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Nosocomial diseases are ones acquired from a stay at a hospital. They are defined in contrast with community acquired diseases. **Nosocomial vs Community Acquired.** (1)

Nosocomial diseases affect\_\_\_\_\_\_\_**,** so they are a significant problem. They increase costs for hospitals, recovery time for patients, and the risk of death. In some cases, it can be difficult to distinguish between the two methods of acquisition. Nosocomial infections are difficult to diagnose because of the existing symptoms of hospital patients. Therefore, they are under reported. (1)

This misidentification is problematic for many reasons. First, the misinterpretation of nosocomial disease symptoms can complicate the treatment of already at-risk patients. (2) Next, different strains of the disease should be treated accordingly. If a strain is misidentified, there is the risk of developing antibiotic resistant strains and increased risk for the patient. Treating symptoms of the wrong disease is not helpful to the patient’s recovery, nor is it a good use of resources or smart action against the battle against antibiotic resistance.

Technology can help diagnose and prevent nosocomial disease, but it has many limitations.

Technology can help diagnose nosocomial disease by providing the compute power required to analyze data from strains. The traditional method of diagnosis depends on distinguishing phenotypic characteristics. (3) This method is limited by the difficulty to distinguish diverse bacteria from their physical characteristics. Therefore, molecular typing can detect nosocomial transmission and facilitate treatment. Nosocomial disease can be detected by comparing data between patients as well as between a patient and the environment. “Isolation of the same strain from both patients and from the hospital environment is highly suggestive of a nosocomial infection.” (4) “Molecular typing has provided persuasive evidence for person-to-person spread. (5) If the strains are the same, this is highly suggestive of a nosocomial infection. As the processes for genomic analysis become more cost effective and time-efficient, this method also becomes more useful for routine automated monitoring. Rapid, inexpensive, reproducible, easy to perform. (6) However, technology should not be the only method used to diagnose nosocomially transmitted strains. Technological diagnoses should be coupled with traditional diagnoses to validate results. (6) Furthermore, there are limitations to technological solutions. These comparisons are only as good as the organization of the database in which they are stored. (6) Furthermore, the most accurate analyses include whole genome sequencing. WGS is not cost or time efficient, so the current methods of single locus analysis may be of limited accuracy. (6).

Technology can also help reduce the spread of nosocomial disease at the root of the problem. Automation can assist in the proper sanitation of hospital equipment. Currently, vacuums and steamers are the primary machines used for sterilizing hospital wards after a patient is discharged. However, technology could reduce this labor-intense process as well as cost, while at the same time doing an even better job. Automation could eliminate human error and perform routine cleans as well as post-discharge jobs. (7) However, the limitation is that proper cleaning not only requires getting all the contaminated space, but also training for special cases. Therefore, technology could be used to assist the regular nurses, but should not replace them. (8) Another reason for this is that sanitation relies also on the behavior and protocols of the hospital staff to promote a culture of safe procedures. If cleaning was left to machines, this attitude could become even further neglected. For example, one solution related to hospital protocols involves access to hand washing stations. It has been shown that this non-technological solution greatly improves sanitation. (9) Technological and non-technological solutions should be accessed for cost and efficiency. (8)Furthermore, technological procedures should be reassessed on a timely basis to ensure their continued efficiency. For example, a room should be treated with a certain antibiotic that the patient’s strain is known to be sensitive to. If technology was used for cleaning, this might also allow for more routine monitoring. (10). Routine monitoring could lower the risk of contamination and give a measure of success to the cleaning protocols.

Finally, the technological solutions are also limited because of antibiotic resistance. The transformation of genomes makes the identification of exact strains more difficult. This in turn makes the treatment even more difficult. The development of resistant strains also emphasizes the importance of proper sanitation. Improper cleaning might worsen the situation by excluding competition for the resistant strains.

Virus excretion for extended periods of time may provide a favorable environment for the emergence of resistant strains. (2)

M.organisms will exploit an inadequately cleaned niche to exchange genetic material coding for antimicrobial resistance and other survival mechanisms.

Shorter treatment duration and correct dosage will reduce selection pressure for resistance. (9)

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