Conflict of Interest

• None
Acknowledgments: It takes a village!

- Dr. Susanna Mak
- Dr. Heather Ross
- Dr. James Downar
- Dr. Amna Husain
- Dr. Jennifer Arvinitis
- Dr. Russell Goldman
- Bhadra Lokuge
- Dr. Deb Selby
- Dr. Janna Pilkey
Objectives

1. Review the nomenclature, pathophysiology, treatment in HF
2. Explore the challenges in palliating this population
3. Explore an approach based on Chronic Disease Management Principles
   • Assess, educate, treat, support, plan
Who Am I?

Leah Steinberg
Mount Sinai Hospital:
  Consult service
  Home-based team
  Clinics
How I became interested in HF and PC
Who are you?

What do you do?

What are your experiences with HF patients?

What are your experiences with cardiology?

What are your learning needs for these days…
Objective #2: Basics of HF

Pathophysiology
Heart Failure

- Activation of RAAS
- Increased pro-inflammatory Cytokines (TNFα & others)
- Increased Norepinephrine

Sleep-disordered breathing

Pulmonary congestion (acute or severe)

Muscle remodeling

Myopathy (skeletal, respiratory & cardiac)

Catabolic state

Dyspnea

Anxiety
Depression

Fatigue

Anorexia
Cachexia

Ergoreflex Activation

Increased ventilatory response to exercise

Sarah J Goodlin, J of Am Coll of Cardiology, 2009
MUSCLE DAMAGE

- RAAS
- Norepinephrine
- SNS
- TNF α
- Inflammatory Oxidative stress

End organ hypoperfusion
- Renal dysfunction
- Confusion
- Fatigue
- GI dysfunction

Muscle Remodelling
- Hypertrophy
- Fibrosis
- Apoptosis

LV Dysfunction

Neuro-Hormonal Activation
- Edema
- Ascites
- Anorexia
- Early satiety
- RUQ pain
- Dyspnea

Sinai Health System
Stages of HF

Class I: Symptoms with more than ordinary activity

Class II: Symptoms with ordinary activity

Class III: Symptoms with minimal activity
  - Class IIIa: No Dyspnea at rest
  - Class IIIb: Recent Dyspnea at rest

Class IV: Symptoms at rest
AHA CLASS – ACC/AHA

A - Risk factor or predisposition (no structural disease)

B - Structural disease, no symptoms

C - Disease and symptoms at any time

D - Disease and requires advanced treatment (ICD, LVAD)
Pathophysiology Categories:

**HFrEF (50%)**
- EF < 50%

**HFpEF (50%)**
- EF normal
- Challenging
- Similar morbidity and mortality
- Older age, women, HTN
Treatment of HF

B Blockers
ACE I/ARB
Hydralazine/Nitrates
Diuretics
Nitrates
Digoxin
Salt and fluid restriction
Treatment of HF in the elderly

Side-effects more likely
Not included in most HF studies
Often need lower doses
Other treatments

Cardiac Resynchronization Therapy
Implantable Cardiac Defibrillators (ICDs)
LVAD Left Ventricular Assistance Device
Transplant
MUSCLE DAMAGE

End organ hypoperfusion
- Renal dysfunction
- Confusion
- Fatigue
- GI dysfunction

Symptoms
- Edema
- Ascites
- Anorexia
- Early satiety
- RUQ pain
- Dyspnea

Muscle Remodelling
- Hypertrophy
- Oxidative stress
- Fibrosis
- Apoptosis

ACE Inhibitors
- Beta blockers

Neuro-Hormonal Axis
- RAAS
- Norepinephrine
- SNS
- TNF α
- Inflammatory
- Na and Water retention
Resources for treatments

• 2013 AHA Guidelines
• European Society of Cardiology Guidelines
Learning Objective #2

Challenges to Traditional Palliative Care Model
Trajectory: Oncology

Onset of incurable cancer → Often a few years, but decline usually < 2 months

Possible hospice enrolment → Death
A Tale of Two Illnesses

Cancer
- Chemotherapy
- Often a transition point
- Public awareness that cancer can cause death
- Investigations “show” progression
- Understanding variable
- Goals of care

Heart Failure
- HF medications continue
- No transition points
- Little awareness of
- “I have a weak heart”
- Goals variable
Complexity of health care team

Often multiple providers with:
• different clinical goals and priorities,
• different resources,
• and different health care and organizational systems
Prognostication:

Prognostication underlies the infrastructure in palliative care

But, in HF – prognostication defies us!
Table 2. European Society of Cardiology Criteria for Advanced Chronic Heart Failure

1. Moderate to severe symptoms of dyspnea and/or fatigue at rest or with minimal exertion (NYHA functional class III or IV)
2. Episodes of fluid retention and/or reduced cardiac output
3. Objective evidence of severe cardiac dysfunction demonstrated by at least 1 of the following:
   - Left ventricular ejection fraction <30%
   - Pseudonormal or restrictive mitral inflow pattern by Doppler
   - High left and/or right ventricular filling pressures, or
   - Elevated B-type natriuretic peptide
4. Severe impairment of functional capacity as demonstrated by either inability to exercise, 6-min walk distance <300 m, or peak oxygen uptake <12 to 14 mL·g⁻¹·min⁻¹
5. History of at least 1 hospitalization in the past 6 mo
6. Characteristics should be present despite optimal medical therapy

NYHA indicates New York Heart Association.
Reprinted from Metra et al,²⁰ with permission of the publisher. Copyright © 2007, Oxford University Press.
More than 100 variables have been associated with mortality and re-hospitalization in heart failure

- **General**
  - Age, diabetes, sex, weight (BMI), etiology of HF,
  - comorbidities (COPD, cirrhosis)
- **Laboratory markers**
  - Na, creatinine (and eGFR), urea, BUN,
  - Hgb, % lymphocytes,
  - uric acid
  - Low HDL
  - Insulin resistance
- **Urine**
  - Abluminuria
  - NGAL - neutrophil gelatinase associated lipocalin
- **Biomarkers**
  - BNP, NT pro BNP, troponin, CRP, cystatin C, GDF-15 (growth differentiation factor), serum cortisol, TNF, ET, NE, midregional-pro-adrenomedullin (MR-proADM), pro-apoptotic protein apoptosis-stimulating fragment (FAS)
- **Medication**
  - Intolerance to ACEI, diuretic dose
- **Cardiopulmonary markers**
  - Peak VO2, % predicted, VE/VCO2, AT, workload, systolic BP < 130, HR recovery
- **Clinical Exam markers**
  - BP (admission and discharge), heart rate, JVP, +S3, cachexia
  - Depression
  - Obstructive sleep apnea
- **Echo parameters**
  - EF, chamber size (LV, LA, RA), sphericity,
  - RNA
  - RVEF, LVEF
- **Recurrent hospitalizations**
- **ECG**
  - IVCD
- **Hemodynamic markers**
  - PA pressures, CO, CI, MVO2
- **Endomyocardial biopsies**
  - Microarrays transcriptomic biomarkers
- **Marital status**
Consistent Predictors

Increasing age
Lower ejection fraction
Higher NYHA class

Hyponatremia
Elevated and rising BUN
Repeated admissions to hospital

From Selby, D. 2008
Yet another way:

Assess knowledge, educational needs, goals and symptoms

Provide care based on:

- FUNCTION and NEEDS, not prognosis
Because we know:

Palliative Care strongly advocated

- ACC/AHA Practice Guidelines
- European Society of Cardiology
- Heart Failure Society of America
- Canadian Cardiovascular Society

Needs well-documented in many studies

Palliative Care specialists often not involved
Guidelines …

• How should we implement these guidelines?
• What is the structure?

• Little guidance in the literature
• Growing, but small amount of evidence for any particular intervention
Palliative Care in Heart Failure

The PAL-HF Randomized, Controlled Clinical Trial

Joseph G. Rogers, MD, a,b Chetan B. Patel, MD, a,b Robert J. Mentz, MD, a,b Bradi B. Granger, PhD, MSN, RN, c Karen E. Steinhauser, PhD, a,d Mona Fiuzat, PharmD, a Patricia A. Adams, BSN, CCRC, a Adam Speck, BS, a Kimberly S. Johnson, MD, a,b Arun Krishnamoorthy, MD, e Hongqiu Yang, PhD, b Kevin J. Anstrom, PhD, b,f Gwen C. Dodson, MSN, a Donald H. Taylor Jr, PhD, MPA, a,g,h Jerry L. Kirchner, BS, CCRP, b Daniel B. Mark, MD, a,b Christopher M. O’Connor, MD, a,i James A. Tulsky, MD j,k
The PAL-HF Study Randomized 150 Patients With Advanced Heart Failure to Usual Care or Usual Care + a Multidimensional Palliative Care Intervention

Usual Care Alone (n = 75)

Usual Care + Palliative Care (n = 75)

Kansas City Cardiomyopathy Questionnaire

Functional Assessment of Chronic Illness Therapy-Palliative Care Scale

![Graph showing the comparison between usual care alone and usual care + palliative care in terms of KCQ and FACIT-PAL scores over 24 weeks.](image-url)
FIGURE 2  Mean Quality-of-Life Measures by Treatment Group Over Time for the Key Secondary Outcome Measures

A

B

C

Arm: ▲ Usual Care + Intervention  ● Usual Care
Palliative Care Interventions for Patients with Heart Failure: A Systematic Review and Meta-Analysis

Michelle S. Diop, BA¹,²,* James L. Rudolph, MD, SM²,⁴,* Kristin M. Zimmerman, PharmD, CGP⁵
Mary A. Richter, MD⁶ and L. Michal Skarf, MD⁷,⁸
FIG. 1. Flow diagram of study selection process.
Meta-analysis

• 5 articles with home-based care

FIG. 2.  Meta-analysis of readmissions.
Improvement in symptoms documented

- Dyspnea
- Sleep
- Mood
Conclusion:

• So evidence is starting to show:

• Palliative care intervention -- ???

• In patients -- ????

• Does something -- ?????
Assessment and Management of End Stage Heart Failure: The Role of Palliative Care
Framework for Palliation

- Identification and Assessment
- Treatment
- Support
- Planning
Framework for Palliation

Assessment

- Illness Understanding
- Education
- Goals of care
- Symptoms
Patient and family understanding

Different from oncology

Often starts with education – patient-centered

Best done with family members

Challenging in HF?

Cognitive impairment in 25 – 50%
2. Educate patients and families

- Takes time
- Draw trajectory --
- Wait for opportunities –
- Standardize triggers --
- Do you have patient information to give out?
- ../Documents/WORK/HF/HearfFull/For Adriana/Caregiver booklet layout v5.pdf
Communication work

• What techniques do you use to have these conversations?

• What skills do you know to do this?

• Have you had training in communication skills?
3. Talk about goals of care

• Try and talk about life and living, not treatments

• Cardiology tends to focus on treatments, outcomes and statistics

• Ask instead: How do you want to live?

• Help from our colleagues here…
ASK/TELL/ASK
Beginning the conversation: ASK

• “Tell me what you can do and can’t do”
• “How is your heart problem affecting you now”
• “what could you do last year -- has that changed?”
• Do you know why this is happening?
• Do you want me to tell you why these things are happening?
Ask

• “What is important to you now?”
• “What are you hoping for?”
• what is important in life outside of the hospital; “
• What is your biggest concern right now?”
• “When you think about the future, what are the things you want to avoid?”
Framework for Palliation

Treatment

• Create team
  • Communication strategy
  • Ensure real-time support
  • Monitoring and communication plan
• Medication management
  • Diuretic protocol
  • PICC line
  • De-prescribing
1. Create a Collaborative Team

• Link to challenge: variable trajectory and hard to prognosticate

• Location determines team – but what can you create in your environment?
• Cardiology?
• Family medicine?
• Nephrology?
• Home care?
Collaborative team

• We learned that cardiology viewed themselves as integral to EOL care

• Didn’t want to “hand off patient”

• That was different for palliative care

• Cardiology preferred a Collaboration with palliative care
Collaborative team

• Explained we could help with management at home –

• Could use IV diuretics at home, so didn’t have to stay in hospital

• Could use oxygen at home…

• Could see cardiologist in clinic if needed…
Collaborative team

- Simple

- Provided direct support and communication
2. Continue HF management

Evidence exists for use of:

- ACE Inhibitor – continue to use
- ARB – continue to use
- B Blocker – continue to use
- Aldosterone blocker – continue to use

**Try** to keep in this patient population – unlike oncology
3. Monitoring and Communication

• Teach patients (Caregivers) to monitor symptoms and weight
• Who will patient contact
• Response in hours, not days
4. Assess and Treat Symptoms

Dyspnea        Fatigue
Depression     Nausea
Anxiety        Pain
Insomnia
**Edmonton System Assessment Scale (ESAS)**

Please circle the number the best describes each of the following symptoms you are experiencing right now (at time of assessment):

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Scale</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>No pain</td>
<td>0-10</td>
<td>Worst possible pain</td>
</tr>
<tr>
<td>Not tired</td>
<td>0-10</td>
<td>Worst possible tiredness</td>
</tr>
<tr>
<td>Not nauseated</td>
<td>0-10</td>
<td>Worst possible nausea</td>
</tr>
<tr>
<td>Not depressed</td>
<td>0-10</td>
<td>Worst possible depression</td>
</tr>
<tr>
<td>Not anxious</td>
<td>0-10</td>
<td>Worst possible anxiety</td>
</tr>
<tr>
<td>Not drowsy</td>
<td>0-10</td>
<td>Worst possible drowsiness</td>
</tr>
<tr>
<td>Best appetite</td>
<td>0-10</td>
<td>Worst possible appetite</td>
</tr>
<tr>
<td>Best feeling of well-being</td>
<td>0-10</td>
<td>Worst possible feeling of well-being</td>
</tr>
<tr>
<td>No shortness of breath</td>
<td>0-10</td>
<td>Worst possible shortness of breath</td>
</tr>
<tr>
<td>Other problem (describe)</td>
<td></td>
<td>Least possible other symptom</td>
</tr>
<tr>
<td>Least possible other symptom</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Assess and Treat Symptoms

Dyspnea
Depression
Anxiety
Insomnia
Fatigue
Nausea
Pain
Dyspnea

Treat reversible cause if appropriate

NSAID? infection? Pizza?

Continue HF medications if possible

Diuresis if congested, allow BUN/Cr to rise

Titrate O2 if symptomatically helpful

Non-pharmacologic management

If still symptomatic, opioids are effective
Managing decompensations

• No clinical guidelines
• Very little evidence
• Based on expert opinion and practice
Home diuretic protocol

For patients whose goals of care are to avoid hospitalization and invasive testing and monitoring

Develop a home-based diuretic protocol
Change in Patient Symptoms/Signs
- Dyspnea
- Orthopnea
- Edema
- Weight gain

ASSESSMENT
On history ask about:
- Medication non-adherence
- High salt
- Infection
- NSAIDs

On exam:
- Increased JVP
- Increased ‘crackles’
- Increased peripheral edema
- PICC line

Heart Failure Decompensation

Heart Failure Decompensation

Initiate RN daily monitoring x 7 days
If HF decompensation

Management
1. Order: RN to monitor symptoms, vitals, ± weight, and call MD daily x 7 days
   (see order template link)
2. Consider: Labwork, dietary counseling, foley catheter, IV line, IV supplies
3. Escalate diuresis: See next step for outline, page 2 for details
4. Consider: Call to cardiologist to inform

Escalation of Oral Therapy
Consider escalation of oral therapy if:
- Success with previous oral escalation
- Patient preference
- Bridging to delivery of intravenous therapy

Oral escalation guidelines - See next page

Initiate Intravenous Therapy
Consider IV if:
- Unresponsive to previous oral escalation
- Already on high dose therapy (>200 mg/day)
- Known resistance to diuretics
- Renal insufficiency
- Shortness of breath at rest

4-day IV dosing guidelines - See next page

Based on Goals of Care consider:
- Reassessment in HF clinic
- ED/Inpatient management
- Transition of therapy to end-of-life pathway

Symptom improvement

No

Yes

Supplement K
- Resume previous PO flurosemide dose
- Consider increasing PO flurosemide dose
- PICC line if anticipate reoccurrence
Change in Patient Symptoms/Signs
- Dyspnea
- Orthopnea
- Edema
- Weight gain

ASSESSMENT
On history ask about:
- Medication non-adherence
- High salt
- Infection
- NSAIDs

On exam:
- Increased JVP
- Increased ‘crackles’
- Increased peripheral edema
- PICC line

Heart Failure Decompensation

No
Leave protocol

Yes
Initiate RN daily monitoring x 7 days

If HF decompensation

Heart Failure Decompensation
Uncertain

MANAGEMENT
1. Order: RN to monitor symptoms, vitals, ± weight, and call MD daily x 7 days (see order template link)
2. Consider: Lab work, dietary counseling, foley catheter, IV line, IV supplies
3. Escalate diuresis: See next step for outline, page 2 for details
4. Consider: Call to cardiologist to inform

Escalation of Oral Therapy
- Consider escalation of oral therapy if:
  - Success with previous oral escalation
  - Patient preference
  - Bridging to delivery of intravenous therapy

Oral escalation guidelines - See next page

Initiate Intravenous Therapy
- Consider IV if:
  - Unresponsive to previous oral escalation
  - Already on high dose therapy (>200 mg/day)
  - Known resistance to diuretics
  - Renal Insufficiency
  - Shortness of breath at rest

4-day IV dosing guidelines - See next page

Based on Goals of Care consider:
- Reassessment in HF clinic
- ED/Inpatient management
- Transition of therapy to end-of-life pathway

Symptom improvement

No

Yes

Initiate Intravenous Therapy

- Supplement K
- Resume previous PO flurosemide dose
- Consider increasing PO flurosemide dose
- PICC line if anticipate reoccurrence
Assessment

Medication Use
- NSAIDS
- Salt intake
- Infection

JVP
CVS
Chest
Edema

Management

1. Order: daily RN visits
2. Consider: Labs, dietary counseling, foley, IV and supplies
3. Escalate diuresis or monitor symptoms
4. Consider: Call to cardiologist to inform

Symptom improvement??

Initiate Intravenous Therapy
Use IV if:
- Unresponsive to previous oral escalation
- Already on high dose therapy (>200 mg/day)
- Known resistance to diuretics
- Renal insufficiency
- Shortness of breath at rest

SC 4-day IV dosing guidelines – next page

Escalation of Oral Therapy
Consider escalation of oral therapy if:
- Success with previous oral escalation
- Patient preference
- Bridging to delivery of intravenous therapy

Supplement K
Resume previous PO lasix dose
PICC line if anticipate recurrence

Initiate Intravenous Therapy
Consider IV if:
- Unresponsive to previous oral escalation
- Already on high dose therapy

Based on Goals of Care consider:
- Reassessment in HF clinic
- ED/Inpatient management
- Transition of therapy to end-of-life pathway
### Escalation of Oral Therapy

<table>
<thead>
<tr>
<th>Suggested dose increases</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Current Daily Dose</strong></td>
<td><strong>Suggested New Dose</strong></td>
</tr>
<tr>
<td>&lt;40 mg/d</td>
<td>40 mg BID</td>
</tr>
<tr>
<td>40 to 120 mg/d</td>
<td>80 mg qAM/40 mg qPM OR 80 mg BID</td>
</tr>
<tr>
<td>120 to 240 mg/d</td>
<td>120-160 mg BID  Consider add on therapy</td>
</tr>
<tr>
<td>&gt;240 mg/d</td>
<td>160 mg BID  Consider add on therapy</td>
</tr>
</tbody>
</table>

### Initiate Intravenous Therapy

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Day 1</strong></td>
<td><strong>Suggested New Dose</strong></td>
</tr>
<tr>
<td><strong>Current Dose</strong></td>
<td><strong>Suggested New Dose</strong></td>
</tr>
<tr>
<td>≤120 mg/day</td>
<td>40 mg IV BID</td>
</tr>
<tr>
<td>&gt;120 mg/day</td>
<td>80 mg IV BID  Consider add on therapy</td>
</tr>
</tbody>
</table>

Can continue beyond 4 days
Add-on diuretics – 30 mins prior

- HCTZ – 12.5 mg 30 mins prior to furosemide
- Metolozone 2.5 – 5.0 mg OD
- Go slow – they are quite effective
Salt and fluid restriction

• Palliative care mantra: ”eat anything you want…”
• What about in Heart Failure?
• Fluid restriction – watch bowels, do not use bulking agents
• Salt restriction suggestions (< 3 g/day)
• Cook without and sprinkle at table
• Relax low fat diet
Oxygen

May be helpful

If not able to do sleep study, can try nocturnal oxygen
Use opioids for dyspnea

If diuresis is not sufficient, opioids are effective in this population.

Low dose, prn for intermittent dyspnea or pain

- e.g. MS 1- 2 mg po q 1 hr prn
- e.g. Hydromorphone 0.2 – 0.5 mg q 1 hr prn

Side effects/myths of opioid use
Use opioids for dyspnea

- Opioids are effective in this population
- Low dose, prn for intermittent dyspnea
- Why opioids work?
Other symptoms

• Similar to oncology patients BUT
• Less pain?
• More fatigue?
• Comorbidities
• Frailty
Depression

Common – assess for it

SSRIs recommended
Insomnia - Multifactorial

May be related to anxiety from dyspnea

Ensure good education re: dyspnea management
Fatigue

Volume overload
Myopathy and Cachexia
  - Neurohormonal abnormalities
  - Catabolism due to inflammatory mediators

Sleep-disordered breathing
Depression (60%)
Comorbidities

Circulation 1995;91:559 - 61
Am J Crit Care 2008;17:124 -32
Fatigue

Manage comorbid reasons for fatigue, then

Can use methylphenidate – monitor HR and BP for tachycardia, hypotension, arrhythmias
Nausea

Gastroparesis
Intestinal edema
Reduced intestinal blood flow
Hepatic congestion
Try metoclopramide – consider s/c route

Avoid dexamethasone
Pain

Etiology not well studied
Multiple sources likely
Tylenol for mild pain
Opioid for moderate to severe pain

Avoid NSAIDs (worsening renal status)
Hypotension

If asymptomatic:
- Don’t change if low BP and no symptoms

If symptomatic:
- Try changing timing of medications
  - give at night; stagger doses
- If need to reduce or eliminate:
  - CCB ➔ alpha blocker ➔ nitrate ➔ hydralazine ➔ BBlocker ➔ aldosterone antagonist ➔ ACEI ➔ ARB
De-prescribing – often a ”preference-sensitive decision”

• Can usually stop statins

• Anticoagulation: Assess risks and benefits of anti-coagulation – individualized decisions --
Framework for Palliation

Support

• Caregiver burden
Psychosocial Burden

Caregiver burden often high – age, comorbidities
Make use of multidisciplinary team to support patient and family

Major concerns of patients

• Not to be a physical or emotional burden
• To an adequate plan of care and health services available to look after you at home upon hospital discharge
• Information communicated by doctor in an honest manner

Framework for Palliation

Planning

• Device management ICD
• Advance care planning
• ICD
ICD Deactivation – Challenges

Deactivation rarely discussed with patients

- <45% even after DNR decisions
- Up to 30% shocked within minutes of death

Patients perceive a dependence on ICD Action, not omission

Am Heart J 2002;144:282–9
Ann Intern Med 2004;141:835-8
30% of patients receive shock therapy from their device in the last 24 hours prior to death.

ICD Deactivation - Pearls

Distinguish pacing from defibrillation

QOL will not change

“Given what you’ve told me is important, I would recommend that…”

Emphasize ongoing care
ICD Deactivation

Contact ICD clinic for information about deactivation

Think about this in advance of last hours

If you are caring for patients at end of life, find out where magnets are kept
Picture of magnet taped directly over ICD.
Appendix F: Magnet Application Instructions

MAGNET APPLICATION FOR IMPLANTABLE CARDIOVERTER DEFIBRILLATORS (ICDs)

- **LOCATE THE ICD:** it is usually located in the upper left chest area, under the collarbone but sometimes the ICD is located on the right side of the chest. In rare instances it may be located in the abdomen. Subcutaneous ICDs are usually located along the left mid axilla area.

- **PALPATE THE ICD:** to ensure that you have the correct magnet placement location, ensure that you can feel the ICD under the skin, place the magnet directly over the ICD and secure it with any type of tape (see figures below).

- **SECURE THE MAGNET:** if the magnet were to lose connection with the ICD, the therapies you are suspending will no longer be suspended.

- **SUSPEND THE ICD:** Once the magnet is placed, tachyarrhythmia detection and therapy will be suspended so the ICD will not deliver any anti-tachycardia pacing (ATP) or shocks for ventricular arrhythmias. After magnet placement you may or may not hear a tone coming from the device. Not all devices will have this tone or ringing feature. If you hear a tone, it last for approximately 10-20 seconds which indicates the magnet has been properly placed.

- Pacemaker functions for a slow heart rate are NOT affected by the magnet. Even when the magnet is in place the patient will continue to receive the programmed pacing for a slow heart rate at the programmed rate.

- **REMOVAL OF THE MAGNET** will restore all anti-tachycardia detection and shock therapy.

- **SKIN INTEGRITY:** assessment of skin integrity is required for magnet application longer than 24 hours.
Appendix E: Treatment Algorithm for Planned and Unplanned Device Deactivation
Resources for ICD deactivation

• Cardiac Care Network


Summary

• Today we’ve reviewed:
  • Pathophysiology
  • Challenges
  • Symptom management
  • Planning/Support
QUESTIONS?