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**New Research Highlights Changing Epidemiology of *Clostridium difficile*,
Explores Health Impact of the Diarrheal Infection in Hospitalized Children**

Report Suggests Fecal Microbiota Therapy May Help Pediatric Patients with Recurrent C. diff. Diarrhea

Las Vegas, NV (October 22, 2012) – A stay in the hospital may not be the only way to acquire *Clostridium difficile* diarrhea – but the potentially life-threatening infection may be associated with a number of health complications in hospitalized children, according to the findings from two studies unveiled today at the American College of Gastroenterology's (ACG) 77th Annual Scientific meeting in Las Vegas. In a separate case report also presented today, fecal microbiota transplantation in a 20-month old with recurrent *Clostridium difficile* infection (CDI) suggests the therapeutic potential fecal bacteriotherapy in pediatric patients who fail standard therapy for CDI.

In one study, researchers from Sinai Hospital in Baltimore retrospectively analyzed the changing epidemiological trends of patients with *Clostridium difficile*-associated diarrhea (CDAD) who were admitted to an acute care hospital between January 2005 and December 2012. The results of their analysis, "**Changing Epidemiology of *Clostridium difficile*-Associated Diarrhea (CDAD) Among Long-Term Care Facility Patients,**" suggest a changing shift in the way CDAD is acquired—from a traditional hospital-acquired infection to a community and long-term-care facility-based infection.

For the study, CDAD was defined as having clinical signs and symptoms of *Clostridium difficile* infection and a positive *c. difficile* stool toxin assay. The patients in the study were divided into three groups: nosocomial (hospital-acquired); long-term-care facility (LTCF); and community-acquired. Of the 258 toxin-positive CDAD patients in the analysis, 53 (20.6 percent) were nosocomial (hospital acquired); 119 were LTCF (46.1 percent) and 86 (33.3 percent) were in the community. The mean age for LTCF patients was higher than the other groups. Presenting symptoms were divided into diarrhea and non-diarrheal symptoms including fever, abdominal pain, and altered mental status. According to the results, the incidence of acute diarrhea was significantly lower in LTCF (18) patients as compared to patients from community (25).

Among the other findings:

* Most LTCF patients (80) presented with non-diarrheal symptoms whereas 47 community patients had non-diarrheal symptoms

* Use of proton pump inhibitors (PPI)s was more frequent in LTCF patients (73 percent) and nosocomial patients (69.8 percent) as compared to community patients (43 percent)

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* No clear indication was found for PPI use in 24.13 percent of LTCF patients using PPIs (21 out of 87), compared to 12.9 percent (4 out of 35) of nosocomial patients and 32.1 percent (9 out of 37) of community.

“There seems to be an epidemiological shift in *C. difficile* associated diarrhea from a traditional hospital-acquired infection to a community and long-term care facility-based infection,” said co-investigator Vivek Kumar, M.D. He noted that diarrhea was not found to be the main presentation in LTCF patients. “This finding suggests that suspicion of *C. difficile* associated diarrhea should be high even if they present with non-specific symptoms such as abdominal pain, fever and altered mental status.” He adds that more large scale epidemiological studies are needed to help us understand the spread of CDAD in the community.

Study Suggests CDI Associated with Increased Length of Hospital Stay, Other Health Implications for Children

While hospital and population-based studies have shown an increased incidence of *C. difficile* infection (CDI) in both adults and children, relatively little is known about the outcomes of infection in hospitalized children with CDI, according to researchers from the Mayo Clinic who analyzed the National Hospital Discharge Survey (NHDS) database to determine the epidemiology and outcomes of CDI in hospitalized children in another study. “**The Epidemiology and Outcomes of Clostridium difficile Infection in Children from 2005-2009: Results from a Nationwide Survey,**” suggest that despite increased awareness of CDI in children and advancements in the management of CDI and infection and control practices, CDI remains a “major problem” in hospitalized children, and is associated with increased length of stay, colectomy, in-hospital mortality and discharge to a short-or-long-term care facility (DTCF).

There were an estimated 13.7 million children over the five-year study period, with a median age of 5 years and 47.8 percent female. Of this group, there were about 46,176 CDI cases (0.34 percent of all pediatric admissions) with a median age of 3 years; 48.1 percent female. The annual rate of CDI varied from 2.4 to 4.3 cases per thousand over the study period with no significant trend up or down, according to co-investigator Sahil Khanna, M.D.

Among the key findings children with *C. difficile* infection, compared to controls, had:

- Longer median length of stay (LOS): 6 versus 2 days
- Higher rates of colectomy (1.6 percent versus .32 percent)
- Higher all-cause in-hospital mortality (1.2 percent versus 0.48 percent)
- Higher discharge to long-term care facility (4.3 percent versus 2.7 percent)

“We did find that children with *C. difficile* infection were likely to stay in the hospital four days longer than children without the infection; twice as likely to lose part or all of their colon, and two and a half more times as likely to die in the hospital,” said Dr. Khanna. “Despite increased awareness of *C. difficile* infection in children and advancements in management of *C. difficile* infection and infection prevention and control practices, this study suggests that CDI remains as major problem in hospitalized children. After adjusting for age, sex and comorbidities, this study also suggests that *C. difficile* infection was an independent and the strongest predictor of increased length of stay, higher rates of colectomy, higher all-cause in-hospital mortality and higher discharge to a long-term care facility,” Dr. Khanna explained.

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“In hospitalized children *C. difficile* infection can be a major cause of morbidity and mortality. CDI should be considered as a differential in hospitalized children with diarrhea and managed aggressively,” added Dr. Khanna.

Case Report: “A Novel Treatment for Recurrent *Clostridium difficile* Infection in a 20 month Old”

“Recurrent *C. difficile* infection (CDI) has become a major problem in children often requiring recurrent and prolonged course of antibiotics,” said co-investigator Dr. Sudhir Dutta. In a separate case-report also presented today, Dr. Dutta and a team of physicians from Sinai Hospital-Johns Hopkins Program in Internal Medicine and the Pediatric GI Department reported success after using fecal microbiota therapy to treat a case of recurrent *C. difficile* infection in a 20-month old male who was born premature at 27 weeks of gestation.

Fecal Microbiota Transplantation (FMT) involves taking the stool of a healthy person and putting it into the colon of a person with disease to help restore health. In persons with *C. difficile* infection, the goal is to restore the natural balance of good and bad bugs in the gut and eliminate the recurrent diarrhea, which can be life-threatening.

“While fecal microbiota therapy is successfully being used in adults with recurrent *C. difficile* infection, to our knowledge there is only one reported case in the pediatric literature where treatment with fecal microbiota transfer resulted in spontaneous improvement of symptoms and improvement of diarrhea,” said Dr. Dutta.

In this case, the patient presented with a two-month history of diarrhea, rectal bleeding, and failure to thrive with a past medical history that included chronic lung disease and gastroesophageal reflux disease as well as treatment with multiple courses of antibiotics.

Co-investigator Dr. Rita Batra, of Sinai’s Pediatric GI Department, noted that the decision to conduct FMT in the 20-month old patient was due to the severity of symptoms and because the procedure, “allows the fastest means of colonic composition of its normal microbiome components thus providing a primary line of defense against colonization and proliferation of opportunistic pathogenic bacteria including *C. difficile*.”

After receiving donor stool from his mother via colonoscope in the right colon, the patient has now remained symptom-free with complete resolution of diarrhea, rectal bleeding and has consistently gained weight over the past three months, according to the case report.

“This case demonstrates the therapeutic potential of fecal bacteriotherapy in pediatric patients who fail standard therapy for *C. difficile* infection,” said Dr. Dutta. “Randomized controlled studies with long-term follow up are needed to support the efficacy and safety of fecal microbiota therapy in pediatric patients.”

About *C. difficile*

C. difficile causes diarrhea linked to 14,000 American deaths each year. Deaths related to *C. difficile* increased 400 percent between 2000 and 2007, due in part to a stronger germ strain, according to the Centers for Disease Control. *C. difficile* infections cost at least \$1 billion in extra health care costs annually. **Source:** [CDC](#)

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