A growing number of individuals with various forms and degrees of immunosuppression require intensive care management. Infection is one of the most common causes of morbidity and mortality in this group of patients. Immunocompromised hosts are more likely to acquire infections, the course of infectious diseases is more severe than in the normal host, and response to antimicrobial therapy may be poor. (1) In addition, infections are observed that do not develop in the normal host. (2-4) These opportunistic infections may be difficult to diagnose and to treat; they may be the cause for intensive care treatment or may emerge during an intensive care unit (ICU) stay for other reasons. The spectrum of such opportunistic infections differs between the different entities of immunosuppression, and patients with T-cell immunity defects have different infections than the neutropenic patient or individuals who receive long-term steroids or disease modifying agents. (5-6) The latter have some unique effects resulting in higher risk for specific infections, such as tuberculosis. (7)

In general, the more profound the immunodeficiency, the broader the spectrum of potential pathogens and the higher the risk of acquiring infections, either from outside sources or from the endogenous reactivation of latent pathogens. Solid organ transplant patients are the largest growing subpopulation of immunosuppressed individuals, and infection – the most common complication – largely contributes to mortality rates. (8)

It is common for a single individual to present with many different opportunistic, nosocomial or surgical infections either simultaneously or consecutively. Many patients will become colonized with many different multidrug-resistant organisms (MDROs) that may re-emerge or spread to other individuals. The long-term, hospitalized immunocompromised host may serve as a reservoir for MDROs and spread them to hospital staff and other patients. More concerning is the spread of these pathogens within the community, including to friends and relatives. In the case of healthcare facilities, transmission to other at-risk patients is a particular concern. This can be devastating in the ICU, as a single patient may be the source of multiple outbreaks.

At the time of ICU admission, the microbiological history of each patient should be researched meticulously. All immunosuppressed individuals should be considered to harbor MDROs until proven otherwise. It is ideal to quarantine admitted ICU patients until they are screened for MDROs. For practical and educational reasons, healthcare workers should be aware that pathogens transmitted from immunocompromised individuals may be harmful to themselves as well as to patients, friends and relatives. Upon admission, patients should be placed in light traffic areas; rooms close to entrances or transition zones are not optimal.

Communicate the Danger
Transporting these patients from their rooms for investigations and procedures always presents a potential breach of isolation, and the radiology department, surgical suites and endoscopy rooms may serve as a distribution center for MDROs. These patients must be flagged clearly as carriers of MDROs. Preferably, a special procedural room should be available that can be thoroughly cleaned after the investigation or procedure. Patients with MDROs should be scheduled last during daily rounds and for procedures when possible. In addition, patients with proven colonization with MDROs should be assigned a single nurse and physician for daily examinations. Of course, handwashing before and after every patient contact is essential, as is the use of gloves and gowns. These individuals may not be suitable for training sessions that require direct patient contact, and all exposed equipment must undergo rigorous post-procedural cleaning. Every investigation and intervention must be weighed not only in terms of the pros and cons for the colonized individuals, but also in terms of the risks for other patients.

Visitors and patients must be educated about interindividual transmission of pathogens and the potential harm to every person who encounters chronic carriers. While extreme contact isolation is the standard for diseases such as severe acute respiratory syndrome, bird flu and tuberculosis, such procedures often are not standard for MDROs.
MDROs may not kill instantly, but their spread does contribute to thousands of deaths each year. Although they are costly, surveillance cultures may be an important future strategy, as they can help prevent even more costly large-scale outbreaks. The spread of MDROs also has presented a question of liability for healthcare providers and hospitals. Identification of carriers of MDROs is an essential benchmark of quality control. ICUs must develop tailored strategies to assess patients; they should have records on MDROs, and overall susceptibility patterns of infection causing pathogens should be available.

Avoiding unnecessary exposure to antimicrobials is crucial. In the immunosuppressed individual, many infections are caused by unusual pathogens. All diagnostic options should be exploited, as the classic, empiric antimicrobial therapy approach may not be suitable as a universal strategy. Treatment courses should be directed with the highest possible dose and the shortest possible duration. In addition, de-escalation should be performed as soon as the causative pathogen has been identified. Frequent retesting is mandatory, and treatment should be adjusted frequently.

**Timing is Everything**

Execution of healthcare services – in terms of evidence-based medicine, financing and insurance reimbursement – is based on prospective, randomized trials. However, pathogens do not wait for such trials to be completed before causing great harm. This problem is even more crucial in the immunocompromised host, as events occur at an accelerated rate. (1) Microbial life functions on a rapid pace in terms of numbers and time spans of mutation, raising questions that a prospective study approach may not be the appropriate way to study some infections in the immunocompromised host. Making general recommendations for managing this patient population may be best, if recommendations are made based on single observations and extrapolation of the worst-case scenario. The latest argument for this approach is the emergence of carbapenemase-producing, Gram-negative rods. This was foreseeable for many years, as the emergence of various betalactamases with expanding spectrum of activity was only a matter of time. Transplant recipients repeatedly have been identified as the original source of outbreaks, which ultimately involve patients with intact immune systems.

To summarize, identification and isolation of patients colonized with MDROs and antibiotic stewardship is crucial in the management of immunosuppressed individuals in the ICU. This effort must extend far beyond care decisions for the MDRO patient; it must also include a global understanding of how pathogens spread and how the immunosuppressed individual may serve as a source of future outbreaks.

**References**


**Disclosures**

*Author has no disclosures to report.*

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