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Evidence-Based Information for Hospitalists Intensivists, and Acute Care Physicians [ALERT]

ABSTRACT & COMMENTARY

Hospitalist Workload May Impact Quality of Care

By Jennifer A. Best, MD

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Dr. Best reports no financial relationships in this field of study

SOURCE: Elliott DJ, Young RS, Brice J, Aguiar R, Kolm P. Effect of hospitalist workload on the quality and efficiency of care. *JAMA Intern Med* 2014;174:786-793

Hospitalists are frequently asked in many systems to work harder and see more patients, yet the effect of the hospitalist workload on the quality and efficiency of care has not been systematically evaluated. In academic institutions, these demands on hospitalists have been exacerbated recently by the shift of patient care from from resident housestaff services to non-teaching hospitalists to meet new graduate medical education duty hour limitations. Anecdotally, a typical hospitalist workload ranges from 10-15 daily encounters, but it has been reported that hospitalists often exceed a workload they feel to be safe.[1] This situation is exacerbated in many cases by both personal and system incentives for productivity.

Elliott and colleagues at Christiana Care Health System in Delaware designed a retrospective cohort study of a population of general medicine and step-down patients admitted to a single private hospitalist group. This group is large, composed of 20-35 providers caring for patients independently, without the assistance of housestaff teams. Patient encounters were selected for inclusion in the study if a patient was greater than 18 years old with an admission and discharge bill submitted by a hospitalist from the group. Patients were excluded from study participation if they were admitted to the ICU, admitted on observation status, transferred from an outside facility or had atypically short (0.5d) or long lengths of stay (>30d).

By analyzing daily hospitalist workload during the study period, as determined by relative value units (RVUs) and the total number of patients for whom a bill was submitted, a number of outcomes were evaluated. Regarding efficiency, the primary outcomes in question were length of stay (LOS) and cost of care. Regarding quality, researchers included hospital mortality, rapid response team activation, 7- and 30-day readmission

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Hospital Medicine [ALERT]

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rate, and patient satisfaction (measured by responses to questions about overall hospital rating for the Hospital Consumer Assessment of Healthcare Providers and Services [HCAHPS] survey). Secondary measures of satisfaction included those HCAHPS questions concerning physician interactions — concern, communication, and courtesy. Researchers adjusted all outcomes for both provider and patient characteristics. Provider/hospital characteristics included whether there was continuity of care between providers (by looking at bills submitted over consecutive hospital days); the overall hospital census (with occupancy categorized as low <75%, medium 75-85%, and high >85%); and overall hospital flow (assessed through the surrogate of average time from order to completion of an echocardiogram).

During the study period, the Christiana group managed 33,137 admissions. From this group, 20,241 admissions of 13,916 unique patients met study inclusion criteria. The mean hospitalist daily census was 15.5 encounters, yielding 28.6 RVUs. All outcomes were evaluated across a census scale from 11-22 patients and RVU scale from 15-40; these numbers corresponded with a range between the 5th and 95th percentiles. When hospital occupancy was low, LOS ranged from 5.5 to 7.5 days on the workload continuum from low to high. At a medium occupancy, LOS rose exponentially beyond the mean daily RVU level of 25 and daily census of 15 encounters. When hospital occupancy was high, the correlation of workload with LOS was J-shaped, with an initial decrease, but a later sharp rise again observed with higher workloads. When cost of care was measured after correction for LOS, cost rose by $111 for each unit-rise in RVU and $205 for each unit-increase in patient census. Workload was not found to have significant effects on hospital mortality, RRT activation, readmission, or patient satisfaction.

The study did have some limitations in that data collection was limited to a single private hospitalist group. Results may not generalize to academic or housestaff hospitalist teams. Researchers did not consider the level of provider experience in their analysis, though it stands to reason that more experienced providers may be more efficient and knowledgeable in system navigation.

In summary, hospitalists with higher workloads demonstrated less efficient and more expensive care. Health systems administrators should be aware of this correlation and consider the potential of excessively high workloads to offset potential productivity gains, as a result of longer LOS and higher care costs. Such systems would be wise to consider possible solutions such as increased support for non-clinical tasks and scheduling providers in a manner that maximizes care continuity. Additionally, incentive structures should consider not only patient volumes but care quality. Practicing hospitalists should also be aware of these data, as they may be useful in negotiating employment contracts or incentives. ■

Reference

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ABSTRACT & COMMENTARY

Functional Status and the Risk for Readmission

By Kenneth P. Steinberg, MD, FACP, Editor

Professor of Medicine, University of Washington School of Medicine, Seattle, WA

Dr. Steinberg reports no financial relationships in this field of study.

SOURCE: Hoyer EH, et al. Association of impaired functional status at hospital discharge and subsequent rehospitalization. *J Hosp Med* 2014; 9:277-282.

Reducing 30-day hospital readmission rates is an important goal in improving healthcare quality and reducing healthcare costs. While causes of hospital readmission are myriad and multifactorial, some previous studies have suggested that impairments in functional status experienced during

an acute care hospitalization may increase the risk of readmission. The presumed causal pathway is that patients who become debilitated during an acute care hospitalization may be vulnerable to post-discharge complications and thus to hospital readmission.

To further explore this issue, the authors conducted a single-center, retrospective study of patients admitted to an inpatient rehabilitation facility at a community hospital over a six-year period of time. Patients were excluded if they died during the inpatient rehabilitation stay or if they were not admitted directly from an acute care hospital. Data were collected from a standard rehabilitation medicine administrative database that included demographic data, Functional Independence Measure (FIM) score on admission to the rehabilitation facility, and a validated case-mix system as defined by the acute care hospital primary discharge diagnosis. A system developed by the University HealthSystem Consortium (UHC), patients were stratified by diagnosis groups and severity of illness. The primary outcome was all-cause readmission defined as a patient transfer to an acute care hospital during the inpatient rehabilitation stay within 30 days of admission to the rehabilitation center. Functional status was measured using the FIM score, an 18-item measure of functional status that allows patients to be divided into low, medium, and high functional groups. Logistic regression was used to evaluate the association between FIM score category and readmission status adjusting for potentially confounding variables available from the administrative databases.

Over the six-year study period, 9,405 consecutive eligible patients were admitted to the acute inpatient rehabilitation facility and a total of 1,182 (13%) were readmitted back to an acute care hospital within 30 days. Median time to readmission was 6 days (interquartile range 3 – 10 days). Patients were divided by diagnosis into neurologic, orthopedic, and medical categories. Patients in the low FIM score category had the highest unadjusted rate of readmission for each diagnostic category and as a continuous variable, FIM scores were linearly associated with readmission. Compared to patients with high admission FIM scores, patients with low and middle FIM scores had higher unadjusted odds of readmission (OR 4.0; 95% CI 3.4 – 4.7; $P < 0.001$ and OR 1.8; 95% CI 1.5 – 2.1; $P < 0.001$).

In the multivariable analyses, patients with a primary medical diagnosis had higher odds of readmission to the hospital (OR 1.8; 95% CI 1.6 – 2.1, $P < 0.001$) relative to patients with a neurologic or orthopedic diagnosis. Across all diagnoses, the adjusted odds ratios (95% CI) for the low and middle versus high FIM score category were 3.0 (2.5 – 3.6; $P < 0.001$) and 1.5 (1.3 – 1.8; $P < 0.001$) respectively. Patients in the lowest FIM group with a medical diagnosis had the highest adjusted readmission rate of 28.7%. The authors did not observe a statistical interaction between age and FIM score in predicting readmission. Finally, there were similar significant associations between admission FIM score group and readmission status that did not differ significantly across the 3 major diagnostic categories, suggesting that the effect of functional status was similar across various types of patients. Of the components of the FIM score, only those items related to transfers (to chair/wheelchair, toilet, and tub/shower), locomotion, and self-care were significantly associated with readmission.

■ COMMENTARY

This study demonstrated that low functional status at the time of discharge from an acute care hospital was strongly associated with higher 30-day readmission rates. This observation was consistent across major diagnostic groups with low-functioning medical patients having the highest rate of readmission (28.7%). The authors found that the motor subscales of the FIM score (transfers, locomotion, and self-care) were independently associated with readmissions. They interpret that observation as suggesting that lower motor scores may be a marker of poor physiologic reserve. Limitations of this study are primarily related to its observational design that allows for detection of associations but does not allow attribution of cause-and-effect. In addition, there may be residual confounding due to limitations in the administrative databases. The study also only evaluated patients discharged to an acute rehabilitation facility and not all patients discharged from an acute care hospital. Nevertheless, the study is consistent with prior literature in this field.

The results of this study are not particularly shocking in that it falls into that category of studies showing that sicker patients do worse. But the importance of this study, in my mind, lies in its identification of a potentially modifiable risk factor for 30-day readmission. Routine inpatient medical practice may not fully address the debilitation that occurs with acute illness as functional assessments might not be made and physical therapy (PT) and occupational therapy (OT) services may be underutilized or understaffed. Incorporating functional status into routine medical care may allow hospitalists to identify patients at higher risk of readmission. For those patients, the integration of early activity and mobility may be a means of decreasing their risk for readmission. This study does not address this hypothesis directly, but it makes me wonder. ■

ABSTRACT & COMMENTARY

Can We Prevent the Avoidable Readmission When Time Is of the Essence?

By Deborah J. DeWaay, MD, FACP

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Dr. DeWaay reports no financial relationships in this field of study

SYNOPSIS: There are four predictors for a potentially avoidable readmission due to end-of-life issues: number of admissions in the past year, opiate prescription at discharge, neoplasm and Elixhauser comorbidity index.

SOURCE: Donzé J, Lipsitz S, Schnipper J. Risk Factors For Potentially Avoidable Readmissions Due To End-of-life Care Issues. *J Hosp Med* 9(5): 310-314. May 2014

There are multiple problems that lead to potentially unnecessary readmissions of patients at the end of their life, including but not limited to poor pain management, a lack of advance directives, and unwanted overtreatment. End of life care is expensive, and uses a disproportionate amount of resources; the 6% of Medicare beneficiaries who die each year use 30% of the resources. The authors of this study sought to identify patient risk factors that would predict when end-of-life issues would lead to a 30-day potentially avoidable readmission (PAR).

This study is a nested case-control study comparing non-readmitted controls to patients with PARs. All patient admissions from the Brigham and Women's Hospital were collected for one year. Patients admitted for observation, those who died before discharge, those who left against medical advice or those who were transferred to another hospital were excluded from the study. The primary outcome was a 30-day PAR from any end-of-life issue as determined by a validated algorithm. A PAR was defined as a readmission secondary to a diagnosis known at the initial admission or from a treatment complication. An unavoidable readmission was defined as a planned admission for scheduled care (for example, chemotherapy), rehabilitation treatments, or for a new condition not present during the initial hospitalization. Nine senior resident physicians were trained to review a random sample of the PARs and determine if they were secondary to end-of-life issues as defined as a hospitalization from a terminal condition (life expectancy < 6 months) not appropriately addressed leading to a readmission. The authors collected information on an extensive list of risk factors including demographics, source of index admission, length of stay, number of hospital admissions, caregiver at discharge, number of medications at discharge, opioid prescription at discharge, and selected comorbidities (for example, diabetes, heart failure and neoplasm).

The authors compared the PARs secondary to end-of-life issues with the control group who had no readmissions in 30 days after their initial admission using a bivariate analysis of all collected potential risk factors. The Student t test was used for continuous variables and the Pearson χ^2 test was used for categorical variables. The authors subsequently performed a multivariable logistical regression analysis on the variables found to be significant in the initial analysis.

The investigators reviewed 12,383 hospitalizations and excluded 17% for a variety of reasons. Of the remaining 10,275 hospitalizations, 22% were followed by a 30-day readmission; 8% were followed by a readmission that was deemed as potentially avoidable. A random sample of these PARs were taken (n=534). 15% (n=80) of the sample was secondary to end-of-life issues. A palliative consult was obtained on 20% (n=16) of these PARs secondary to end-of-life issues. After the multivariate analysis, four risk factors were identified as being associated increased PARs from end-of-life issues (control vs. PAR due to end of life): presence of neoplasm (33.9% v. 86.3%: $p < 0.001$), an opiate prescription at the time of discharge (33.2% v. 73.8%: $p < 0.001$), Elixhauser score (median score: 8 v. 23 $p < 0.001$), and the number of admissions in the previous 12 months (1 v. 2 <0.001). The Elixhauser comorbidity index is an index that is calculated via administrative data using the 30 comorbidities in the ICD-9 coding manual into a single numeric score that summarizes disease burden and is predictive of in-house mortality. Of note, age was not a significant risk factor associated with a PAR from end-of-life issues.

There are several limitations to this study. First, the authors looked at readmissions at 3 affiliated hospitals, which account for 80% of the readmissions for patients that go to these facilities. Therefore, patients readmitted to other centers are not accounted for. Second, there are other risk factors, such as cognitive status, which may also be important but cannot be ascertained using administrative data. Finally, the generalizability to hospitals which are small, community-based or rural is questionable.

■ COMMENTARY

Discussing end-of-life issues with patients is a skill that

is crucial for hospitalists to have. In addition, hospitalists often have these discussions when the patients did not discuss these issues with their primary care physician. However, it is common for hospitalists to sometimes avoid the issue because they are dealing with short length of stays and a patient with whom there isn't a long-term relationship. Many patients do not need extensive end-of-life discussions with their hospitalist. They have a limited illness that requires short-term treatment and their comorbidities are controlled. However, there is a group of patients with multiple comorbidities, multiple admissions and no end-of-life planning that do need extensive discussions with their hospitalist. In my opinion, the most difficult conversations are those with patients that are dying from multisystem organ dysfunction. There isn't one illness that will cause them to pass away, so bringing up end-of-life planning can be difficult, especially with the patient who is in denial about his or her global health. The risk factors described in this article are a good way for hospitalists to screen their patients for who really needs these discussions, challenge us to have the hard conversations, and consult palliative care. Hospitalists need to be equipped with having these discussions, however, because I suspect few hospitals have the palliative care resources to consult on every patient that has these risk factors. ■

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ABSTRACT & COMMENTARY

Gloves Are Not Perfect

By Eric C. Walter, MD, MSc

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Dr. Walter reports no financial relationships relevant to this field of study.

This article originally appeared in the June 2014 issue of Critical Care Alert. *It was edited by David J. Pierson, MD, and peer reviewed by William Thompson, MD. Dr. Pierson is Professor Emeritus, Pulmonary and Critical Care Medicine, University of Washington, Seattle, and Dr. Thompson is Associate Professor of Medicine, University of Washington, Seattle. Drs. Pierson and Thompson report no financial relationships relevant to this field of study.*

SYNOPSIS: After caring for patients with *Clostridium difficile* infection, nearly 25% of health care workers were found to have hand contamination with *C. difficile* spores.

SOURCE: Landelle C, et al. Contamination of healthcare workers' hands with *Clostridium difficile* spores after caring for patients with *C. difficile* infection. *Infect Control Hosp Epidemiol* 2014;35:10-15.

Clostridium difficile is a prominent pathogen in intensive care units (ICUs) and frequently leads to nosocomial infections. One of the most common modes of transmission of *C. difficile* is via the hands of health care workers (HCWs). In this study, Landelle and colleagues aimed to determine how often HCWs' hands became contaminated with *C. difficile* after caring for patients with *C. difficile* infection (CDI). They also identified risk factors for hand contamination.

In this prospective study, HCWs caring for patients with and without CDI were observed daily over an 8-week period. Patients were located in the ICU and medical and surgical hospital wards. Over the course of the study, HCWs caring for seven patients with CDI and 16 control patients without CDI were observed. Observations included patient contact time, level of risk of patient contact (high risk was defined by the possibility of HCWs' hands to be highly contaminated with fecal material, such as with handling bedpans), use of gloves, hand hygiene compliance, etc. All patients with CDI were placed in contact precautions. For HCWs, these precautions included the use of dedicated equipment, donning a disposable gown with full-length sleeves and gloves prior to entering the room, hand hygiene with an alcohol-based solution before wearing gloves, and hand hygiene with soap and water followed by alcohol-based solution after glove removal. HCWs' hands were sampled for *C. difficile* spores immediately after caring for patients, following glove removal, but before hand washing.

Amazingly, and also disturbing, *C. difficile* spores were found on the hands of nearly one out of every four HCWs who had cared for patients with CDI (16/66, 24%). *C. difficile* spores were not isolated from any HCWs caring for patients without CDI (0/44). Having more patient contacts or more contacts with a patient's environment was associated with a higher risk of hand contamination. The number and length of high-risk contacts as well as lack of glove use were also risk factors for hand contamination. After controlling for multiple risk factors using logistic regression, the number of high-risk contacts (odds ratio for every additional high-risk contact, 2.78; 95% CI 1.42-5.45) and having at least 1 contact without the use of gloves (odds ratio 6.26; 95%

CI 1.27-30.78) were associated with hand contamination with *C. difficile* spores.

■ COMMENTARY

In this study, Landelle and colleagues report a distressingly high proportion of HCWs found to have hand contamination with *C. difficile*. Remember this study the next time you go to shake the hand of a colleague caring for a patient with CDI. Even more worrisome, 24% may be a low estimate of the proportion of HCWs with hand contamination. In this study, all HCWs knew they were being observed. Despite knowing this, 7.8% of contacts occurred without the use of gloves. In unobserved settings, the lack of glove use is likely to be higher. Despite only 7.8% of contacts occurring without gloves, 24% of HCWs had contaminated hands. Some contamination can be explained by the lack of glove use but 56% of the HCWs with contaminated hands used gloves for all patient contacts. Gloves are not perfect.

There are some limitations to this study. The number of HCWs observed caring for patients with CDI was adequate but not large (n = 66) and there were only seven patients with CDI during the study. HCWs' hands were not sampled for *C. difficile* spores prior to entering patient rooms, so it is possible that contamination was present prior to caring for patients with CDI. However, no spores were identified on the hands of HCWs caring for patients without CDI. It is presumed that hand contamination with spores is a risk for transmission of *C. difficile* but the degree of risk is not known, and this study does not address this question.

In summary, this study offers strong evidence that HCWs' hands become contaminated with *C. difficile* spores during patient care and that glove use and contact precautions decrease the risk of contamination but are not perfect. The implied importance of washing your hands vigorously with soap and water after glove removal should not need repeating. ■

ABSTRACT & COMMENTARY

Patients with Multiple Medical Emergency Team Calls Are at High Risk for Adverse Outcomes

By David J. Pierson, MD

This article originally appeared in the June 2014 issue of Critical Care Alert. *It was peer reviewed by William Thompson, MD. Dr. Pierson is Professor Emeritus, Pulmonary and Critical Care Medicine, University of Washington, Seattle, and Dr. Thompson is Associate Professor of Medicine, University of Washington, Seattle. Drs. Pierson and Thompson report no financial relationships relevant to this field of study.*

SYNOPSIS: In this large observational study in four hospitals with a standardized rapid response system, among patients with an initial team activation who were not immediately transferred to the ICU, those with one or more additional activations during the hospitalization were more likely to need ICU care and had both longer hospital stays and higher mortality.

SOURCE: Stelfox HT, et al. Characteristics and outcomes for hospitalized patients with recurrent clinical deterioration and repeat medical emergency team activation. *Crit Care Med* 2014; Mar 25. [Epub ahead of print.]

This retrospective cohort study was carried out at four institutions in Alberta — two tertiary care hospitals and two community hospitals — in which each hospital's rapid response system (RRS) for ward patients was activated according to criteria standardized for the province's health care system,[1] with data on all such activations recorded prospectively. A medical emergency team (MET) consisting of an intensivist (attending or fellow, or physician extender), a nurse, and a respiratory therapist responded to all activations, which were triggered by criteria-based changes in vital signs or mental status, or if the ward provider was worried about the patient. By policy, during such "emergency second opinions" a decision is made regarding ICU admission within 30 minutes. The investigators examined all MET records for the four hospitals from 2007 through 2009, focusing on patients whose initial MET call did not trigger an ICU admission, and compared those with only an initial such call to those who had one or more subsequent calls. The study's primary outcome was the need for admission to the ICU following the initial MET call; secondary outcomes were health care resource utilization, ICU and hospital lengths of stay, and in-hospital mortality among patients.

During the 3-year study period, 5008 patients experienced clinical deterioration and MET activation, of whom 26% were admitted to the ICU, 3% died during the consultation, and 7% had the goals of care changed to exclude ICU admission during the initial MET call. Of the remaining 3200 patients, 337 (10.5%) had one or more subsequent MET calls. Compared to patients who had only a single MET call, more of those with multiple calls had chronic liver disease (odds ratio [OR], 1.75; 95% confidence interval [CI], 1.14-2.69), but they were otherwise indistinguishable demographically. Patients with multiple MET calls were more likely to require

subsequent ICU admission (43% vs 13%; OR, 6.11; 95% CI, 4.67-8.00; $P < 0.01$), to have longer hospital lengths of stay (median, 31 vs 13 days; $P < 0.01$), and to die during the hospitalization (34% vs 23%; OR, 1.98; 95% CI, 1.47-2.67; $P < 0.01$). During the initial MET call, patients who received airway suctioning, noninvasive ventilation, or placement of a central IV line were more likely to experience subsequent deterioration and MET activation.

■ COMMENTARY

While some controversy continues about the benefits of RRSs, their optimal structure and functioning, and their necessity for improved outcomes among acutely hospitalized patients, such systems have been widely implemented in North America. This study, carried out by an experienced group of investigators in the context of a standardized RRS employed throughout a provincial healthcare system,[1] is helpful whatever the ultimate verdict on the RRS concept turns out to be. It shows that the need for a second MET call during a given hospitalization — a common occurrence — appears to identify a patient as at greater risk for adverse outcomes as compared to patients whose initial call does not result in ICU admission and who do not trigger a second call.

Further, patients whose initial MET activation includes airway suctioning, the initiation of noninvasive ventilatory support, and/or placement of a central line may be at increased likelihood of subsequently triggering one or more additional MET calls. As Stelfox and colleagues suggest, it may be possible to identify patients at increased risk of recurrent clinical deterioration once a MET activation has occurred. This information may be helpful even in the absence of proof that interventions based on these observational findings can ameliorate the adverse consequences of such risk. ■

REFERENCE

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ABSTRACT & COMMENTARY

U.S. MERS cases worked in Saudi hospitals

By Stan Deresinski, MD, FACP, FIDSA

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This article originally appeared in the June 2014 issue of Infectious Disease Alert. *It was peer reviewed by Timothy Jenkins, MD. Dr. Jenkins is Assistant Professor of Medicine, University of Colorado, Denver Health Medical Center. Dr. Deresinski does research for the National Institutes of Health, and is an advisory board member and consultant for Merck, and Dr. Jenkins reports no financial relationships relevant to this field of study.*

SOURCE: CDC. Middle East Respiratory Syndrome (MERS). http://www.cdc.gov/features/novelcoronavirus/

SYNOPSIS: The first U.S. case of MERS-CoV infection diagnosed in the U.S. has been identified in an individual traveling from Saudi Arabia.

An American health care worker flew from Riyadh, Saudi Arabia, to Chicago on a connecting flight from London on April 24, 2014. This was followed by an approximately 30-mile bus ride to Munster, Indiana. Three days later, on April 27, he developed fever, cough, and breathlessness and he presented to the Emergency Department of the 427-bed Community Hospital in Munster on the evening of the following day and was admitted as an inpatient. Middle East respiratory syndrome coronavirus (MERS-CoV) infection was suspected. As a consequence, the patient was managed with appropriate isolation precautions and specimens were sent to the Centers for Disease Control and Prevention (CDC), which confirmed the diagnosis on May 2nd.

In order to detect possible secondary cases, family members and health care workers with significant contact with the patient underwent daily monitoring for 14 days, which is considered the outer limit of the incubation period of the infection. The CDC began contacting the patient's airplane and bus co-passengers on May 3rd.

■ COMMENTARY

As of May 12th, 2014, CDC reported a total of 538 confirmed MERS-CoV cases that include 145 deaths. The fact that 200 new cases were reported by Saudi Arabia and the United Arab Emirates in the single month of April 2014 has appropriately raised concerns that viral mutations had led to enhanced adaptation to human hosts.[1]

The available evidence, however, has not, to date, confirmed this fear. Rather, it has been suggested that at least part of the reason has been increased recognition of the disease. Another suspected factor is the mass birthing of dromedary camels (the one-humped type) that occurs every winter in breeding facilities.

The virus, like the SARS coronavirus, has been found in bats. The role of these mammals in the transmission of MERS-CoV is uncertain, but dromedary camels are an important reservoir of the virus. For instance, a country-wide survey in Oman led to its detection in conjunctival and nasal secretions in high concentration in 5 of 76 of the ungulates tested and the finding that the viruses were

closely related to MERS-CoV of human origin detected in the same geographic area.[2] In a few cases, closely related MERS-CoV has been identified in humans and camels with which they had had contact. Thus, it has been suggested that human infections may result from contact with the camels, eating camel meat, and the common practice of eating unpasteurized camel milk. Human-to-human transmission also occurs, with cases occurring in those with close contact with cases, including family members and health care workers. Fortunately, sustained transmission has not been observed.

Autochthonous cases of infection have occurred in 6 countries in or near the Arabian Peninsula: Saudi Arabia (where the bulk of cases have occurred), Oman, Kuwait, United Arab Emirates, Qatar, and Jordan. The U.S. is the 12th country to which the virus has been exported and, in our globally connected world, it will not be the last.

Fatal cases mostly occurred in those with significant comorbidities such as chronic renal insufficiency and diabetes mellitus. Treatment of rhesus macaques experimentally infected with MERS-CoV with ribavirin and interferon-α2b, which are active against the virus in vitro, was associated with somewhat improved outcomes.[3] Monoclonal antibodies with neutralizing activity have also been developed.

One last thing — congratulations to the alert clinicians at Community Hospital in Munster for rapidly recognizing the possibility of MERS-CoV infection in their patient!

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CME QUESTIONS

1. In the study published by Elliott and colleagues, hospitalist workload correlated with which of the following:

a. Patient satisfaction
b. Cost of care
c. Time to echocardiogram
d. Readmissions at 30 days

2. What is the Elixhauser comorbidity index?

a. It is an index that predicts 10 year mortality on a patient with multiple comorbidities such as heart disease, AIDs and cancer.

b. It is an index that predicts hospital readmission rates based on age, ethnicity and marital status.

c. It is an index that is calculated via administrative data using the 30 comorbidities in the ICD-9 coding manual into a single numeric score that summarizes disease burden and is predictive of in-house mortality.

d. It is a comorbidity index that is easily calculated by a hospitalist on the wards.

3. In the study by Landelle, et al., healthcare workers who wore gloves while caring for patients with *C. difficile* infection had approximately what rate of hand contamination with *C. difficile* spores before washing their hands?

a. Less than 5%
b. 25%
c. 50%
d. 90%

CME OBJECTIVES

Upon completion of this educational activity, participants should be able to:

- discuss pertinent safety, infection control and quality improvement practices;
- explain diagnosis and treatment of acute illness in the hospital setting; and;
- discuss current data on diagnostic and therapeutic modalities for common inpatient problems.