Congress Interview

In this exclusive conversation with EMJ, Johnny Zakhour delves into the critical role of diagnostic stewardship and the myriad challenges of its implementation in clinical practice. He also shares key insights on the ESCMID Global 2024 Congress, and the fundamental role it plays in the continuous education of healthcare professionals.

Johnny Zakhour

Internal Medicine Department,
Henry Ford Hospital, Detroit, Michigan, USA

Citation: EMJ Microbiol Infect Dis. 2024;5[1]:41-44. https://doi.org/10.33590/emjmicrobiolinfectdis/LATS3322.

Q1 What inspired you to focus your medical career on infectious diseases and antimicrobial resistance (AMR)?

I was born and raised in Beirut, Lebanon, where I attended medical school. I was fortunate to train at one of the largest teaching hospitals in the country, where I encountered many attendings who cultivated my interest in infectious diseases. I have always been fascinated by the pathophysiology of infectious diseases, and the concept of antimicrobial stewardship as a means to reduce the burden of AMR. After graduating from medical school, I joined Souha Kanj at the American University of Beirut Medical Center for a post-doctoral research fellowship.

Kanj is a global pioneer in infectious diseases research, and has played a vital role in advancing knowledge about AMR and stewardship in the Middle East. She further cultivated my interest in infectious diseases. Throughout my year with her, I gained a deep understanding of the development of AMR, and the determinants that can affect it. She fostered a sense of stewardship in me, and I actively involved myself in multiple research projects and initiatives focusing on AMR and stewardship. I believe that stewardship is one of the most important qualities a physician could have, as it reflects a sense of responsibility and commitment to patient care.

"Educators and mentors should empower their trainees with the evidence behind diagnostic stewardship."

Q2 In the talk you gave at The European Society of Clinical Microbiology and Infectious Diseases (ESCMID) 2024, 'Empowering junior doctors with diagnostic stewardship principles', what were the key messages you wished to convey?

After starting my residency in internal medicine at Henry Ford Hospital, Detroit, USA, I gained further knowledge about ways to combat AMR in a setting with more available resources compared to my home country. I witnessed firsthand the stewardship strategies that I had previously researched.

I further discovered the key role that residents play in stewardship, whether in terms of diagnostic or antimicrobial stewardship. As a resident, it can sometimes be frustrating to encounter a hard stop on the electronic medical record. However, with residents being at the forefront of ordering diagnostics, they hold the highest level of responsibility regarding the judicious use of diagnostics, and developing this sense of stewardship is very important for their training. Early-career physician hesitancy plays a significant role in excessive prescribing. If I had to choose a single message from my talk, it would be that educators and mentors should empower their trainees with the evidence behind diagnostic stewardship, and reiterate the importance of physical examination and history-taking, as diagnostics alone are insufficient.

Q3 How has ESCMID used its position this year to educate healthcare professionals about AMR and stewardship? Are there any sessions you found particularly insightful?

With the rising tension around the world, I was particularly impressed by Kanj's presentation regarding AMR in displaced populations. I believe this presentation shed light on a topic that is rarely discussed; the severe impact of human and natural disasters on AMR. This serves to further enlighten healthcare professionals who are fortunate to practice in high-income settings about the struggles of both patients and providers in areas with a high prevalence of displaced populations, and the global impact of these struggles.

Q4 What steps can junior doctors take in their practice to ensure faster, more accurate detection of pathogens? What criteria should be used when deciding whether to order blood cultures?

To ensure faster and more accurate detection of pathogens, junior doctors should consider the pre-test probability of any diagnostic test before ordering it. This requires careful history-taking and physical examination. Subsequently, the fastest and most accurate detection is feasible only when collaboration among multiple teams is at the forefront, including the nursing, microbiology, and infection prevention and control teams. Although novel diagnostics are tempting with their extremely high sensitivities, junior doctors need to be aware that speed can sometimes compromise accuracy, and that finding the right balance between the two is crucial.

False positive results in infectious diseases greatly contribute to overtreatment and adverse events in patients. This is particularly important for blood cultures, as ordering them has become reflexive in response to any unexplained elevation in white blood cell count or fever. However, junior doctors need to be aware of the pre-test probability of blood cultures in different clinical scenarios. They should ask themselves, "what will I do with this test if it is negative?" and "what will I do with it if it is positive?" Furthermore, if it is positive, they should consider how the isolated organism and the duration to positivity will affect their management. Beyond their provider role, they should also be mindful of the possibility of contamination during the process of drawing blood cultures.

For example, while positive blood cultures can be helpful in isolating the causative organism of infective endocarditis or vertebral osteomyelitis, they are much less useful in cases of uncomplicated cellulitis or post-operative fevers. Unfortunately, there are still no clear indications for blood cultures. Ultimately, ordering blood cultures relies on the clinical scenario, differential diagnoses, the pre-test probability of a certain diagnosis, and the changes to management that a blood culture result will bring.

"Adopting diagnostic stewardship principles in immunocompromised populations is also challenging."

Q5 What are some common diagnostic pitfalls to watch out for, as a clinician?

The yield of a diagnostic tool, especially diagnostics for infectious diseases, should be carefully considered before ordering it. This serves largely to reduce the incidence of false positives, healthcare costs, length of stay, and patient discomfort.

In infectious diseases, urinary tract infections can represent significant diagnostic challenges. This is most relevant in cases of catheter-associated urinary tract infections and asymptomatic bacteriuria which are associated with a high risk of unnecessary antimicrobial prescriptions with consequential adverse events and emergence of resistance. It is very important to be aware that asymptomatic bacteriuria and non-infectious pyuria are very common, and that treatment is not warranted in the majority of those cases.

Clostridioides difficile colitis poses another diagnostic challenge to clinicians, especially early-career clinicians. This is largely due to the reflexive approach of ordering *C. difficile* testing for patients presenting with watery diarrhoea. Interestingly, over half of the admitted patients who test positive for *C. difficile* are only colonised rather than infected and do not require treatment. Careful history taking, clinical exam, and review of the medication administration record are essential to identify other causes of watery diarrhoea, and avoid false positive results.

Q6 Are there any novel diagnostic tools with enhanced sensitivity and specificity that you find particularly promising?

Although novel microbiologic diagnostics, particularly molecular diagnostics, have been shown to be highly sensitive, they carry a higher risk of false positives than other conventional diagnostics as they are more likely to detect colonisation or contamination. Interpreting these diagnostics in collaboration with the microbiology team and the antimicrobial stewardship team can help spare the risk of false positives.

Johnny Zakhour and Souha Kanj

Although most diagnostics for infectious diseases focus on detecting a causative pathogen, new diagnostics are currently based on exploring the host's response to an infection. Host-response-based diagnostics further explore the response of hosts to a certain pathogen, and may be more appropriate to differentiate infection from colonisation or contamination. However, most of these diagnostics are still in the research stage and are not yet available for clinical use.

Q7 In your opinion, what are currently the main challenges to diagnostic stewardship implementation, and how can these issues be tackled?

The benefits of implementing diagnostic stewardship in the inpatient setting have been well-proven. For instance, implementing hard

stops in the electronic medical record to prevent providers from ordering *C. difficile* testing for patients with watery diarrhoea in the absence of certain criteria was able to reduce the incidence of hospital-onset *C. difficile* by two-fold, without any reported missed diagnoses, and no impact on patient outcomes. Similar applications have been used for catheter-associated urinary tract infections and ventilator-associated pneumonia. However, little evidence exists regarding diagnostic stewardship in the outpatient setting. Hence, areas where diagnostic stewardship can be applied in the outpatient setting needs to be explored.

Adopting diagnostic stewardship principles in immunocompromised populations is also challenging. This is largely due to the lack of patients who are immunocompromised, and who are at a higher risk of severe infections, but also due to physician hesitancy when caring for such high-risk patients. However, some evidence is starting to emerge. For instance, at our institution, Henry Ford Hospital, we were able to show that routine microbiologic testing ordered for lung transplant recipients does not have a high diagnostic yield, and can expose patients to unnecessary treatment and interrupt life-saving immunosuppressive regimens.

Additional challenges include the unavailability of novel diagnostics in low-resource settings, lack of knowledge regarding diagnostic stewardship principles, physician hesitancy, and lack of evidence regarding the diagnostic yield of some novel diagnostics. Further research is warranted in these areas to optimise patient outcomes.

Q8 Where can we see your research lie in the near future? Are there any exciting projects on the horizon?

Diagnostic stewardship is definitely a hot topic in infectious diseases and microbiology right now. We are slowly moving from focusing on creating more diagnostics to optimising the yield of our existing ones. Exploring the use of diagnostic stewardship in patients who are immunocompromised is one area that I would like to look into, as well as ways to implement diagnostic stewardship in low-resource settings. Currently, we are looking into ways to improve data reporting on AMR in low-resource settings, in particular the Middle East, as this would be the foundation for any future projects pertaining to diagnostic stewardship in that area.