

Opinion

Dalbavancin and moleculight in the COVID-19 pandemic

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Abstract

The COVID-19 Pandemic, which began in March 2020, and its associated surges, had an immense impact on our medical staff and their ability to perform their daily duties.

The COVID-19 Pandemic necessitated hospital modifications, including the expansion of the Emergency Department, ICU, and Isolation units. The overwhelmed staff and overburdened ER and ICU required adjustments to deal with the inpatient impasse. For example, temporary patient care rooms needed to be set up for the overflow of patients. The tsunami of the Pandemic almost overwhelmed our hospital.

With the challenges presented to our hospital during the Pandemic, we needed a fresh perspective to our multi-disciplinary approach. Thus, we fathomed that the use and cost-effectiveness of both Dalbavancin, a long-acting lipoglycopeptide antibiotic combined with the diagnostic Moleculight Imaging Device would be a sound decision.

We hypothesized that with the use of this cost-effective antibiotic in conjunction with the use of the Moleculight Imaging Device, with its fluorescent imaging, we could detect the presence of bacteria and assist our wound treatment and decision-making.

A shift in patients from the Emergency Room/Inpatient Department to the Outpatient Department/Wound Care Center was made possible with the use of these two novel products.

Introduction

Clara Maass Medical Center is a fully accredited acute care facility in northern New Jersey. It offers a full array of services, including an outpatient cancer center, dedicated breast health and disease management, broad-scope cardiac services, and comprehensive wound care, including parenteral infusion, full podiatric services, vascular and plastic surgery, and infectious diseases.

The COVID-19 Pandemic and its associated waves and surges, as well as its multiple symptoms, required our institution to re-evaluate our multi-disciplinary approach to patient care. Currently, the United States is experiencing a 3.8 trillion dollar health care deficit. Chronic wound care accounts for 96.8 billion dollars of this deficit. If an infection advances in this patient population, the shortfall can be expected to increase by 20%.

Chronic wounds affect millions of individuals in the United States. Wounds of the lower extremity affect between 2.5 and

4.5 million people, including 3% to 5% of those 65 years or older [1]. Chronic non-healing ulcers, such as diabetic foot ulcers and venous stasis ulcers have a major impact on health care. Infections of these ulcers remain pervasive. Prevention of infection is imperative. Every day, 10,000 Baby Boomers turn 65. 15% of all Medicare beneficiaries are subject to non-healing wounds. This translates into 6.5 million patients annually. The estimated costs of treating a diabetic foot ulcer were \$28000 in a 1999 US study and \$18000 (with no amputation) [2] and \$34000 (with amputation) in a 2000 Swedish study [3]. Mortality following amputation ranges from 13% to 40% at a year, 35% to 65% at 3 years, and 39% to 80% at 5 years—worse than for most malignancies [4].

The Moleculight Imaging Device is a one-of-a-kind wound management system. Cardinal signs of inflammation (rubor, tumor, calor, loss of function, dolor) often go undetected and may be muted in high bacterial wounds. The Moleculight Device, with its fluorescent imaging, provides an objective method to detect the presence of bacteria. It assists with

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overall wound treatment decision-making. Clinical outcomes are improved with the addition of information previously unavailable to wound care clinicians. Visualization of bacteria is quick, safe, and easy when the Moleculight Imaging Device is employed. This device has received Food and Drug Administration (FDA) approval. Medicare established a CPT (Current Procedural Technology) code for this device, making reimbursement a seamless process. In addition, the Moleculight Imaging Device was awarded Top Innovation in Wound Care, 2022 from Wound Management and Prevention.

The use of Dalbavancin, a long half-life lipoglycopeptide, allowed streamlined care, decreased selected admissions, decreased patient time in the facility's outpatient department, and decreased the need for central line access for antibiotic therapy [5], while still maintaining excellent patient care with a 30 minute one dose intravenous infusion.

Dalbavancin provides a new paradigm in the use of antibiotics. Dalbavancin is indicated to treat acute bacterial skin and skin structure infections (ABSSSI). Its long half-life allows for a full course of complete therapy. Most bacteria, because of their porphyrins, fluoresce red. *Pseudomonas* species, because of their pyoverdines, fluoresce cyan.

Methods

The use of the Moleculight Imaging Device and Dalbavancin concurrently to diagnose and treat infected wounds began soon after COVID-19 was declared a pandemic. The joint use of Moleculight and Dalbavancin remains a mainstay in the diagnosis and treat wounds in the Outpatient Department/Wound Care Center at our facility.

Patients with lower extremity cellulitis or infected foot and ankle ulcers were included in the study. Those patients with three or more cardinal signs and symptoms of inflammation were included, as were those patients with > 2 cm of associated cellulitis. Those with one predominant sign of inflammation were also included.

The cost for day stay Emergency Room visits in New Jersey is estimated to be \$3087 per patient [6]. The shift from Emergency Department day- stay to Outpatient Department/Wound Care Center, with an estimated cost savings of \$2850 per patient could help decrease the Emergency Room Pandemic burden and Inpatient impasse. 631 cases were treated in this manner during the COVID-19 lockdown. Clinical follow-up occurred via telephonic conversations on day 8 for a two-dose protocol—two doses of Dalbavancin, or day 11 for a one-dose protocol—the dose of Dalbavancin [7].

The Moleculight Imaging Device provides a point-of-care detection of elevated bacterial burden. It is quickly becoming the standard of care in wound care settings. The Moleculight Imaging Device makes the invisible visible. With its fluorescence, Moleculight allows for an early start

of treatment. There is no waiting on PCR (Polymerase Chain Reaction) or culture swabs. It allows for a more targeted treatment.

Moleculight's direct fluorescence measures wounds and reveals the location of harmful bacteria. Moleculight has been proven to diminish both clinical and economic burdens.

The Moleculight Imaging Device is the only point of care modality that will enhance clinicians' decision-making ability and augment their clinical intellect. Moleculight provides immediate bedside diagnosis of both the presence and degree of harmful bacterial burden in real-time.

Moleculight allows for the visualization of the significant bacterial burden by the use of fluorescence in a quick, easy, and safe manner. Reliance on clinical signs and symptoms as an assessment is not sensitive. This can lead to the misuse of antimicrobials [8]. The Moleculight Imaging Device is handheld and mobile. It is both MAC and PC compatible. It does not require a contact or coupling agent. The Moleculight Device can be used repeatedly without harming the patient, unlike an X-ray.

Moleculight is non-invasive. The Moleculight Device utilizes safe violet light, not ultra-violet light (UV). It does not produce enough energy to damage the skin or eyes. The violet light is absorbed by wound tissue and emits fluorescence.

The Joint Commission (a global quality improvement organization that accredits and certifies hospitals in the United States) mandates that all outpatient departments that prescribe antimicrobials have an antimicrobial stewardship plan (ASP) in place [9].

Observational prescription of antimicrobials/antibiotics often results in both under and over-prescribing antimicrobials/antibiotics. This can impede wound healing. It also hinders the Antimicrobial Stewardship Plan (ASP).

Evaluation of clinical signs and symptoms with criteria at > 3 signs and symptoms or one predominant symptom was considered. CSS results in antibiotic misuse [10]. Inconsistency in prescribing can be related to certain co-morbidities (i.e. diabetes, steroid use, autoimmune disease).

Cost effectiveness

Published data about diabetic foot ulcers found the mean annual cost of treatment was \$9306. For an infected foot ulcer, it is \$24582. For a foot ulcer with osteomyelitis, the cost is \$45579 [11].

Patient care was optimized. We were able to control and lower expenses using Dalbavancin and the Moleculight Imaging Device together. These techniques helped streamline care and decrease patient time in the facility's Emergency Department while maintaining excellent patient care.



Patient satisfaction is the extent to which patients are happy with their healthcare, both inside or outside the doctor's office [12] or medical setting. As a measure of the quality of care, patient satisfaction gives providers insight into various aspects of medicine [12].

Conversations with patients via telemedicine indicated that those who received Dalbavancin were satisfied with this protocol. Efficient use of the antibiotic in conjunction with the Moleculight Imaging Device was important to patients and their families, as it limited time spent in the hospital. This was always important to patients, but even more so during the Pandemic.

The use of these two products, Dalbavancin and Moleculight, allowed us to bullet rather than buckshot our therapeutic regimen. Our tailored treatment allowed us to decrease admissions, reduce the length of stay, and neutralize complications. A central line was not required, and this significantly reduced costs.

The use of Dalbavancin and the Moleculight Imaging Device in tandem alleviated the need for additional supplies. The impasse in the Emergency Department and general and intensive care units were resolved. By improving efficiency with the use of Dalbavancin and Moleculight, patient care was optimized, expenses were lowered, and the burden on the staff was eased.

Results

- No control group was established due to the COVID-19 Pandemic.
- Reduction in admission was accomplished by day-stay admission utilization in kind to same-day surgery.
- The length of stay was reduced to day-stay status.
- No complications were noted in our study of 631 patients.
- Cost reduction was significant. Deflecting the Emergency Room
- Burden to the Outpatient department management resulted in a 53% cost savings.
- No correlation studies were completed to compare Moleculight with microbial diagnostic lab results.
- No readmissions were noted in the study.

Challenges

The logistics of moving patients from the Emergency Department to the Outpatient Department/Wound Care Center was a challenge.

Conclusion

Our goal was to deflect and ease the burden on the Emergency Department. Making the shift from Emergency Department/Inpatient admissions to the Outpatient Department/Wound Care Center was a key factor in relieving the staff's stress. These changes provided significant cost savings to our facility.

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