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A Change of Heart: Limitations of National Healthcare Safety Network (NHSN) and Society of Thoracic Surgeons (STS) Surveillance Strategies in Identifying SSI After Heart Transplant Surgery

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Abstract

Objective: This study aimed to compare three different surveillance systems for surgical site infections occurring after heart transplant surgery (OHT). The three systems are: National Healthcare Safety Network (NHSN), Society of Thoracic Surgeons (STS) methods, and manual surveillance performed by Transplant ID physicians (TXID).

Methods: Retrospective review of all adult (≥18 years) single-organ OHT procedures performed at an academic medical center between 1/1/19 and 12/31/20 to identify SSI cases using NHSN, STS, and TXID SSI surveillance systems.

Results. TXID identified 17 (10.5%) SSIs among 162 OHT surgeries during the study period. NHSN identified 7 (4.3%) SSIs, including 3 false positive SSIs, which were not considered SSI by TXID. STS identified 4 (2.5%) SSIs during the study period and no false positive SSIs.

Conclusion: Current SSI surveillance systems have low sensitivity in detecting OHT SSI, which is likely due to complex hospital courses following OHT surgeries. While comprehensive manual surveillance performed by Transplant ID physicians is time- and resource-intensive, it likely provides a more accurate depiction of SSI rates compared to semi-automated surveillance systems.

Background

- SSIs complicate 4.8-12.4% of OHT and result in increased length of hospital stay, morbidity, mortality, and costs.
- Accurate SSI surveillance following OHT is critical in developing targeted prevention initiatives.

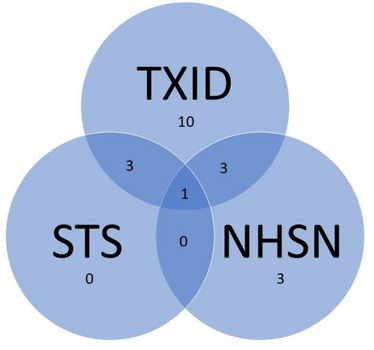
Methods

- Retrospective review from 1/1/19 to 12/31/20
- Inclusion criteria
  - ≥ 18 years of age; single-organ OHT procedure
- TXID is considered “Gold Standard”

Category	National Healthcare Safety Network (NHSN)	Society of Thoracic Surgeons (STS)	Transplant ID Surveillance (TXID)
Surveillance window	30 days for superficial and deep incisional SSIs; 90 days for organ/space SSIs	30 days for all SSIs until 7/1/20 when a 90-day surveillance window for deep sternal wound infections was initiated	90 days for all SSIs
Superficial Incisional SSI	Occurs within 30 days after surgery and involves only skin and subcutaneous tissue of the incision	Occurs within 30 days after surgery and involves only skin and subcutaneous tissue of the incision	Occurs within 90 days after surgery and involves only skin and subcutaneous tissue of the incision
Deep Incisional SSI	Occurs within 90 days and involves deep soft tissues (e.g., fascial and muscle layers)	Infection occurs within 30 days after surgery and involves deep soft tissues (e.g., fascial and muscle layers), but 90-day surveillance began 7/1/20	Occurs within 90 days and involves deep soft tissues (e.g., fascial and muscle layers)
Organ/Space SSI	Occurs within 90 days and involves any part of the anatomy (organs or spaces) other than the incision that was opened or manipulated during the operation	Occurs within 90 days and involves any part of the anatomy (organs or spaces) other than the incision that was opened or manipulated during the operation	Occurs within 90 days and involves any part of the anatomy (organs or spaces) other than the incision that was opened or manipulated during the operation

Results

- TXID identified 17 (10.5%) SSIs among 162 OHT (*Gold Standard)
- NHSN identified 7 (4.3%) SSIs, including 3 false positive SSIs
- STS identified 4 (2.5%) SSIs during the study period with 0 false positive SSIs



Test Characteristic	NHSN	STS
Sensitivity	23.5%	23.5%
Specificity	97.9%	100%
Positive-Predictive Value	57.1%	100%
Negative Predictive Value	91.6%	91.8%

- NHSN’s low sensitivity is mostly explained by intervening surgeries (such as chest closures or washouts) that prevented a subsequent SSI from being attributed to the OHT
- STS’s low sensitivity is mostly explained by the prior 30-day surveillance window

Conclusions

- Current SSI surveillance systems have low sensitivity in detecting OHT SSI, likely due to complex hospital courses following OHT surgeries.
- While comprehensive manual surveillance performed by Transplant ID physicians is time- and resource-intensive, it likely provides a more accurate depiction of SSI rates.
- Future studies are needed to determine how to modify NHSN and STS surveillance definitions to more accurately identify OHT SSI.