Nonteaching Hospitals May Be Best for Colon Resections

BY KERRI WACHTER

Mortality and length of stay following colon resection are significantly reduced at nonteaching hospitals compared with teaching hospitals, according to a retrospective analysis of 6 years' worth of data in the National Inpatient Sample.

Following risk and volume adjustment, teaching hospitals were associated with a 14% increased risk of operative mortality, Dr. Awori J. Hayanga reported at the annual Academic Surgical Congress in Fort Myers, Fla. In addition, there was a significant increase in length of stay—10.4 days at teaching hospitals vs. 8.5 days at nonteaching hospitals—and a trend toward an increase in total charges from about $6,000 to more than $8,000.

"The assumption is that teaching hospitals have higher volumes for all procedures, and that's not the case. … Most colon resections in the United States are not performed in teaching hospitals," Dr. Hayanga said in an interview. "Cancer makes up the minority of resections that are performed on the colon. More resections are performed for benign disease." The bulk of resections for benign colon disease are performed at nonteaching hospitals.

"We are postulating that there might be a tipping point in the volume-outcome ratio that shifts in favor of nonteaching hospitals—once you hit the critical volume of procedures," said Dr. Hayanga, a surgical resident at the University of Michigan in Ann Arbor.

The analysis conducted by Dr. Hayanga and his colleagues was supplemented with data from the Area Resource File and the National Inpatient Sample. Logistic regression analysis was used to estimate 30-day mortality while linear regression analysis was used to estimate both length of stay and total charges. A teaching hospital met the definition by the American Hospital Association and was affiliated with either an Accreditation Council for Graduate Medical Education–accredited general surgery residency and/or colon fellowship at the institution.

There was a significant increase in length of stay—10.4 days at teaching hospitals vs. 8.5 days at nonteaching hospitals—and a trend toward an increase in total charges.

The analysis included patients over the age of 18 who had undergone a colon resection as classified by ICD-9 codes.

Covariates included age, sex, race, insurance status, geographic region, institutional volume and urban/suburban/rural status, median county income, and percentage of county residents living below the federal poverty level.

"Teaching hospitals—with their propensity for performing rare and specialized surgery—tend to see sicker patients, who require the resources that are available only at these tertiary centers to get these patients better," Dr. Hayanga said. "There is a feeling that there is a qualitatively different patient who comes to teaching hospitals."

To attempt to control for possible differences in the types of patients seen at teaching vs. nonteaching hospitals, the investigators included the Charlson comorbidity index as a covariate.

In all, 115,250 patients underwent colon resection during the time period at more than 2,000 hospitals. Most patients (60%) received care at nonteaching hospitals. Overall, the mortality rate was 3.8%.

The researchers concluded that teaching hospitals may offer improved outcomes for complex oncologic surgical resections but may have worse outcomes for less complex surgery. Most of the less complex procedures are performed at nonteaching hospitals.

The databases have some limitations, and the study raises more questions than it answers, Dr. Hayanga acknowledged, adding that to accurately determine this relationship, a randomized prospective study would be needed for further clarification. ■

Nosocomial C. difficile *Increases Length of Stay*

BY MIRIAM E. TUCKER

WASHINGTON — Nosocomial *Clostridium difficile* infection was associated with 85% higher costs per hospital stay and 99% longer lengths of stay in the first-ever nationwide multihospital analysis of these infections.

The study included 10,857 cases of *C. difficile* infection (CDI) and 19,214 controls; all were adult inpatients. Data were collected from teaching hospitals in the University HealthSystem Consortium for the period 2002-2007. The number of hospitals participating in the UHC's clinical resource manager database varied from 25 to 45, depending on the year.

Cases of health care–acquired CDI were defined as instances where patients had the appropriate ICD-9 code listed as a secondary diagnosis, and metronidazole or oral vancomycin was administered for 4 or more days starting on day 5 of the hospitalization or later.

This case definition has been validated, Amy L. Pakyz, Pharm.D., said at the jointly held annual Interscience Conference on Antimicrobial Agents and Chemotherapy and the annual meeting of the Infectious Diseases Society of America.

Each case was matched with at least one control who did not have an ICD-9 code for CDI but who had another in the same diagnosis-related group (DRG), was within 5 years of the case patient's age, and was from the same hospital and year quarter.

Both groups had a mean age of 61 years and were 48% female. The CDI group was more likely to be white (68% vs. 65%) and less likely to be black (19% vs. 21%); both were significant differences. The All-Patient Refined DRG severity of illness rating (APR-DRG SOI) for the CDI patients was significantly more likely to be "extreme" (56% vs. 21%) and less likely to be "minor" (2.0% vs. 11%), compared with controls.

Unadjusted mean total hospital costs were $56,407 for the CDI cases vs. $29,237 for controls. Mean length of stay was 21.2 days vs. 10.1 days, respectively. Both differences were highly statistically significant. After adjustment for sex, age, race, and APR-DRG SOI, health care–acquired CDI was associated with 85% higher costs and 99% longer inpatient stays, vs. controls, said Dr. Pakyz of Virginia Commonwealth University, Richmond.

CDI had a greater effect on costs in patients with the "minor" APR-DRG SOI classification, in whom CDI was associated with 65% greater total hospital costs and 46% longer stays, compared with controls.

These results are consistent with those of previous studies done in single hospitals and one multihospital study conducted in Massachusetts, she noted.

Dr. Pakyz received investigator-initiated funding for this study from ViroPharma Inc. ■

Probiotic Ineffective in Preventing *C. difficile* Infection

BY MIRIAM E. TUCKER

WASHINGTON — The probiotic *Lactobacillus GG* failed to prevent *Clostridium difficile* infection when given at the same time as systemic antibiotics to hospitalized adults in two prospective, randomized, double-blind, placebo-controlled trials.

Lactobacillus GG (LGG) is an *L. rhamnosus* isolate named after the initials of the two scientists—Sherwood Gorbach and Barry Goldin—from whom the strain was derived and who hold the patents for it. The strain is marketed as a dietary supplement under the name Culturelle by the ConAgra Foods Co., which funded the two studies.

The organism is acid- and bile-stable and has high affinity to mucosal cells of the gastrointestinal tract, thus rendering it a potential gut probiotic that could prevent disruptions in normal flora that occur with antibiotic use, Dr. Mark Miller said at the jointly held annual Interscience Conference on Antimicrobial Agents and Chemotherapy and the annual meeting of the Infectious Diseases Society of America.

Virtually all cases of *Clostridium difficile* infection (CDI) are preceded by antibiotic consumption in the previous 60 days, and perturbation of normal flora is almost certainly responsible for the mechanism that "turns on" CD spore germination and toxin production. Yet no study has demonstrated the effectiveness of a probiotic to prevent CDI, said Dr. Miller, head of the division of infectious diseases and chief of the department of microbiology at SMBD-Jewish General Hospital, McGill University, Montreal.

In the first study, 95 hospitalized patients who were receiving oral or parenteral antibiotics for 14 days or less were randomized to receive LGG in an oral dose of 2×10^{10} bacteria twice daily for 14 days; 94 patients received placebo. No patient was severely immunocompromised, and all were able to take medications by mouth.

Over the subsequent 30 days, four of the LGG patients (4.2%) and seven of the placebo patients (7.4%) developed documented CDI (diarrhea plus positive toxin B assay), but this difference was not significant.

Two of the LGG patients (2.1%) and four placebo patients (4.3%) died; none of the deaths were deemed to be related to the study drug.

The larger, second study employed a higher dose of LGG (6×10^{10}) twice daily for 14 days. Again there was no significant difference between groups, with CDI developing in 2 (1.3%) of 157 the LGG patients and in 0 of the 159 placebo patients.

Four (2.6%) of the LGG patients died—none deemed related to the study drug—while none of the placebo patients died. Watery diarrhea was reported by 5.1% of the LGG patients and 2.5% of the placebo group, also not a significant difference.

Study medication compliance was similar for the two groups.

It's possible that the low rate of CDI in the study population may have obscured an effect of LGG, or that monitoring the effects of "lesser" diarrhea than "watery" may have shown an effect, Dr. Miller commented.

In general, probiotic prophylaxis studies are hampered by the large number of study subjects needed to show an effect. Also, whether the failure of LGG is a product-specific effect or is representative of all probiotics is an open question.

Dr. Miller received research support from ConAgra Inc. ■