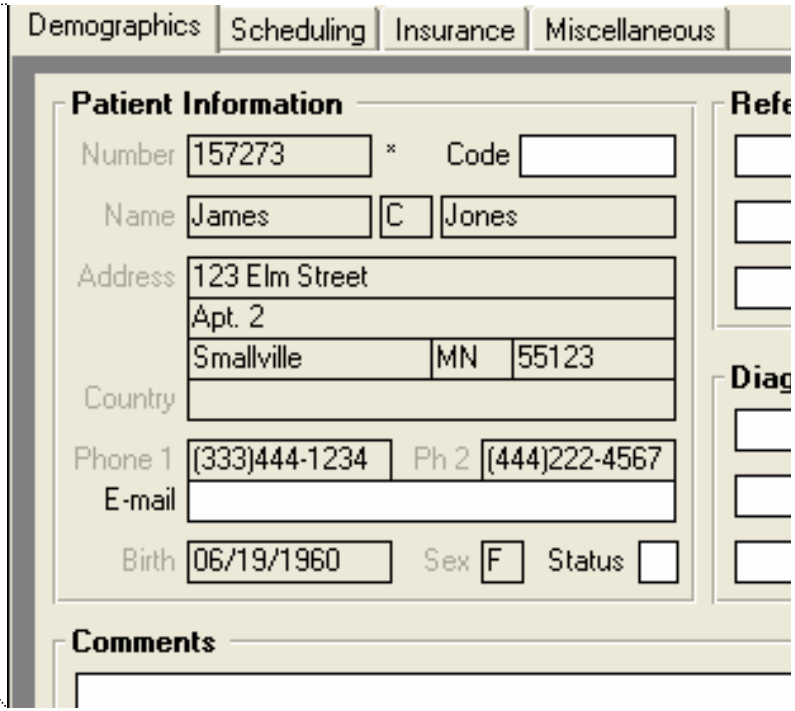
Results: 11 matches

Patient Name	ID	City	State
Diamond, Vivian T.	101	Clancy	MN
Ireland, Charles P.	102	Eden Point	MN
Ironwing, George U.	103	Cedar Falls	MN
Jones, James C.	157273	Smallville	MN
Marcus II, Ivan N.	104	Arden Valley	MN
Martin, George E.	105	Barrington	MN
Maslaski, Stan J.	106	Columbia Heights	MN
Morse, Samuel J.	107	Clancy	MN
Paulson, Edward N.			
Reynolds, Kathleen D			
Roth, Alice R.			

Double Click



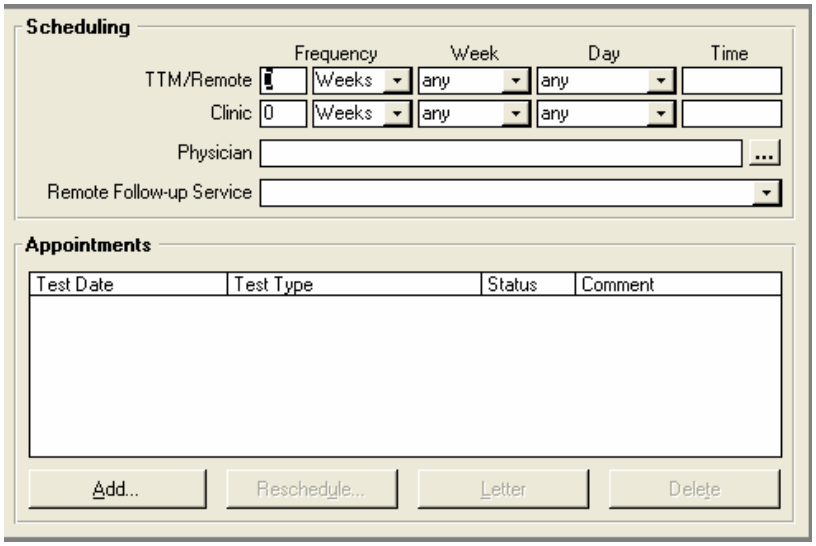
- Having a single source for demographic information frees clinicians from managing the administrative task of adding and updating demographics



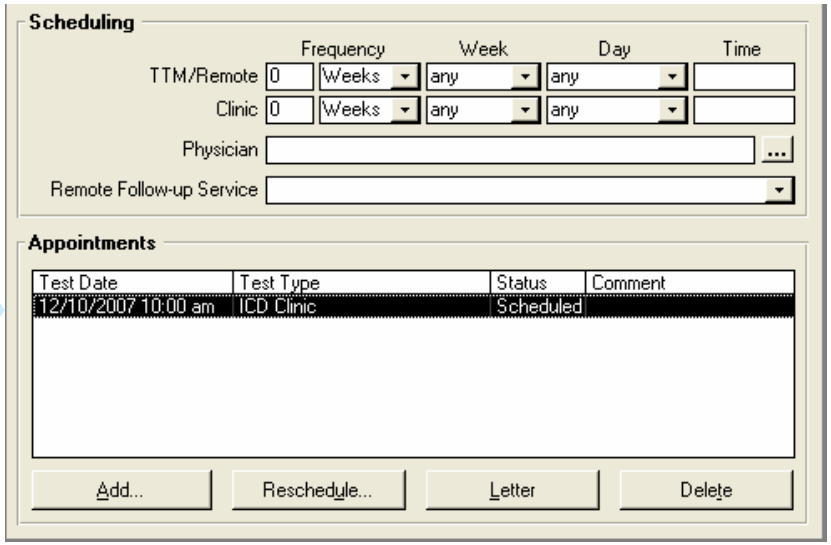
NEW APPOINTMENT FOR JAMES JONES IS AUTOMATICALLY CREATED IN PACEART VIA HL7

- **A new appointment for James Jones is created in the Practice Management System**
- **Paceart receives an HL7 message from the Practice Management System about this appointment**

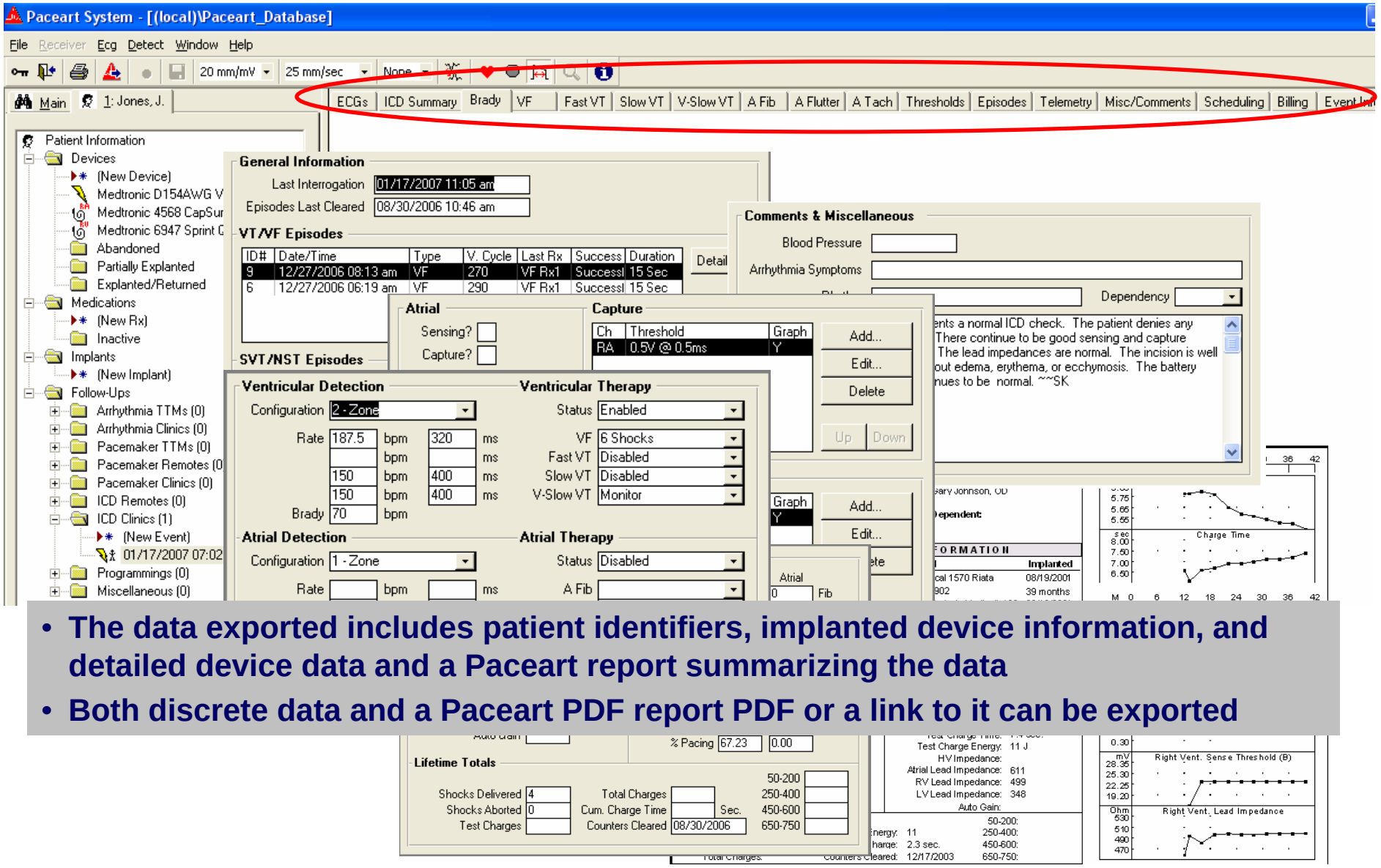
Paceart Connectivity



Updated



DEVICE DATA SENT TO THE EHR VIA HL7 INCLUDES THE DETAILED INFORMATION IN PACEART



- **The data exported includes patient identifiers, implanted device information, and detailed device data and a Paceart report summarizing the data**
- **Both discrete data and a Paceart PDF report PDF or a link to it can be exported**

For the “constellation of caregivers”…

With Medtronic devices, information flows to wherever it is needed, whenever it is needed, and in formats customized to the user

In summary

Access to remote device data helps both the Device clinic and the Heart failure clinic

Establishing workflow protocols to provide sharing of data will benefit all

Providing excellent, coordinated and timely care to the patient is key.

MEDTRONIC CARELINK® NETWORK

Giving Patients the Freedom to LIVE | LIFE

Thank You For Your Attention!

MEDTRONIC CARELINK® NETWORK

Giving Patients the Freedom to LIVE | LIFE