



MASSACHUSETTS
GENERAL HOSPITAL

NURSING

Technological Advances: Setting Standards for Nursing Practice

Diane L. Carroll, PhD, RN, NFESC, FAHA, FAAN

Yvonne L. Munn Nurse Researcher

Massachusetts General Hospital

Boston, MA USA



Cardiovascular Nursing

- Nursing care that focuses on the optimization of cardiovascular health across the lifespan
- Cardiovascular health is reflected in a lifestyle that prevents or delays the development or progression of cardiovascular disease
- This care includes:
 - Prevention
 - Detection
 - Treatment



MASSACHUSETTS
GENERAL HOSPITAL

NURSING

Elements of Cardiovascular Nursing

- Development of preventive programs that promote heart health
- Education and counseling about heart health
- Nursing interventions tailored to:
 - Promote physiologic, psychological and psychosocial homeostasis
 - Optimize behavioral change and treatment adherence
 - Advocate to support patients and families



Cardiovascular Nursing Standard

- The cardiovascular nurse collects comprehensive data pertinent to the patient's health or the situation
 - Assessment of patient parameters
 - Bedside
 - Wearable /Implantable
 - Tele management



MASSACHUSETTS
GENERAL HOSPITAL

NURSING

Cardiovascular Nursing Standard

- Current trends in monitoring
 - Integration of monitoring and clinical information systems
 - Reduces redundancy
 - Reduces medical errors by using standardized language
 - Wearable/Implantable
 - Monitoring in ‘real time’ at a distance
 - Communication link to provider
 - Remote
 - Patient comfort/safety
 - Detection



CV Implantable Electronic Devices (CIED)

- Pacemakers – 465,000 implanted in Europe in 07
 - 1970s: Trans telephonic monitoring (TTM) - limited data acquisition
 - 2000: Recommendations for direct patient follow-up
- Implantable Cardioverter Defibrillators (ICD)/Cardiac Resynchronization Therapy (CRT) – 88,000 ICD & 61,000 CRT implanted in Europe 07
 - 2004: Internet /radiofrequency transmission of functioning or an event
- Implantable Loop Recorders
- Implanted Cardiovascular Monitors for heart failure management by intracardiac pressure monitoring



CIED Remote Surveillance

- **Benefits**

- Reliable data
- 99% sensitivity for detecting problems
- Reduced staff and cost burden
- Early detection

- **Barriers**

- Continuous contact → patient anxiety
- Reimbursement

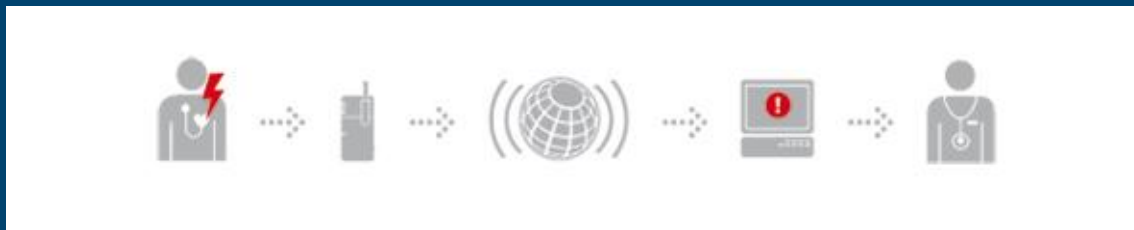


Biotronik: Home MonitoringTM

- Daily automatic information on functioning



- Events: symptoms and/or alert



Medtronic CareLink®

SECURE DATA TRANSFER FROM PATIENT TO CLINIC . . . IN MINUTES



1 While at home, work, or traveling,³ the patient holds the mouse-like antenna of the Medtronic CareLink Monitor over the pacemaker.

Data are transferred from the device to the monitor.



2 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.



MASSACHUSETTS
GENERAL HOSPITAL

NURSING

Medtronic CareLink®


Log Off

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

Quick Look - LastName007, 135590-001

[All Sends](#)

[Address, Phone, etc.](#)

This Transmission:

[Current EGM](#)

[QuickLook](#)

[Patient Alert](#)

[Episodes](#)

[Counters](#)

[Battery/Lead Status](#)

[Parameters](#)

[Patient Info](#)

Reports:

Print...

Print This Page

[Important Medical Record Information](#)

ICD Model: Gem II DR 7273 Serial Number: PJK135590H Date of Interrogation: Feb 12 2002 9:25AM

Clinical Status: Since Nov 26, 2001

Episodes	Count	% Pacing	Percentage
VF	0	AS-VS	2 %
FVT	0	AS-VP	17 %
VT	0	AP-VS	3 %
SVT	0	AP-VP	78 %
NST and others	138		
Mode Switch	46		

Observations (1)

- The VF Detection Interval (FDI) is < 300 ms. May result in delayed detection of VF.

ICD Status

Battery Voltage (ERI=2.55 V, EOL=2.40 V)	2.61 V	Feb 12, 2002
Last Full Energy Charge	9.11 sec	Jan 12, 2002
Last Capacitor Formation (Interval=3 month)		Jan 12, 2002

Lead Information

ICD	Medtronic	Gem II DR 7273	PJK999999H	Nov 18, 1999
Atrial	PACSETTER	TENDRIL DX-...	0000000000	Nov 18, 1999
RV/SVC	Medtronic	6940 CapSur...		Nov 18, 1999

Lead Performance	Atrial	Ventricular	Date
Pacing Impedance	378 ohms	481 ohms	Feb 12, 2002

Other CIEDs:

- Loop Monitor
 - Recording of heart rhythm
- Cardiovascular Monitors
 - Left atrial pressure
(Ritzema et al. (2010) Circulation)
 - Thoracic impedance
(Yu et al., (2005), Circulation)



Impact on Nursing Practice

- Accountability/Scope of Practice
- Nurse workflow
- Role of the expert nurse to filter critical events
- Algorithms for treatment
 - Assessment of arrhythmias
 - Assessment of fluid status
- Role in system improvements



MASSACHUSETTS
GENERAL HOSPITAL

NURSING

Cardiovascular Nursing Standard

- The cardiovascular nurse employs strategies to promote health and a safe environment
 - Health teaching
 - Counseling
 - Patient/Family Support



MASSACHUSETTS
GENERAL HOSPITAL

NURSING

ICD Recipient and Driving

- Consensus statement from AHA, HRS, and EHRA set the standard for ICD patient
- Private driving restrictions:
 - US
 - Primary – 1 week
 - Secondary – 6 months
 - EU
 - Primary – 4 weeks
 - Secondary – 3 months
- Professional driving restrictions:
 - permanent



(Epstein et al., 2007; Vijgen et al., 2009)



MASSACHUSETTS
GENERAL HOSPITAL

NURSING

Impact on Nursing Practice

- Patient, Family and Society
 - Rights of Individual and Good of Society
 - Laws, Policy, Guidelines
- Standardized Information
 - Patient
 - Family



MASSACHUSETTS
GENERAL HOSPITAL

NURSING

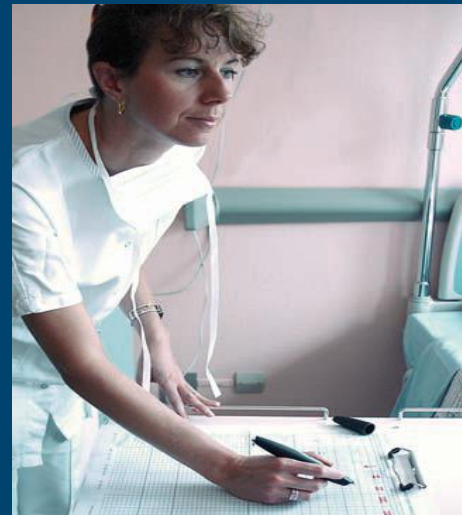
Cardiovascular Nursing Standard

- The cardiovascular nurse analyzes the assessment data to determine the nursing diagnosis or health–related issues.
 - Derives the diagnoses or issues based on assessment data that reflects the patient’s current clinical condition
 - Systematically compares and contrasts clinical findings with normal/abnormal variations



Data Acquisition

- Intermediate technologies are needed to "bridge" the gap between paper and electronic systems as a means to improve:
 - work flow efficiency
 - patient safety
 - compliance
 - quality
- through data acquisition at the point of care



MASSACHUSETTS
GENERAL HOSPITAL

NURSING

Technology

- Feasibility of digital pen and paper technology as a means to capture data in the context of acute care workflows/research site.
 - Patient use
 - Relaying signs, symptoms, metrics to providers
 - Nurse use
 - Use at point of care by professionals and para-professionals



Remote Symptom Monitoring

- Communication Systems:
 - Pen and Paper
 - Digital pens
(Dykes et al., 2007)
 - Telephone Systems
 - Health Buddy
(Zimmerman et al., 2007)



MASSACHUSETTS
GENERAL HOSPITAL

NURSING

Impact on Nursing Practice

- Nurse workflow
- Partnerships with patients
- Patient education



MASSACHUSETTS
GENERAL HOSPITAL

NURSING

Future Considerations

- Novel remote methods for monitoring cardiovascular patients responses to disease, medication and treatment
- Cardiovascular nurses as experts in assessment of patient responses
- Development of evidence for nursing practice
 - Generation of best evidence for CV monitoring
 - Expertise in defining consensus documents for CV pts
 - Development of tools for symptom assessment



Conclusions

- **Cardiovascular nurses need to be:**
 - technology experts
 - skilled in transitional care issues
 - effective/efficient in data capture
 - able to partner with patients and families to emphasize personal responsibility
 - life-long learners



ESC Council on

Cardiovascular Nursing and
Allied Professions



**EUROPEAN
SOCIETY OF
CARDIOLOGY®**



MASSACHUSETTS
GENERAL HOSPITAL

NURSING