Mechanical Circulatory Support Driveline Infection Demographic Research

Discovering the risks and variables associated with infection

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What is a Ventricular Assist Device (VAD)?

- Also known as Mechanical Circulatory Support (MCS) device
- Supports circulation for patients who have end stage heart failure
- Bridge to transplant (BTT) or destination therapy (DT)
- Continuous flow, non-pulsatile
- Patients manage VAD at home
- Powered by batteries (8-12 hrs) or AC power
- Driveline exits body
Risks with a VAD

• Thrombosis
  – Pump
  – Ischemic stroke

• Bleeding r/t anticoagulation
  – GI bleeding
  – Hemorrhagic stroke

• Infection
  – Bactremia
  – Driveline infection
Ideal Driveline
Infected Driveline
Infected Driveline
DT Incident DL Infection Rate w/in 1 Year of Implant Date (Updated 10/1/17)

Incident Driveline Infection Rate w/in 1 Year by Implant Date

- 2013: 29%
- 2014: 27%
- 2015: 57%
- 2016: 11%
- 2017: 25%
DT VAD Driveline Infection Data

% Driveline Infections within 1 Year of Implant (revised denominator)

- 65%
- 35%

Time to First Driveline Infection (Days)

- 91-365 Days
- 31-90 Days
- 0-30 Days
- 365+ Days
Purpose & Aims

Purpose
• Reduce overall DLI in JHHS

Aims
• Examine driveline infection (DLI) prevalence for mechanical circulatory support (MCS) patients being cared for at the Johns Hopkins Hospital from 2012 until present
• Explore correlations between acute and chronic DLI and patient characteristics.
• Redesign JHH driveline dressing practice based on evidence
2015 - present

Sept 2015 Nursing students database

June 2016 Helene Fuld Fellow

September 2016 Shirley Sohmer Award Compare demo data

Fall 2017 Improve & Standardize Practice (EBP)

Spring 2016 Attempting silver

July 2016 DEL grant almost

Spring 2017 Systematic Literature Review

Future Addition of silver (research)

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Barriers to reducing DLI

- Literature - lack of, no RCTs
- Leadership turnover
- Data management turnover
- Obtaining interdisciplinary expertise and buy-in
- Unit specific practices are diverse
- Supply chain - inpatient and outpatient
- Navigating the JHH system
Facilitators to reducing DLI

- Clinical Nurse and research collaboration
- Access to interdisciplinary expertise and international experts
- Writing retreats
- Helene Fuld program
- Graduate student assistance
- Perseverance
- CLABSI initiative
- Leadership buy-in
- Passion for our patients

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Interdisciplinary

• Our team:
  – Surgery
  – Medicine
  – SON
• VAD team: nursing coordinators & physicians (Cardiology & Cardiac Surgery)
• Administration
• HEIC
• Materials Management
• Inpatients, outpatients, and family

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Society to Cells

(Szanton & Gill, 2010)
Chain of Infection

(CDC, 2012)
### What has been studied?

<table>
<thead>
<tr>
<th>Categories</th>
<th># of articles</th>
<th>Study Design</th>
<th>Key findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Predictors &amp; Outcomes</td>
<td>24</td>
<td>Retrospective Review, Prospective Cohort</td>
<td>Demographic variables and clinical characteristics are not significant predictors of driveline infection.</td>
</tr>
<tr>
<td>Interventions to Prevent</td>
<td>2</td>
<td>Prospective Cohort</td>
<td>Dressing change practices can reduce infection.</td>
</tr>
<tr>
<td>Interventions to Treat</td>
<td>1</td>
<td>Prospective Cohort</td>
<td>Systematic approach to surgical interventions for driveline infection (algorithm) can improve infection clearance.</td>
</tr>
<tr>
<td>(Surgical)</td>
<td></td>
<td></td>
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<tr>
<td>Surgical Technique</td>
<td>4</td>
<td>Retrospective Review, Prospective Analysis</td>
<td>Increased infection with anchoring sutures. Decreased infection with driveline tunneling.</td>
</tr>
<tr>
<td>Total</td>
<td>31</td>
<td></td>
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</tbody>
</table>
What has been studied?

LVAD Driveline Dressing Change Kit, Practices, and Policy
Protocol revision

- Chlorhexidine scrubbing practice standardization - crosshatch
- Instructions in protocol to match new kit
- Drainage description quantified using accepted scale (Bates-Jensen wound assessment tool)
- Site Care algorithm
- Interdisciplinary team approval
- Committee Review
- Approval of protocol
New VAD Dressing Policy

OLD

 Current Method:
 Cover driveline with 3” x 3” gauze and tape 3 sides in a “window” fashion using paper tape and change weekly.

NEW

 Proposed Method:
 Evidence-based cleansing of site and covering with large breathable Tegaderm that seals all 4 sides. Change weekly.

NEW PROTOCOL

• Stop use of gauze
• Standardized & improve kit
• Step by step instructions in kit
• Disinfection of work surface
• "Sterile procedure" sign on door
• Saline gauze to cleanse the site of debris
• Alcohol pads to driveline
• Photography with each change - upload to EPIC
• Transparent “breathable” dressing
• Creates a 4-sided barrier dressing
• Super users for all inpatient dressing changes
  • Similar concept to VAT team, PICC team, etc.
• Dressing frequency - no sooner than 48 hours unless completely soaked through
• Used ideas and techniques from VAD policy and CLABSI initiative

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New VAD Dressing Training

Staff Training:

• “Kick off” in 2018 with super users with a goal of zero driveline infections
• Standardization of care between all units and CVOR
• All staff do a MyLearning yearly- Create a video for demonstration

Patient Training:

• Work w/ CVPCU and VAD coordinators
• Potential to supply of kits to patients at home

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What we looked like when we started
What we will look like when we’re done
References


References

- John, R., Aaronson, K. D., Pae, W. E., Acker, M. A., Hathaway, D. R., Najarian, K. B., & Slaughter, M. S. (2014). Drive-line infections and sepsis in patients receiving the HVAD system as a left ventricular assist device. https://doi.org/10.1016/j.healun.2014.05.010
References

References
