Chair’s Letter

Hello and greetings to all Section on Infectious Diseases (SOID) Members!

Since you’re reading this, you care about infectious diseases, and perhaps look to the Section for information to most effectively do what you do. SOID really hopes this newsletter is useful to you.

First, I would like to thank Dr. Tina Tan for Chairing SOID for four years. All SOID members should know that not only did she do a great job in the public sphere, but behind the scenes as well. This included input on many issues, discussions, and problem-solving at SOID and serving as its representative on other national ID committees and societies. Also, our AAP staff manager of >10 years, Suzanne Kirkwood, has been assigned to other duties at AAP. Most of you did not know her, but no SOID activity of significance got done without her guiding and extraordinarily competent hand. We therefore welcome Dana Bright, a very experienced AAP staff member as our new manager. Her brief tenure to date has already been reassuring to the Executive Committee that SOID will continue to run smoothly.

I would like to let you know that Dr. Robert Frenck was elected to a second, three-year term on the Executive Committee and has assumed the role of the Education Subcommittee Chair for the Section. Bob is also rolling off the PREP®:ID Planning Group and we’re very pleased that Dr. Kari Simonsen will step into that role. PREP®:ID is in Atlanta this year in August. The marketing has begun, and registration is open; talk it up to all you believe may benefit. As you know, we actively involve ID Fellows in SOID leadership.
As such, I would like to thank our Training Fellow Liaisons Drs Sophie Katz and Katie Richardson who are rolling off the Executive Committee and Education Subcommittee, respectively. Both have been very productive for SOID and a pleasure to work with. We look forward to working with them in the future as they move forward in their careers. We are very grateful for this and many other members’ volunteerism to the Section!

What about some news on our outreach? Please have a look at the new Pediatric Antibiotic Stewardship Program toolkit developed as a collaborative effort between SOID, PIDS, and Health Care Without Harm. It is now posted on the PIDS website. This involved a tremendous amount of time and effort led by Rana Hamdy and Jason Newland with the active participation of other SOID and PIDS contributors.

Our 2018-2019 S. Michael Marcy Visiting Professor Program took place at the University of California San Francisco at Fresno Pediatric Residency Program in March 2019, and Dr Mary Anne Jackson was the Visiting Professor. As an added bonus, Joan Marcy attended as well and I’m told the Program was fantastic for all involved. For 2019-2020, the Carilion Children’s program in Roanoke was selected. Congratulations to them!

Lastly, SOID sponsored 18 general infectious diseases-related sessions and co-sponsored three others at the 2018 National Conference and Exhibition (NCE) in Orlando, Florida. For 2019, 17 general infectious diseases sessions were accepted for the NCE in New Orleans, Louisiana along with other joint programs with the Section on Allergy and Immunology, the Section on Otolaryngology - Head and Neck Surgery, and the Section on Radiology.

As of this writing, measles continues its sweep across the county with the most cases in a single year in over 25 years. As you probably know, the great majority of the cases have been under- or unvaccinated; ie, they were preventable. This is an ongoing challenge for Section members, many of whom are on the front lines of containment and education of clinicians and families. SOID is working closely with other AAP groups to help combat this issue.

It is important to reiterate that SOID gets its work done because of the generous time donated by our membership whilst working with our dedicated AAP staff. If you have colleagues interested in our kind of outreach and collaborations, please refer them to join the Section. Further, if you are interested in getting (more) involved and/or have suggestions regarding educational topics and/or website or newsletter content please contact me (kzangwill@labiomed.org) or Dana (dbright@aap.org) directly. SOID has also begun the process of rethinking our Strategic Plan; your suggestions in this regard are also welcomed.

As always, many thanks to Drs. Jennifer Read and Jane Carnazzo for serving as Editors of this Newsletter, a laborious task with great results.

Happy reading.

Ken Zangwill, MD
The “less is more” movement is also applicable to the outpatient realm, and opportunities exist to safely and effectively condense
antimicrobial prophylaxis. The Society of Health-System Pharmacists which recommended discontinuation of all antimicrobial
prophylaxis for all clean and clean-contaminated procedures. 3,4 It has been shown that evidence-based guidelines can be modified and
before clinicians will be strongly inclined to modify their current prescribing practices. A recent study by Coon et al. in Pediatrics
used information collected from the Pediatric Health Information System database to compare rates of infection recurrence and
treatment failure among infants with uncomplicated late-onset Group B Streptococcus (GBS) bacteremia with intravenous (IV)
antibiotic therapy: 163 treated for ≤ 8 days and 612 treated for > 8 days. 5 The authors found no significant differences between the
groups with regard to treatment failure or relapse of infection. Limitations of the study included an inability to definitively determine which specific
patients in the short-term IV treatment group received oral antibiotic therapy post-discharge (16% were known to have received an oral
antimicrobial on the date of discharge). The results of this study do not directly support shortening the accepted 10-day treatment
duration for uncomplicated late-onset GBS bacteremia in infants. Nevertheless, the results of this analysis do raise the question of
whether or not a minimum of 10 days of IV antibiotic therapy is truly required for treatment of such infections.
Antibiotic courses totaling 14 days have long been recommended for treatment of uncomplicated Gram-negative bacteremia, though
studies in both the adult and pediatric literature are now questioning that paradigm. 1,2 These studies found no differences in the risks of
microbiologic relapse or treatment failure for individuals treated with shorter courses (7-10 days) compared to those who received 14
days of antibiotics. Central line-associated bloodstream infections (CLABSIs) accounted for > 60% of cases of bacteremia in children
included in the retrospective study by Park et al. 3 Notably, the 2009 Infectious Diseases Society of America (IDSA) guideline for
management of CLABSIs advises a widely variable treatment duration for such infections (ie, between 7-14 days). 3 A urinary tract
source of bacteremia was identified for nearly 70% of adults in the open-label prospective trial by Yahav et al. 4 The AAP guideline for
management of initial urinary tract infections (UTIs) in children 2-24 months of age recommends antimicrobial treatment for (once
again) between 7-14 days. 5 The AAP guideline authors acknowledge this shortcoming by noting that providing a single evidence-based
recommendation for duration of therapy instead of a range would have been preferred; unfortunately, no data comparing 7 versus 10
versus 14 days of treatment were found. As hypothesized by Dr Andrew Riordan in 2016, studies comparing antibiotic durations of
therapy in bacteremic children with UTIs might be difficult to perform because of their relatively infrequent occurrence. 6 However, in
the absence of appropriate evidence to guide treatment decisions, clinicians are then forced to rely primarily on clinical experience and
expert opinion when choosing amongst durations of therapy such as 5, 7, 10, or 14 days. This is a tactic which Riordan deftly likens to
“calling out numbers in a game of antimicrobial bingo.” In short, additional research and guidance in this area are clearly needed before
evidence-based guidelines can be modified and before clinicians will be strongly inclined to modify their current prescribing practices.
Gram-negative bacteremia is not the only target of antimicrobial stewardship-minded researchers who are attempting to chip away at
certain standardized durations of antibiotic therapy. A recently published retrospective cohort study by Coon et al. in Pediatrics used
information collected from the Pediatric Health Information System database to compare rates of infection recurrence and treatment
failure among infants with uncomplicated late-onset Group B Streptococcus (GBS) bacteremia with intravenous (IV) antibiotic
therapy: 163 treated for ≤ 8 days and 612 treated for > 8 days. 7 The authors found no significant differences between the groups with
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duration for uncomplicated late-onset GBS bacteremia in infants. 8 Nevertheless, the results of this analysis do raise the question of
whether or not a minimum of 10 days of IV antibiotic therapy is truly required for treatment of such infections.
It is worth noting that at least one recently published guideline should serve as a valuable resource in persuading clinicians to discontinue
unnecessary antibiotics. In 2017, the Centers for Disease Control and Prevention (CDC) and Healthcare Infection Control Practices
Advisory Committee (HICPAC) published their guideline for prevention of surgical site infections. 9 On the basis of high-quality
evidence, discontinuation of antimicrobial prophylaxis for all clean and clean-contaminated surgeries following surgical incision closure
in the operating room is strongly recommended. Of particular note, the recommendation also applies to all clean and clean-contaminated
surgeries regardless of whether or not surgical drains have been placed intraoperatively. The CDC/HICPAC guidance mirrors that of the
World Health Organization (WHO), which in 2016 advised discontinuation of antibiotic prophylaxis immediately following completion
of such procedures. 10 The WHO guideline working group highlighted the risk of development of antimicrobial resistance as well as
possible negative effects on the patient microbiome with use of prolonged postoperative antibiotic prophylaxis. The CDC/HICPAC and
WHO recommendations on postoperative antimicrobial prophylaxis essentially supersede the ones published in 2013 by the American
Society of Health-System Pharmacists which recommended discontinuation of all antimicrobial prophylaxis for all clean and
contaminated surgeries within 24 hours after initiation. 11

The “less is more” movement is also applicable to the outpatient realm, and opportunities exist to safely and effectively condense
Of Football Scores and When Less is More  Continued from Page 3

courses of outpatient antimicrobial therapy for certain infectious conditions. In a 2018 study published in Infection Control and Hospital Epidemiology that included over 10,000 ambulatory encounters of children treated for skin and soft tissue infections (SSTIs), Jaggi et al. identified these diagnoses as potential targets for shortened courses (≤ 7 days) of antimicrobial therapy.12 Treatment of uncomplicated SSTIs with ≤ 7 days of antibiotics has been shown to be safe, efficacious, and is within the recommended duration of therapy set forth by published national guidelines.13-15

In keeping with the theme of “less is more,” perhaps we as physicians should change our game to golf instead of picking multiples of football scores. In golf, the individual with the lowest score following successful completion of the game is the winner.

References
**Clostridioides (Clostridium) Difficile Infection in Children: Highlights of the Updated Guidelines from the Infectious Diseases Society of America (IDSA) and the Society for Healthcare Epidemiology of America (SHEA)**

*Thomas J. Sandora, MD, MPH, Hospital Epidemiologist, Division of Infectious Diseases, Boston Children’s Hospital, Boston, MA*

**Brief case**

A healthy 7 year old boy presents with a 2-day history of watery diarrhea. He has not had fever or vomiting. There are no sick contacts at home or school. He is currently receiving amoxicillin (day 8 of 10) for treatment of streptococcal pharyngitis. Stool is sent for *C. difficile* PCR and returns positive. Which treatment option would you recommend?

A. Discontinue amoxicillin and observe for resolution of diarrhea  
B. Discontinue amoxicillin and start oral metronidazole  
C. Continue amoxicillin and add oral metronidazole  
D. Continue amoxicillin and add oral vancomycin

The correct answer to this question is that there isn’t really consensus about the best option for management in this particular situation (but options C and D are both reasonable to consider; for this patient, A and B are less preferred because completing the 10 days of amoxicillin for streptococcal pharyngitis is recommended for prevention of rheumatic fever). The 2017 update of the Infectious Diseases Society of America (IDSA)-Society for Healthcare Epidemiology of America (SHEA) clinical practice guidelines for *C. difficile* infection (CDI) included, for the first time, dedicated recommendations for diagnosis and management of CDI in pediatric patients. This article will review key highlights from these guidelines, with a focus on diagnosis and treatment of CDI in children.

**Epidemiology**

*Clostridioides difficile* (previously called *Clostridium difficile*) is an anaerobic spore-forming Gram-positive bacillus. Strains that produce toxin are capable of causing clinical disease (CDI), which typically manifests as watery diarrhea and may be accompanied by low-grade fever or mild abdominal pain. Severe or fulminant disease is less common but may include hypotension, ileus, or toxic megacolon. The most important modifiable risk factor for CDI is exposure to antibiotics, with specific antibiotic classes (including third-and fourth-generation cephalosporins, fluoroquinolones, carbapenems and clindamycin) carrying a high risk because of the associated disruption of the intestinal microbiota. Within healthcare settings, the most likely routes of transmission of *C. difficile* are via the hands of healthcare workers and environmental contamination.

The most important feature of the epidemiology of *C. difficile* in children is the high rate of asymptomatic colonization. The highest rates are in infants, in whom colonization rates can be >40%. Colonization decreases with increasing age, such that by 2-3 years of age, approximately 1-3% of children remain colonized. When a child less than 2 years old develops diarrhea, it is difficult for a provider to determine whether a positive test for *C. difficile* represents a true infection vs. detection of colonization with an alternate reason (either infectious or noninfectious) for diarrhea. For this reason, the new guidelines discourage public reporting of CDI cases (for surveillance purposes) in children <2 years of age, to minimize misclassification.

**Diagnosis**

For adults, the guidelines recommend the preferred target population for *C. difficile* testing be patients with new onset of 3 or more unformed stools in a 24-hour period, without an alternate explanation for diarrhea. In children, there is no universally-accepted definition of clinically significant diarrhea, but sustained diarrhea without a likely alternate explanation should be present before *C. difficile* testing is undertaken. In stable children who are receiving laxatives or stool softeners, discontinuing these agents should be strongly considered to assess for resolution of unformed stool before testing for *C. difficile*. The guidelines recommend not routinely testing for *C. difficile* in infants who develop diarrhea, because of the increased likelihood of detecting colonization as described above.

*Continued on Page 6*
This recommendation matches the language from the C. difficile chapter of Red Book® 2018, which discourages testing of infants. For children between ages 1 and 2 years, the IDSA-SHEA guidelines recommend excluding other noninfectious and infectious causes of diarrhea before consideration of C. difficile testing. In children ≥2 years of age, testing is reasonable for patients who have risk factors (eg, antibiotic exposure, hospitalization) and prolonged or worsening diarrhea.

Providers often do not have influence over which C. difficile testing method is available at the location in which they practice. However, the new guidelines suggest using an approach that includes a stool toxin test as part of a multi-step algorithm rather than a nucleic acid amplification test (NAAT) alone, because a NAAT detecting the genes for toxins A and/or B has low-to-moderate positive predictive value (ie, a positive result may reflect asymptomatic colonization with a toxigenic organism rather than actual toxin production and true CDI). Multi-step algorithms are recommended because the sensitivity of a toxin enzyme immunoassay alone is still not high enough to reliably use it as a stand-alone approach for diagnosis.

Repeat testing should not be performed within 7 days during the same episode of diarrhea. There is also no value to testing for cure, as >60% of patients may still test positive for several months despite successful treatment.

**Treatment**

For adults with CDI, the new guidelines recommend using oral vancomycin or fidaxomicin (and not metronidazole) as first-line agents for treatment both for mild-moderate and severe CDI. This recommendation is based on data from randomized controlled trials of adult patients that showed oral vancomycin to be superior to oral metronidazole in achieving clinical cure. Evidence of the comparative effectiveness of these two agents for treating pediatric CDI is lacking, and accumulated experience of using metronidazole to treat mild-moderate CDI in children suggests good outcomes. For this reason, the guidelines endorse either metronidazole or oral vancomycin for 10 days as appropriate choices to treat a first episode of mild-moderate disease in a pediatric patient. The Red Book® 2018 lists metronidazole as the preferred treatment for a first-episode of mild-moderate CDI, but suggests considering a switch to vancomycin if there is failure to respond in 5-7 days. Oral vancomycin should be used for severe or fulminant CDI, as previously recommended. Once a patient has had 2 or more episodes of recurrent CDI, metronidazole should no longer be used for treatment because of its potential for neurotoxicity when given in prolonged or repeated courses; instead, tapered or pulse regimens of vancomycin are often used. For the first time, the guidelines provide a dedicated table outlining the recommended treatment options for pediatric CDI, including antibiotic dosing. Of note, fidaxomicin has not yet been approved by the Food and Drug Administration for treatment of patients less than 18 years of age, but data from clinical trials in children are now available to help guide dosing with an eye towards future FDA approval.

Although robust pediatric data are lacking, fecal microbiota transplantation (FMT, installation of donor stool into the gastrointestinal tract to restore the diversity of intestinal microbiota) has been shown in limited case reports and case series to be effective in children with CDI. Because of concerns about potential unintended long-term infectious and non-infectious consequences of this approach, the guidelines recommend not considering FMT for children with CDI unless there have been multiple recurrences despite treatment with recommended antibiotic regimens.

**References**


ID Training Fellows Column –
Probiotics (Live Biotherapeutic Products): Miracle Drugs?

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According to the U.S. Food and Drug Administration (FDA), live biotherapeutic products (LBPs) are biological products other than vaccines that contain live organisms used to prevent or treat diseases or conditions in humans.1 Such products are often referred to as probiotics. The FDA has not approved any microbiome-based probiotic preparation as an LBP. But, dietary supplements containing probiotics are legally available (although these products cannot lawfully be marketed to cure, mitigate, treat, or prevent disease).1

In this article, we present an overview of the data that exists in areas where probiotics commonly have been utilized.

Acute gastrointestinal disease

Probiotics have been studied in several diseases of the intestine, including: acute gastroenteritis (AGE), antibiotic-associated diarrhea (AAD), antibiotic-associated *Clostridioides* (*Clostridium*) difficile, inflammatory bowel disease (IBD), irritable bowel syndrome (IBS), necrotizing enterocolitis (NEC), constipation, and infant colic. In 2014, utilizing information from systematic reviews and randomized controlled trials, the European Society for Paediatric Gastroenterology Hepatology and Nutrition (ESPGHAN) published recommendations on the use of probiotics in acute gastroenteritis.2 Although the quality of evidence was low, the ESPGHAN recommended *Lactobacillus rhamnosus* GG (LGG) and *Saccharomyces boulardii* for use in AGE as either may shorten symptom duration by about 24 hours.2 However, a randomized, double-blind trial in 943 U.S. children aged 3 months to 4 years with AGE did not demonstrate any significant difference in duration or severity of illness among participants who received LGG vs. placebo.3 Due to the high frequency of diarrhea among patients prescribed antibiotics (up to 11%, with amoxicillin-clavulanate as the biggest offender),4 several randomized controlled trials have studied the effects of probiotics on AAD. In a Cochrane Review, the incidence of AAD in children who receive probiotics was 8% versus 19% in the children in the control group.5 While numerous organisms have been used in probiotic treatment of AAD, the Cochrane Review found LGG and S. boulardii have the highest efficacy.5 Both the ESPGHAN and the North American Society for Pediatric Gastroenterology, Hepatology and Nutrition (NASPGHAN) recommend LGG or S. boulardii for prevention of AAD.6 However, the effect of the intervention is not dramatic; an estimated 10 children at risk for AAD need to be treated with a probiotic to prevent one episode of AAD. The benefit of probiotics needs to be weighed against the potential adverse events, the most serious being translocation of bacteria across the bowel wall. This may occur in high risk individuals, eg, patients who are immunocompromised; patients with a critical illness, a central venous catheter, or anatomic heart disease; preterm infants; or the elderly.5–8

The prevention of *C. difficile* colitis is another area where the use of probiotics has been evaluated. A Cochrane Review found probiotics reduce the incidence of *C. difficile* colitis from 4% to 1.5% when compared to patients not receiving probiotics, with the effect being greatest in those with a baseline risk for *C. difficile* colitis in excess of 5%.9 ESPGHAN and NASPGHAN have stated that *S. boulardii* may be helpful in the prevention of *C. difficile* colitis.6

Chronic gastrointestinal disease

Probiotics, particularly VSL #3 (a combination of *Lactobacillus paracasei*, *Lactobacillus plantarum*, *Lactobacillus acidophilus*, *Lactobacillus delbrueckii* subsp. *bulgaricus*, *Bifidobacterium longum*, *Bifidobacterium infantis*, *Bifidobacterium breve*, *Streptococcus thermophiles*), have been evaluated in patients with inflammatory bowel disease but the results have been marginal.10 The NASPGHAN clinical practice guidelines from 2006 stated that, based on LGG alone, efficacy has not been demonstrated for probiotics in Crohn’s disease.10,11 However, recent evidence suggests that S. boulardii and VSL #3 in combination may be beneficial in Crohn’s disease.10

Continued on Page 8
ID Training Fellows Column – Probiotics (Live Biotherapeutic Products): . . . Continued from Page 7

Probiotic use may have some effectiveness in the treatment of irritable bowel syndrome (IBS) as evidenced by reduction of abdominal pain and other symptoms such as flatulence and bloating. However, such improvement may wane over time. Additionally, some patients discontinued probiotics due to worsening symptomatology, although discrimination between symptoms of the IBS and use of probiotics was difficult as the symptoms of use of probiotics and IBS (ie, flatulence, bloating, abdominal pain, diarrhea) can overlap.

To date, studies have not demonstrated a beneficial effect of probiotics among patients with chronic constipation.

Use of probiotics in neonates

As demonstrated by one meta-analysis, probiotics appear to have some benefit in the neonatal population as evidenced by a 37% reduction in necrotizing enterocolitis, a 20% decrease in mortality, and hospital stay decrease by 3.77 days in patients receiving probiotics as compared to controls. Effects were greater when administered to infants younger than 29 weeks gestation. However, due to the heterogeneity in probiotics administered along with marked variations in length of administration, drawing firm conclusions about probiotics in neonates, particularly with very low birth weight and extremely low birth weight, is difficult. And, while generally safe, probiotics can be associated with severe consequences as evidenced by an infant who died of gastrointestinal mucormycosis after receiving probiotics contaminated with Rhizopus oryzae. For infant colic, in a randomized controlled study, the administration of Lactobacillus reuteri resulted in a decrease in crying time from 147 minutes to 74 minutes per day.

Non-gastrointestinal disease

Data regarding use of probiotics for non-gastrointestinal conditions are limited. In a study evaluating the effect of probiotics on respiratory tract infections, while the agents did not affect the duration of the infection, there are conflicting data regarding decreased number of respiratory tract infections in children who received probiotics. Probiotics (as monotherapy) have no effect with regard to preventing urinary tract infections, but, when used with prophylactic antibiotics, there is a decrease in the incidence of urinary tract infections. For atopic dermatitis, there was some benefit in Asian populations but not in European populations, and Lactobacillus spp. other than LGG seemed to be more beneficial. Probiotics may enhance the immune system and therefore have been studied as regards to vaccine response. Some studies have shown increased hepatitis B and diphtheria titers (although not necessarily clinically relevant) with use of probiotics, but others have shown no such effect.

Conclusions

In conclusion, probiotics may be beneficial in certain conditions, but benefits attributed to probiotics have differed by the disease being evaluated as well as the specific microbial agent used as the probiotic. Further studies on specific probiotics are required to draw better conclusions, especially in at-risk populations. Overall, more education needs to be provided by pediatricians to their patients regarding the benefits, but also potential harms.

References


Continued on Page 9


**FYI: Accessing the SOID Web site**

The easiest way to access the SOID website is to save it as a favorite (Internet Explorer) or bookmark it (Firefox) on your computer. Visit to the SOID webpage at: [https://www.aap.org/en-us/about-the-aap/Committees-Councils-Sections/Section-on-infectious-diseases/Pages/default.aspx](https://www.aap.org/en-us/about-the-aap/Committees-Councils-Sections/Section-on-infectious-diseases/Pages/default.aspx). For Internet Explorer, click on favorites and then add to favorites.
ID Pearls and Other Gems: Does A Positive Molecular Test Result for Group A Streptococcus Warrant Antibiotics?

Christopher J. Harrison, MD, FAAP, FPIDS, Professor of Pediatrics, Children’s Mercy Hospital and UMKC, Kansas City, MO

Are the new rapid-turnaround molecular tests (MT) appropriate for point of care decisions to treat group A streptococcus (GAS)? Per current recommendations,\(^1,2\) it is not the test modality that is the first critical step. That first step is to not routinely test children < 3 years old or those with likely viral sore throats. That said, can MT-GAS change that, ie, is MT for GAS (MT-GAS) better and can it differentiate carriers from GAS disease? The following cases are not challenging – just illustrative.

1. A five-year-old has 100.9°F fever, sore throat but no other respiratory symptoms, tender bilateral anterior cervical adenopathy and purulent bilateral tonsillitis. His mother reports that “strep throat” has been in his kindergarten.

2. A four-year-old has 101.2°F fever, sore throat, cough, rhinorrhea, and non-purulent pharyngitis. His younger sibling has croup.

Selective testing has been critical because carriers are frequent and current testing (rapid antigen testing [RAT]) and/or culture does not differentiate disease from carriage. This is a real conundrum. The AAP Red Book® indicates that up to 25% in healthy children have GAS carriage in non-outbreak situations,\(^2\) similar to rates of GAS as the true cause of pharyngitis.3 Per IDSA and AAP Red Book® recommendations for GAS testing,\(^2\) Table 1, patient #1 warranted testing while patient #2 did not. Both had positive MT-GAS results. Should both be treated?

Remember, current recommendations\(^1,2\) do not directly address MT-GAS use, however, data suggest MT-GAS’s pitfalls parallel traditional GAS tests. We need to know MT-GAS’s sensitivity and specificity plus whether it discriminates carriers from disease.

Sensitivity and specificity: MT-GAS appears to have sufficient clinical sensitivity (92-98%) and specificity (94-95%) that culture backup should not be needed to confirm initially negative MT-GAS results (the norm for rapid GAS antigen testing [RAT-GAS]).\(^4\) The high sensitivity of MT-GAS is due to its ability to detect <100 organisms/mL of sample compared to >10,000 organisms/mL of sample for RAT-GAS.\(^5\)

Does high sensitivity change strategies for testing/managing children with pharyngitis/tonsillitis? Clinicians have long wished for a super sensitive and specific test with rapid turnaround. MT-GAS appears to fulfill those wishes. But this may be a case of being careful of what we wish for. Another consideration is the added test expense (3-5 times) compared to RAT-GAS or culture.

Differentiating carriers from disease: The downside of extra sensitivity is excess inadvertent carrier detection, particularly in children with viral respiratory symptoms\(^6\) that could result in more inappropriate antibiotics - adding cost, microbiome disturbances, and drug-associated adverse effects.

Two reports suggest fewer missed GAS detections and therefore more appropriate antibiotic use with MT-GAS.\(^7,8\)

Study 1. RAT-GAS plus throat culture was compared to Meridian's loop-mediated isothermal amplification (LAMP) assay (illumigene®) in 361 patients (2 months-18 years old (N= 66 under 3 years old).7 By protocol definitions, the estimated “true” GAS pharyngitis prevalence was 19.7% (71/361). MT-GAS was positive in 70, RAT-GAS in 35, culture in 55, and RAT-GAS plus culture in 58. MT-GAS had 23 more “true” GAS detections than RAT-GAS plus culture.

Comment: These data derive from a strict protocol excluding viral presentations (Table1) but included 66 <3 year olds. Also, the 23 extra MT-GAS detections included 10 (43%) proven false positives (negative GAS-specific PCR); and it is not clear how many of the other 13 were carriers.

Study 2. A “real-world” prospective open-label comparison of RAT-GAS/culture to Roche’s MT-GAS (cobas® Liat® Strep A) enrolled 3-18 year olds\(^8\) (N=255) with sore throat plus ≥1 other symptom (red posterior pharynx, pharyngeal/tonsillar exudate, tonsillar swelling, tender cervical lymphadenopathy, and/or fever >100°F [apparently no exclusion for viral symptoms]). Samples were defined as “true

Continued on Page 11
positive” (N=110) if an alternative MT-GAS (Copan’s FDA approved Solana® GAS NAAT) and sequencing were both positive. Roche’s MT-GAS detected 105/110 “true positives” (sensitivity of 95.5%, 95%CI = 89.7–98.5%). Interestingly RAT-GAS detected more GAS than culture, ie, 94 positive RAT-GAS vs. 79 positive cultures (sensitivity 85.5%, 77.5–91.5; and 71.8%, 62.4–80.0 respectively). The authors concluded that 31 cultures were false-negative.

Comment: One could argue that molecular tests indeed detect GAS in more patients, but the authors’ “true positives” likely included carriers. The “true positive” definition was actually changed mid study because the original “true positive” definition (positive throat culture) had an “unexpectedly low positive rate.” This raises concern about culture methods; RAT-GAS detection rarely exceeds culture. Also, their definition of appropriate antibiotics (prescribed for “true positives”) lacks precision because <3 year olds were tested and up to 25% of GAS detections can be carriers. Thus, “appropriate” antibiotics were likely prescribed to some carriers.

Too sensitive? A more recent study of MT-GAS (Illumigene®) in well 3-17 year olds (N=385) used a gold standard of a highly sensitive non-Illumigene GAS PCR compared to throat culture and Illumigene® (detection threshold was 55 GAS CFU/ml in these authors hands). Unsurprisingly, MT-GAS detected GAS more often (N=78, 20.3%) than throat culture (N=48, 12.5%) in well children, p=0.0035. Of the 30 extra MT-GAS detections, 4 were false positive (negative PCR). Thus, MT-GAS detected more carriers. The authors state: “Failure to appropriately select patients for testing may negatively affect antimicrobial stewardship without benefit to patients.”

Patient #1 was appropriately tested so clinicians can be confident in treating GAS disease. In contrast, the viral symptoms in patient #2 mean that no GAS test should have occurred; yet the super-sensitive MT-GAS detected a carrier, who will likely test positive even post-recovery from the current virus. No GAS treatment is indicated for patient #2.

Bottom line: GAS testing’s goal is to appropriately treat GAS disease but not carriers. Current MT-GAS testing is sensitive and specific, but a bit too sensitive, detecting an estimated extra 40% carriers particularly if patients do not meet Table 1 criteria. Patient selection remains job 1 regardless of the test you choose. In my opinion, MT-GAS use at point of care will likely lead to extra carrier treatment. Hopefully, methods will soon be developed that allow us to differentiate GAS disease from carriage in patients with positive testing.

References

Table 1. IDSA Guideline vs. AAP Red Book® recommendations for testing for GAS by any test modality. (Note: The IDSA guideline

Continued on Page 12
does not specifically address molecular testing [MT], but experts use the same criteria for MT.)

<table>
<thead>
<tr>
<th>IDSA Guideline</th>
<th>AAP Red Book®</th>
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<tr>
<td>Not recommended with viral features eg, cough, rhinorrhea, hoarseness, oral ulcers</td>
<td>No testing with viral manifestations eg, coryza, conjunctivitis, hoarseness, cough, anterior stomatitis, discrete ulcerative oral lesions, or diarrhea</td>
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<tr>
<td>Not indicated at &lt;3 years old* because:</td>
<td>Generally not indicated &lt;3 years old*.</td>
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<tr>
<td>1. Acute rheumatic fever rare &lt;3 years old</td>
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<td>2. Incidence of GAS pharyngitis and classic pharyngitis presentation uncommon &lt;3yo$</td>
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<tr>
<td>Note: Selected &lt;3 year olds with other risk factors, e.g. older sibling with documented GAS infection, may be considered for testing</td>
<td>Note: Small GAS outbreaks may occur in child care settings, but rheumatic fever risk so remote in industrialized countries that testing not indicated &lt;3 years old</td>
</tr>
<tr>
<td>No routine use of follow-up posttreatment throat cultures or RADT</td>
<td>Follow-up testing only if particularly high rheumatic fever risk, eg, living in endemic areas</td>
</tr>
<tr>
<td>No diagnostic testing or empiric treatment of asymptomatic household contacts of GAS patients</td>
<td>No testing of asymptomatic household contacts unless contacts at increased risk of GAS sequelae, eg, rheumatic fever or acute glomerulonephritis</td>
</tr>
</tbody>
</table>

* Select symptomatic children <3 years old with other risk factors such as older siblings with GAS infection may be considered for testing.

$ The Up-To-Date chapter on GAS by Ellen Wald discusses the < 3 year old presentation: “Prolonged nasal discharge, tender anterior cervical adenopathy, and low-grade fever (eg, <38.3°C [101°F]), particularly if they have exposure to contacts with GAS infection.”
New Policy/Guidelines

Andrea Sperduto, MD, FAAP, Cleveland Clinic Foundation, Cleveland, OH

American Academy of Pediatrics

A. Management of Neonates at <34 6/7 Weeks’ Gestation With Suspected or Proven Early-Onset Bacterial Sepsis. Pediatrics 2018;142(6) e20182896.

Developed by the Committee on Fetus and Newborn together with the Committee on Infectious Diseases, the purpose of this clinical report is to:

• Provide a summary of the current epidemiology of preterm neonatal sepsis, and

• Provide guidance for the development of evidence-based approaches to sepsis risk assessment.

Summary points include:

• The epidemiology, microbiology and pathogenesis of early onset sepsis (EOS) differs substantially between term infants and preterm infants with VLBW (BW<1500 gms).

• Infants born ≤34 6/7 wks. can be categorized by level of risk for EOS by the circumstances of the preterm birth.
  o Infants born by C-section because of maternal noninfectious illness are at lower risk.
  o Infants born preterm because of PROM, maternal cervical incompetence, infectious or unexplained reasons are at highest risk.

• EOS is diagnosed by blood or CSF culture, not by laboratory tests alone (eg, CBC or CRP).

• Combination ampicillin and gentamycin are the most appropriate empirical antibiotics. However, broader spectrum coverage may be appropriate in severely ill infants or following prolonged antepartum maternal antibiotic therapy.

• When blood cultures are sterile, antibiotic therapy should be discontinued by 36-48 hrs unless clear evidence of site-specific infection.

Morbidity and Mortality Weekly Report


• Postexposure prophylaxis (PEP) with Hepatitis A vaccine or immunoglobulin (IG) effectively prevents infections with Hep A virus (HAV) when administered within 2 weeks of exposure.

• Hep A Vaccine should be administered to all persons age ≥12 months for PEP. Previously, PEP was only recommended for persons aged 1-40 years and IG for persons >40 years.

• In addition to Hep A vaccine, IG may be administered to persons >40 years depending on providers risk assessment.

• ACIP recommends that Hep A vaccine be administered to infants aged 6-11 months traveling outside the US when protection against HAV is recommended. The travel-related dose for infants should not be counted toward routine 2-dose series.


• On October 24, 2018, the ACIP recommended that all persons age 1 yr and older experiencing homelessness be routinely immunized against HAV.

• Homelessness includes living in a shelter, living with extended families or friends, living in abandoned buildings, cars, on the street or any nonpermanent situation.

C. Advisory Committee on Immunization Practices Recommended Immunization Schedule for Children and Adolescents Aged 18 Years or Younger- United States, 2019. MMWR Morb Mortal Wkly Rep 2019;68(5);112-114.


Continued on Page 14
**New Policy/Guidelines**  Continued from Page 13

- LAIV (Live Attenuated Influenza Vaccine) is contraindicated in pregnant women, immunocompromised adults and those with HIV infection, adults with functional or anatomic asplenia or complement deficiencies.
- LAIV is given a precaution designation for use in end-stage renal disease, heart or lung disease, chronic liver disease or diabetes.

### Infectious Diseases Society of America

**A. Clinical Practice Guideline: Tonsillectomy in Children (Update)**, *Otolaryngology-Head and Neck Surgery* 2019;160(1S):S1-S42.
- Updates 2011 guidelines.
- Provides recommendations on pre-, intra-, and post-operative care and management of children 1-18 years of age under consideration for tonsillectomy.
- Tonsillectomy is one of the most common surgical procedures in US; 289,000 procedures a year in children <15 years.
- Guidelines include indications for surgery and natural history of recurrent throat infections and perioperative management.
- Discussed “Paradise” criteria for tonsillectomy:
  - \( \geq 7 \) episodes for sore throat in preceding year, or \( \geq 5 \) episodes in each of 2 preceding years, or \( \geq 3 \) episodes in each of 3 preceding years.
  - Plus 1 or more of the following: temp\( > 38.3 \), or tender cervical lymph nodes or >2 cm size nodes, or tonsillar exudate or + Group A strep test.
  - Plus treatment with antibiotics.
  - Plus documentation.
- Guideline discuss tonsillectomy for obstructive sleep-disordered breathing and obstructive sleep apnea and indications for polysomnography.

- Last updated 2009, prior to H1N1 pandemic.
- 58 recommendations are summarized at the beginning of the report.

- Outpatient parenteral antimicrobial therapy (OPAT) is defined as administration of parenteral antimicrobial therapy in at least 2 doses on different days without intervening hospitalization.
- This report updates 2004 guideline.
- It is intended for providers who prescribe and oversee OPAT.
- Consideration for specific patients, infusions catheter issues, monitoring questions and antimicrobial stewardship issues are addressed.

### HIV Guidelines

Completed guidelines and information can be found at: [http://aidsinfo.nih.gov/guidelines](http://aidsinfo.nih.gov/guidelines) and are updated periodically. Some of the highlights are listed below.

**A. Guidelines for the Use of Antiretroviral Agents in Pediatric HIV Infection.**
- Updated December 14, 2018.
- The use of an assay that detects HIV non-B subtype viruses or Group O is recommended for known or suspected maternal non-B subtype virus or Group O infections.
- Zidovudine plus lamivudine plus raltegravir is NOW recommended empiric HIV therapy option for neonates who are at a higher risk of perinatal HIV transmission.
- Discontinuation of perinatal empiric therapy should be done under the guidance of an expert in pediatric HIV. 

*Continued on Page 15*
New Policy/Guidelines  Continued from Page 14

B. Guidelines for the Use of Antiretroviral Agents in Adults and Adolescents Living with HIV.
   • Updated October 25, 2018.
   • New information on use of HIV-1 proviral DNA genotypic resistance testing was added as well as the use of proviral DNA tropism assay.
   • Due to data suggesting increased risk of neural tube defects in infants born to women who were receiving dolutegravir (DTG) at the time of conception, guidelines were added regarding in using DTG or other integrase strand transfer inhibitors.
   • Various changes in regimens for initial ARV therapy need to be reviewed prior to initiation of ARV therapy and are listed in the report.
   • For virologic failure, newly published data are included to help guide which drugs to use.

   • Updated February 8, 2019.
   • New individual OI infection updates will be reported as developed. Currently nothing new reported.

   • Updated February 15, 2019.
   • For Disseminated Mycobacterium avium Complex Disease, the panel no longer recommends primary prophylaxis in HIV-infected individuals who are initiating on ARV therapy regardless on CD4 cell count.
   • Some experts suggest repeating an HPV 9-valent vaccine series in those who are ages 13-26 years and have already completed HPV-2 or 4 series.

E. Recommendations for the Use of Antiretroviral Drugs in Pregnant Women with HIV Infection and Interventions to Reduce Perinatal HIV Transmission in the United States.
   • Updated December 7, 2018.
   • Safety concerns are addressed regarding the use of dolutegravir at the time of conception and during pregnancy (possible increased risk of neural tube defects).
   • New recommendations for the use of ARV during pregnancy and the various trimesters of pregnancies.
   • Hep C virus (HCV)-exposed infants need follow up and testing for the first few years of life.
   • There may be increased susceptibility to HIV infection during pregnancy and breastfeeding.
   • Zidovudine plus lamivudine plus raltegravir is NOW recommended as empiric HIV therapy option for neonates who are at a higher risk for perinatal HIV transmission.
   • Discontinuation of perinatal empiric therapy should be done under the guidance of an expert in pediatric HIV.
Review of the Recent Infectious Disease Literature

These summaries and commentaries are completed by volunteer Contributing Editors from the SOID. Each is responsible for reviewing the current infectious disease literature for several journals. They select an interesting article and present it for your review to help keep you current on various issues.


Reviewed by: Stephen C. Aronoff, MD, FAAP, Temple University School of Medicine, Philadelphia, PA

Objective: To develop and validate a pediatric cellulitis risk score to predict the need for intravenous antimicrobial therapy.

Methodology: The study population was derived from children aged 6 months to 18 years who presented to the ED at the Royal Children’s Hospital in Melbourne, Australia with cellulitis. Children with complicated cellulitis (orbital cellulitis, undrained abscess, penetrating injury, immunosuppression, fasciitis or foreign body or cellulitis caused by large animal or human bite) were excluded. Clinical features were collected in a standardized fashion. The primary outcome was the perceived need for continued IV or oral therapy at 24 hours after admission.

Results: Of the 285 subjects in the derivation group, 114 (40%) were placed on IV therapy at the time of presentation; at 24 hours, 175/285 were on oral and 110/285 were on parenteral therapy. By univariate comparison, prior oral therapy, systemic signs and symptoms, involvement > 1% of BSA, functional impairment, moderate-to-severe erythema, swelling, tenderness, lymphangitis and periorbital involvement were significantly different between the groups. Through trial and error, successive receiver-operator curves were fitted to the data until a parsimonious model with 5 features and a high area under the curve (AUC) was developed; the features were selected based on clinical reasoning: the scoring tool is shown below.

<table>
<thead>
<tr>
<th>Feature</th>
<th>Scale</th>
<th>Maximum Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area</td>
<td>0 = &lt;1% body surface area affected</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>1 = ≥1% or more body surface area affected</td>
<td></td>
</tr>
<tr>
<td>Systemic features</td>
<td>0 = absent</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>1 = present</td>
<td></td>
</tr>
<tr>
<td>Swelling</td>
<td>0 = none</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>1 = mild</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 = moderate to severe</td>
<td></td>
</tr>
<tr>
<td>Eye</td>
<td>0 = not involved</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>1 = involved</td>
<td></td>
</tr>
<tr>
<td>Tenderness</td>
<td>0 = none</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>1 = mild</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 = moderate to severe</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>7</td>
</tr>
</tbody>
</table>

To validate the model, a test set of 251 children of whom 144 (57%) received antibiotics at 24 hours was used. Using a score of 4 as the cutoff, training error was 20% (Sensitivity = 63%, Specificity = 93%, AUC = .86) and test error was 24% (Sensitivity = 85%, Specificity = 63, AUC = .83).
Review of the Recent Infectious Disease Literature  Continued from Page 16

Reviewers Commentary:
Cellulitis is a common pediatric problem and the decision to admit these children for parenteral antimicrobial therapy is largely intuitive. Using continuation of parenteral therapy at 24 hours after hospital admission as the response variable, the authors derived and validated a simple rule for identifying those children with cellulitis who should be candidates for parenteral therapy. Of note, while the AUC for both the training and test errors are similar (.86 and .83, respectively), there are significant differences in sensitivity between the two data sets. This is unusual but may have resulted, in part, from statistically significant differences in \textit{a priori} rates of parenteral therapy at 24 hours (.40 vs .57, \( \chi^2 = 5.27, p = .021 \)) although the positive likelihood ratios differ sharply for the two data sets (9 vs 2.29). Together these observations suggest that this model is unstable and should not be deployed clinically. These data sets are valuable, and the authors may wish to reanalyze them using modern machine learning algorithms.


Reviewed by: Jane Gould, MD, FAAP, Associate Professor of Pediatrics, Drexel University College of Medicine, Hospital Epidemiologist, Attending Physician, Section of Infectious Diseases, St. Christopher’s Hospital for Children, Philadelphia, PA

Islam et al describes the epidemiology of third generation cephalosporin resistant (3GCR) and extended spectrum β-lactamase producing (ESBL-P) \textit{Enterobacteriaceae} colonizing the intestines of healthy US children. Stool specimens from children 14 days to 14 years old were tested for 3GCR and ESBL-P \textit{Enterobacteriaceae}. These children were recruited during well child visits from three geographically distinct US cities to determine risk factors for intestinal colonization with 3GCR and ESBL-P. In 519 children, the overall 3GCR colonization rate was 4.4% (range 3.4%-5.1% among the study sites) and highest in 1-2 years old (6%) and <5 years old (5.2%). The ESBL-P colonization rate was 3.5%. These are higher colonization rates than previously reported from healthy American populations, but comparable to those populations from European countries. In this study, both 3GCR and ESBL-P colonization was associated with international travel by the child within the previous year; 11% of ESBL-P colonized had travel history compared with only 1.6% of non-colonized children (P=.004); varying by study site. The 3GCR and ESBL-P \textit{Enterobacteriaceae} colonized children and their household members (HH) traveled to Mexico, Nepal, Dominican Republic and Vietnam. Rates of hospitalization in the past year and antibiotic exposure in the past 3 months did not differ between those colonized and not colonized for both 3GCR and ESBL-P in either the children or their HH contacts. Seventy-nine percent of the 3GCR isolates were resistant to trimethoprim-sulfamethoxazole, 58% resistant to ciprofloxacin, 4% meropenem intermediate and 58% were multidrug resistant (non-susceptible to \( \geq 1 \) agent in \( \geq 3 \) antimicrobial classes). The authors hypothesize that infants are at higher risk as they may attend daycare or are in situations with multiple adult caregivers, are in diapers and frequently touch and mouth the environment. Studies have demonstrated that young children frequently have prolonged colonization; up to 2 years in some studies. Additionally, national data have shown that approximately 5% of children had at least one UTI by the age of 5 years and that approximately 50% of 3GCR and ESBL-P pediatric isolates in the US are from children less than 5 years old and that most of these isolates are from urinary specimens.

Reviewers Commentary:
There are few pediatric studies examining international travel as a risk factor for antibiotic-resistant \textit{Enterobacteriaceae} colonization or infection. This study is the largest community-based description of antibiotic resistant \textit{Enterobacteriaceae} colonization in healthy children from North America to date. It adds to our understanding about the prevalence of these organisms in the community and it reminds us that we live in a global community in relationship with our environment. Drug resistant organisms have been identified in humans, animals, soil, water and food supplies worldwide. The Centers for Disease Control and Prevention created the One Health initiative to address the global increase in antimicrobial resistance. This is a global collaborative that takes a multisectoral and trans-disciplinary approach to understanding and combating antimicrobial resistance by recognizing that the health of people is connected to the health of animals, plants and their shared environment.

References
AAP Links Members and Parents to Resources on Vaccine Safety

Pediatric health care providers play an important role in communicating with patients, families and the public about the safety of vaccines. To assist, the American Academy of Pediatrics (AAP) makes information and resources about vaccine safety readily available on both AAP.org and HealthyChildren.org, including those from the Centers for Disease Control and Prevention and the Vaccine Education Center at Children’s Hospital of Philadelphia. Listed below is a sample of these resources.

American Academy of Pediatrics
- Communicating with Families
- Vaccine Safety: Examine the Evidence
- Vaccine Safety: The Facts
- AAP Red Book®
- AAP Clinical Report, Countering Vaccine Hesitancy

Centers for Disease Control and Prevention
- Understanding Vaccines and Vaccine Safety

Vaccine Education Center at the Children’s Hospital of Philadelphia
- Vaccine Education Center
- Vaccine Safety
- Vaccine Safety References

In addition, pediatricians may have the experience of being called upon to provide expert witness testimony on the safety of vaccines. A Pediatricians and the Law article published in October 2018 in AAP News article entitled, “Depositions 101: Preparation, professionalism key when providing testimony,” provides a list of general principles to follow when being deposed. Related resources include the AAP policy statement, “Expert Witness Preparation in Civil and Criminal Proceedings,” and the AAP technical report, “Expert Witness Participation in Civil and Criminal Proceedings.”

Policy Highlights from the Committee on Infectious Diseases (COID)

AAP statements under development or revision:
1. Antimicrobial Stewardship in Pediatrics
2. Chemical-Biological Terrorism and Its Impact on Children
3. Tuberculosis Infection in Children: Testing and Treatment
4. Prevention and Management of Perinatal Group B Streptococcal Disease
5. Infectious Diseases in Newborns Associated with Non-traditional Perinatal Practices
6. Recommendations for Prevention and Control of Influenza in Children, 2019–2020

The following AAP clinical practice guidelines are in the process of development:
1. Fever in Infants Under 3 Months of Age

Guidelines in Progress with External Organizations:
1. CDC Plague guidelines
2. CDC pediatric sepsis guidelines
3. HICPAC guideline for prevention of infections among patients in neonatal intensive care units (NICU)

Continued on Page 19
Policy Highlights from the Committee on Infectious Diseases (COID)  
Continued from Page 18

4. Diagnosis and Management of Bone and Joint Infections (IDSA/PIDS)
5. Infectious Diseases Society of America (IDSA), the American Academy of Neurology Institute (AANI) and the American College of Rheumatology (ACR) clinical practice guideline on Lyme Disease
6. Subcommittee on Babesiosis

From the October 2018 and February 2019 Advisory Committee on Immunization Practices (ACIP) Meetings

The most recent ACIP meetings took place October 24-25, 2018 and February 27-28, 2019. The slide sets and minutes from these meetings are available here. The next ACIP meeting is scheduled for June 26-27, 2019.

Welcome New SOID Members

If you know of others who might be interested in joining the Academy and the Section please have them call 1-800-433-9016 ext 5885 or go to www.aap.org. The “Become A Member” link will take them to an application. Current Academy members may join the Section here (member ID and login required). You may also call AAP Customer Services at: 866-843-2271.

SOID Member and Staff Recognitions

During the SOID Executive Committee Meeting on April 1, 2019, Sophie Katz, MD, FAAP was recognized for her service on the Executive Committee for the past two years. Suzanne Kirkwood was recognized for her contributions and support as the staff manager for the SOID from 2009-2019.

(from left) Dr Ken Zangwill, Chairperson; and Dr Sophie Katz.
(from left) Dr Lilly Immergluck, Dr Bob Frenck, Suzanne Kirkwood, Dr Tina Tan, and Dr Ken Zangwill.
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- Networking with peers
- Opportunity to earn ABP MOC Part 4 and MOC Part 2 points

INFECTIOUS DISEASE SPECIALISTS will benefit by:
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- Up-to-date, cutting-edge approaches taught
- Networking with peers
- Opportunity to earn both ABP MOC Part 4 and MOC Part 2 points

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