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Critical Rounds

MICRO LABS LIMITED

Dear Doctor,

Greetings from Micro Labs limited. We are happy to bring "CRITICONNECT" containing latest information in the field of Critical care medicine.

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Best Regards,
Medical Team, Micro Labs Ltd

Not all COVID-19 patients seroconvert

A new study published reports on the use of inexpensive and accurate ELISA and Rapid Diagnostic Tests (RDT) in June 2020 to identify demographic and clinical factors affecting the response of COVID-19 patients to an antibody. Over 9 million deaths and over 472,000 deaths have been caused by the ongoing COVID-19 pandemic caused by severe acute respiratory coronavirus 2 syndrome (SARS-CoV-2) The swift and extensive spread of the infection has led many countries to implement lockdowns and other social interaction restrictions in an effort to slow the pandemic pace.

Diagnosis still lags in several low- and middle-income countries (LMICs) owing to a shortage of efficient and fast reverse-transcriptase polymerase chain (RT-PCR) reactions. However, serological assays will assist in the production of vaccinations, the centered application of diagnostic tests, and the usage of innovative medication. They may also help to understand the underlying disease process.

Using the affordable immunosorbent enzyme-linked assay (ELISA) with RDT optimized for LMICs allows this study special in its applicability to emerging regions. The study examined 645 of 177 patients in the clinical studies. Around 34 per cent and 35 per cent respectively were white and non-white.

The median age was 64 years, with 57% being male. Almost three-fourth had one or more coexisting illnesses. 34 (19 %) were admitted asymptomatic and incidentally diagnosed. Of those with complaints, the mean period from the earliest occurrence to the study was 6 days. Ninety-four per cent were admitted, and a fifth expired at a mean 19-day time.

After a median hospital stay of 19 days, 61 per cent were discharged at the end of the study. By the conclusion of the report, 14 (8 %) were already in care. 63 (36%) patients needed intensive care.

Among the findings of IgG ELISA, it is shown that approximately 9 per cent did not seroconvert during the follow-up time. Upon enrolling in the research about 7 percent formed antibodies, while at the time of the first test 84 percent had antibodies.

Follow-up on patients who did not produce antibodies for another three weeks before the end of the study period, indicates that, despite getting the infection, from 2 percent and 9 percent may struggle and seroconvert for weeks.

After seroconversion, the mean IgG values from the first sign stayed stable for up to 2 months. The rates of age or the incidence of respiratory symptoms didn't alter. Non-whites however had a higher mean IgG titer in whites at 1.06 vs. 0.85.

At the age of 41, sero converters were larger, averaging 65 years of age than non-seroconverters, and also likely to have a coexisting disorder. Notably, seroconversion was more normal in hypertension patients, as were those with a higher body mass (BMI). Higher amounts of C-reactive protein (CRP) are showing a bad result due to cytokine production syndrome. Non-seroconverters had lower CRP values, compared to sero converters. Compared to peak CRP values only, these differences were more pronounced. Certain inflammatory markers such as peak D-dimer, fibrinogen, and ferritin have been found in the same sequence. These findings are linked to patients that show after having been symptomatic for many days with apparently normal viral loads. Serological examination may help to detect infection at later stages of the disease where RT-PCR is no longer sufficiently active. Again, serological tests can help to understand which patients are at risk of infection and immunity, as well as being extremely useful.

Stable levels of the antibody are another important finding, as well as identifying factors related to seroconversion, namely hypertension, symptomatic disease, growing age, and increased BMI. Non-whites, medically enrolled individuals, and higher inflammatory marker titers indicate elevated rates of antibodies, which in effect indicate the disease 's greater seriousness.

This could be due to the parallel increase in antibody titer and cytokines, signaling a higher risk of severe illness & death. Or, on the other hand, that could be that these people have a more active adaptive immune system, with an elevated likelihood of extreme illness and mortality following. This could be due, of course, to a higher viral load or the activation of genes regulating innate immunity.

Higher viral loads are expected to stimulate the acquired immunity, however, and this is more likely given the benefit shown in small trials with passive antibody therapy.

The 9 percent of patients who are non-seroconverts may never fully produce antibodies or may acquire certain types of immune response such as T-cell immunity or certain antigens-confined antibodies. Once again, very mild infections can involve only the respiratory mucosa, resulting in dominant secretory immune responses, and therefore limited systemic production of IgG antibody.

The research indicates that many COVID-19 patients stay seronegative for weeks following diagnosis, and that a proportion of antibodies stays negative for up to 60 days after. This is the first such study outside of China, showing how different races are responding to the infection.

The benefits of utilizing this first-generation ELISA test to validate infection solely on serological grounds, in a large population and with infection from asymptomatic to lethal infection at various stages. The use of serological testing increases the accuracy of the diagnosis, especially when RT-PCR is negative, but symptoms suggest COVID-19. This may be a valuable procedure if late presentation becomes more prevalent, perhaps because of containment measures that lead patients to self-isolate rather than enter hospital.

The research has certain drawbacks, such as only hospitalized patients being involved, with asymptomatic about 20 percent. Future studies also need to include patients with mild infection, which will also address the association between the viral load as measured by RT-PCR and serological response, as well as the duration of antibody production. Ultimately, more extensive research is needed of the clinical role of antibody responses in healing or defending against this infection.

Source: Staines, HM, et al. Dynamics of IgG Seroconversion and Pathophysiology of COVID-19 Infections. medRxiv preprint 2020. doi: https://doi.org/10.1101/2020.06.07.20124636.

Adverse Events post Transition from ICU to Ward

INTRODUCTION

The move from ICU to hospital ward of treatment is a daunting time in the progression of care for patients suffering from serious illness. Such changes entail not only going from high-intensity to low-intensity treatment environments, but also requiring the exchange between various health care services with vast quantities with sensitive and essential knowledge. The result is often a communication breakdown that can lead to medical errors, overuse of diagnostic tests, patient dissatisfaction or increased costs.

There has been extensive documentation of the transition from ICU to hospital ward, but less is known about the safety of care during and after the transition from ICU to hospital. It has been suggested that patients may be at increased risk of adverse events (AEs) following discharge from ICU, but no studies have examined this aspect directly. Critically sick patients have an elevated chance of AEs, with an average three out of four ICU patients suffering an AE at any stage after admission to hospital. The effects of these AEs include extended ICU and hospital stay, ICU readmission and elevated likelihood of hospital mortality; it is predicted that 6.3% of all ICU released patients will be readmitted after their hospital stay and 6.8% of all ICU released patients will die in hospital. Half of AEs and 11 per cent of unplanned ICU readmissions could be prevented. Collectively, this research shows that during the move from ICU to hospital bed, there may be a major potential to enhance the quality of treatment for chronically ill patients. An understanding of AEs in chronically ill patients during this time is of need to be cautious in advising measures to enhance the protection of the move from ICU to hospital ward.

METHODS

Design: Multicenter cohort study.

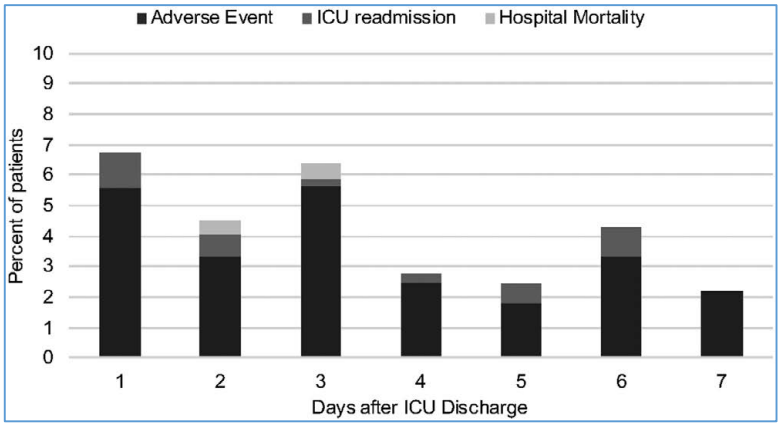
Setting: Ten adult medical-surgical Canadian ICUs.

Patients: Patients were those admitted to one of the 10 ICUs

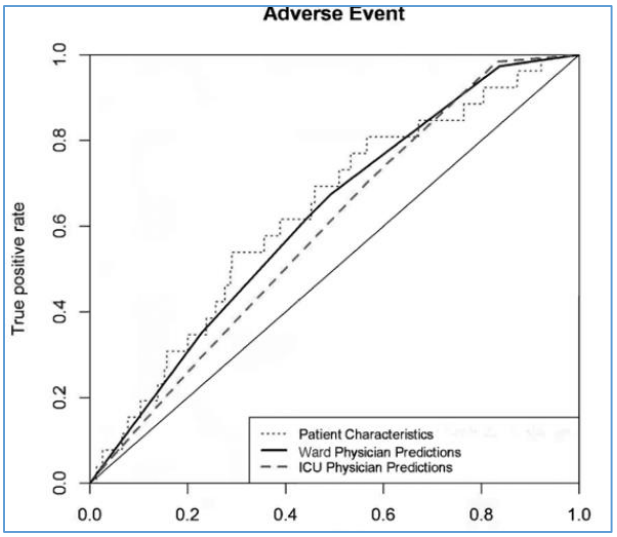
RESULTS

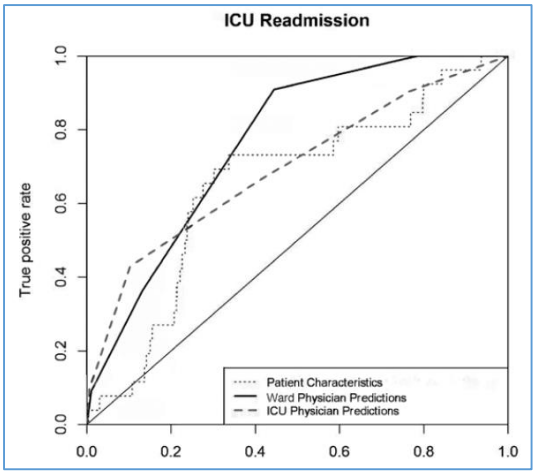
Two ICU physicians independently reviewed progress and consultation notes documented in the medical record within 7 days of patient's ICU discharge date to identify and classify adverse events. The adverse event data were linked to patient characteristics and ICU and ward physician surveys collected during the larger prospective cohort study. Analyses were conducted using multivariable logistic regression. Of the 451 patients included in the study, 84 (19%) experienced an adverse event, the majority (62%) within 3 days of transfer from ICU to hospital ward. Most adverse events resulted only in symptoms (77%) and 36% were judged to be preventable.

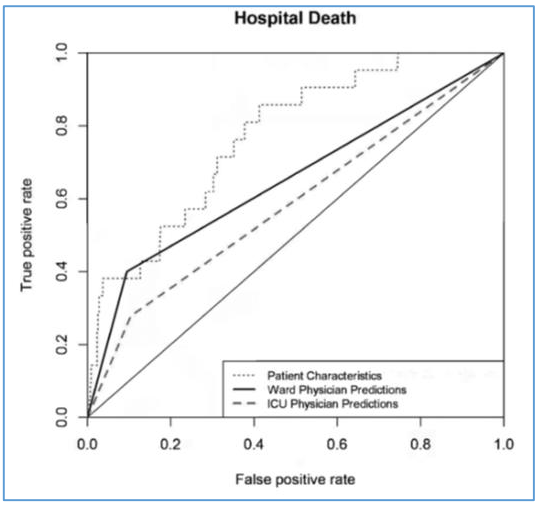
Patients with adverse events were more likely to be readmitted to the ICU (odds ratio, 5.5; 95% CI, 2.4–13.0), have a longer hospital stay (mean difference, 16.1 d; 95% CI, 8.4–23.7) or die in hospital (odds ratio, 4.6; 95% CI, 1.8-11.8) than those without an adverse event. ICU and ward physician predictions at the time of ICU discharge had low sensitivity and specificity for predicting adverse events, ICU readmissions, and hospital death.



Timing of adverse events, ICU readmission, and hospital mortality relative to ICU discharge







ICU and ward physician predictions of adverse events, ICU readmission, and hospital mortality. Patients characteristics included in the model are Acute Physiology and Chronic Health Evaluation II score at discharge, Charlson Comorbidity Index, age, and sex. Response rate was 80% (n = 358) for ICU physicians and 46% (n = 203) for ward physician.

CONCLUSIONS

During the transition from ICU to hospital, AEs are frequent among critically ill patients and the first 3 days after ICU discharge reflect a especially vulnerable period for critically ill patients. Such AEs are related to longer hospital stays and decreased likelihood of ICU readmission and hospital death. Neither ICU nor ward doctors can reliably predict which patients will experience an AE after ICU discharge into hospital ward. Nonetheless, many AEs are preventable among critically ill patients, highlighting an important opportunity to improve the safety of care during the transition from ICU to hospital ward.

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Prospects to Improve Antibiotic Appropriateness in U.S. ICUs

INTRODUCTION

Around 2.8 million individuals in the United States develop multidrug-resistant bacterial infections per year, and at least 35,000 people die of such infections. The use of antibiotics is the single most significant modifiable risk factor for multidrug-resistant bacterial infections to develop. Studies suggest that 30–50 per cent of hospital antibiotic use in acute care and outpatient settings is unnecessary or inappropriate, but there is a lack of standardized data on suitability in multicenter studies in the United States. The ability to identify and stop unnecessary use is essential for improving patient outcomes, promoting patient safety, and reducing pressure for and pharmacodynamics which complicates appropriate antibiotic dosage.

Experts have highlighted the urgent need for antibiotic stewardship programs (ASPs) to target education and interventions aimed at improving antibiotic use in the ICU; studies have shown that ASPs can improve antibiotic use, be cost-effective and safe in the ICU setting, but published literature on identifying inappropriate use in the ICU and how to deal with it is restricted. In 2016, the Quality Care Consortium (PQC) created the Antibiotic Stewardship Program, with guidance from the Centers for Disease Control and Prevention (CDC). PQC is a group of healthcare professionals and community staff committed to providing good quality, accessible community. PQC includes public, private, religious, teaching and non-profit hospitals, integrated health care systems and more than one million U.S. healthcare workers. PQC organizations involved in the Antibiotic Stewardship Initiative conducted a multicenter antibiotic appropriateness assessment in ICUs using a standardized CDC tool which they validated to identify opportunities for local improvement. The results of this assessment are described here.

METHODS

Design: Pilot point prevalence conducted on October 5, 2016; point prevalence survey conducted on March 1, 2017.

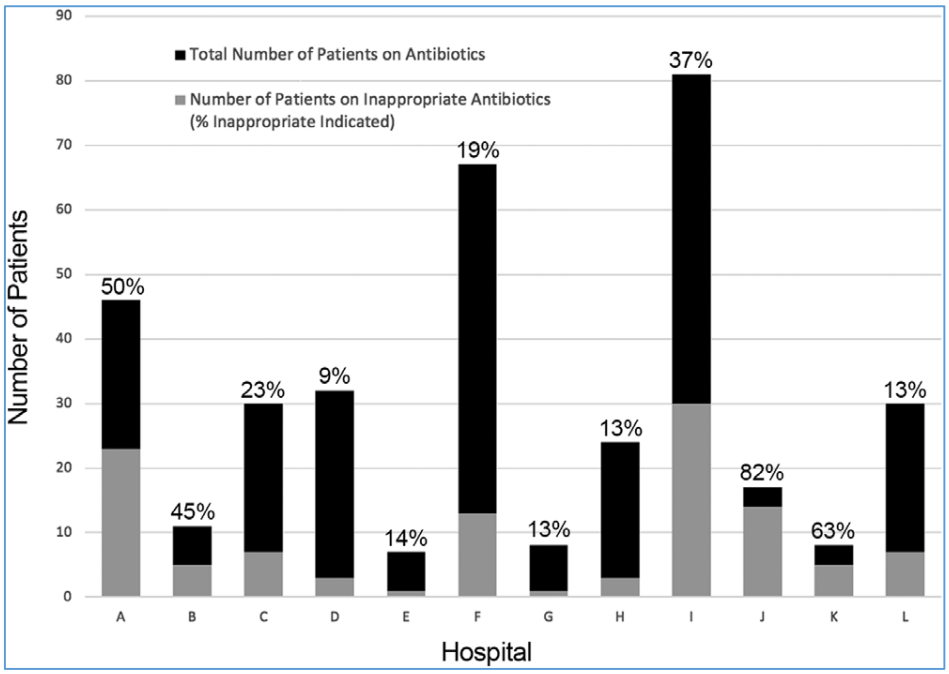
Setting: ICUs in 12 U.S. acute care hospitals with median bed size 563.

Patients: Receiving antibiotics on participating units on March 1, 2017.

Interventions: The Centers for Disease Control and Prevention tool for the Assessment of Appropriateness of Inpatient Antibiotics was made actionable by an expert antibiotic stewardship panel and implemented across hospitals. Data were collected by antibiotic stewardship program personnel at each hospital, deidentified and submitted in aggregate for benchmarking. hospital personnel identified most salient reasons for inappropriate use by category and agent.

RESULTS

Forty-seven ICUs participated. Most hospitals (83%) identified as teaching with median licensed ICU beds of 70. On March 1, 2017, 362 (54%) of 667 ICU patients were on antibiotics (range, 8–81 patients); of these, 112 (31%) were identified as inappropriate and administered greater than 72 hours among all 12 hospitals (range, 9–82%). Prophylactic antibiotic regimens and PICU patients demonstrated a statistically significant risk ratio of 1.76 and 1.90 for inappropriate treatment, respectively. Reasons for inappropriate use included unnecessarily broad spectrum (29%), no infection or nonbacterial syndrome (22%), and duration longer than necessary (21%). Of patients on inappropriate antibiotic therapy in surgical ICUs, a statistically significant risk ratio of 2.59 was calculated for noninfectious or nonbacterial reasons for inappropriate therapy.



Inappropriate antibiotic prescribing in 47 ICUs from U.S. Hospitals

CONCLUSIONS

31 percent of the ICU antibiotic regimens were inappropriate in this multicenter point prevalence study; prophylactic regimens were often inappropriate across different types of ICU, particularly in surgical ICUs. The involvement of intensivists in antibiotic stewardship program efforts is crucial for sustaining the effectiveness of antibiotics and the quality of care for infectious diseases in critical care settings. This study underscores the value of standardized assessment tools and benchmarking for targeted antibiotic stewardship program interventions to be shared with local leaders.

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