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- Do you have a bad sore throat?
 - Do you have difficulty swallowing liquids?
 - How severe and how long?
 - How quickly did it become severe?
 - Has your voice been affected?
- Have you been exposed to others with similar symptoms?
 - Are any friends, coworkers or travel associates experiencing similar illness?
- Have you recently been out of the country or out of the region?
 - If yes, what are the specific places and what activities were you engaged in?
 - Reinforce the importance of disclosing vacation locations even if they are US territories such as the Virgin Islands, or seemingly harmless places such as Bermuda
- Have you recently been camping?
 - If yes, what activities and exposures?
- What is your occupation?

COMMUNITY AWARENESS/EDUCATION

Just as the messages with signs and symptoms have been important for patient behaviors such that they think chest pain – 911 for suspected myocardial infarctions, and FAST – 911 for suspected strokes, we need to do a similar job in reminding people about communicable diseases, and the part each of us plays in controlling potential contagions. Clearly there are some challenges – language barriers, and cultural beliefs. But with closer collaboration with vulnerable populations and public health, along with the media, and other leaders of enterprises where people congregate, we can increase public awareness about communicable illnesses; along with methods they can implement to limit spread.

VACCINATIONS [1–6]

As mentioned earlier in this issue, vaccination rates are inconsistent nationwide. According to the CDC flu vaccination rates remain very low on college campuses, with estimates between 8 and 39 percent, which is significantly less than the Healthy People 2020 recommendations for 70% of collegiate being vaccinated against influenza [6]. Interestingly, according to a Nichol, et al. in a document by the National Foundation for Infectious Diseases [4,5] the average college student who gets the flu, will experience illness for eight days or more.

Increasingly there are outbreaks of pertussis, measles, chickenpox and other vaccine preventable diseases. Part of this has to do with better communications about the need for booster vaccines in adulthood, and greater emphasis by healthcare professionals. There is no denying the anti-vaccine movement has had an impact on immunization rates; albeit exact numbers are unavailable. One has to wonder if the utter dismissal of immunizations would occur if it were recognized measles, for example is a preventable cause of blindness in the developing world. With the vaccine more readily available in Africa, such events have been reduced. Would the testimony of a parent whose child is blind from measles, or died from a vaccine preventable disease make an impact? Would the stridence against such powerful medical interventions persist? As physicians, health care providers and respected members of the community, we can be a powerful voice for vaccines.

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FREQUENT UPDATES

To be sure we are all stretched to capacity and facing an increasingly complex environment of competing demands in healthcare. But we must remain connected to public health updates, and the changing disease trends in our community. Moreover we can be the sentinel outposts, even if in solo or small group practice. Communications concerning epidemiological patterns can often be relegated to institutions and agencies – sometimes called “siloeing.” As was learned during the anthrax, swine flu, SARS and ebola events since 2001, preparedness, even enhanced delivery of care by group practices relies upon the close working relationships across health delivery organizations, and professional groups in a community.

The small investment in time to share information on potentially worrisome trends within the medical community, along with appropriate warnings and counsel to our communities, and should more than pay off in enhanced care to our patients.

TRAVEL ASSOCIATED ILLNESS

An article about emerging pathogens would be remiss in not discussing travel related illness (TAI). As of 2010 it was estimated nearly 940 million tourists arrived at international destinations, which is twice that of 1990 [1,2]. Of note, journeys to developing regions represented 47% of travel in 2010 compared to 31% in 1990.

Given the burden of disease, especially infectious diseases, remains high in the often impoverished developing world, it is not surprising that more than half of international travelers to developing countries become ill during their trip according to one study, and approximately 8% seek medical care for TAI during or after their journey [1–4]. Not unexpectedly, there are changes in the type of TAI reflective of the changing destinations – from tourism to work and destination based travel, and the local, endemic illnesses found therein [5]. The most common sites for contracting malarial illness, the most common TAI in one study, were sub-Saharan Africa (77%), and Oceania (6%) [1,2]. Giardiasis and Dengue fever were the second and third most commonly diagnosed TAI respectively. Of note, gastrointestinal illness represented ~25% and febrile or viral syndrome caused about 10% with respiratory syndromes affecting about 5% of TAI patients. These data are not unexpected given travelers often spend upwards of 7 – 17 hours in close proximity during airline travel. Even with improved ventilation and air turnover in modern jet travel, the small distance between and prolonged exposure to people make travelers vulnerable to respiratory and other infections. Financial considerations impact airlines; it is obvious to any frequent flier there remains a lack of proper between-flight cleaning of surfaces (seatback trays, lavatories, arm rests) which increases the likelihood of disease transmission. Frequent hand washing, avoiding touching nose, mouth and eyelids are important basic approaches travelers can take to reduce risk, as well as proper vaccination.

Adding to the challenge of characterizing and quantifying the extent of and patterns associated with TAI are the lack of data. Studies about travel associated illness, including the medical response to TAI are limited. Never the less some disturbing results have been published. Data suggest that among patients who presented to an ED with symptoms consistent with a potential TAI, and who were eventually diagnosed as such, less than 10% were asked about travel at their first presentation to the HCF, resulting in delayed diagnosis, delayed treatment and unnecessary patient discomfort [6,7]. We can do better.

One of the few, recent, and large scale TAI studies involved over 40,000 ill travelers [1,2]. It revealed the most common destinations were sub-Saharan Africa (26%), Southeast Asia (17%), south-central Asia (15%), and South America (10%). And noted increases in enteric fever and dengue TAI.

International travel, the expansion of transnational business enterprises, growing reliance on imported goods, including food, all continue to raise the likelihood that infectious diseases, as well as the vectors that spread them, will enter the United States, remain, and pose significant public health challenges [1–9]. Diseases that have historically been confined to regions, even continents can now spread with relative ease. Given the globalization of commerce, agriculture, tourism and the job market, raising awareness, improved surveillance and greater collaboration must go beyond traditional public health to include non medical resources and partnerships.

Many of us were taught in medical school, and residency training, that when you hear hoof beats, think horses, not zebras. In the aftermath of avian and swine influenza outbreaks, an ebola event that was unlike others in the past, and evolving, highly pathogenic coronaviruses, such advice must now be called into question. Consider global travel and immigration into the United States from countries with endemic illnesses not commonly found in North America. Also societal factors (domestic and international) that include poverty, homelessness, institutionalization, overcrowding – in health care facilities as well as domiciles – and lack of access to timely healthcare, these all set the stage to create conditions that facilitate the spread of diseases that are from previously unknown, little recognized, or emerging pathogens. Endemic, even novel strains in foreign lands, can become very quickly clinical realities and community-wide problems in the U.S. That is to say, we now need to think zebras as well as horses. And why it is important to obtain a thorough travel and occupational history from patients who present with an atypical or severe, progressive illness. Such information may give valuable insights into the origin of the infection, the etiological pathogen, how to access timely information from sources experienced in treating the cascade of symptoms (biodrome) [10], thus allowing you to more rapidly initiate appropriate, potentially life-saving interventions.

As WHO notes in its International Travel and Health updates [1,6,7,9,10], international travelers are at risk depending upon the area visited, the purpose of the trip, itinerary, resources, accommodations, hygiene, sanitation and individual behaviors, as well as innate immunity and vaccinations, but unfortunately such pre-travel guidance is lacking [1,11,12]. General precautions can reduce the risk of exposure to infection risks. The most common infectious illness to affect travelers is “traveler’s diarrhea” – of which many food and water borne pathogens can be implicated. Knowing the modes of infectious disease transmissions provides opportunities for prevention. These include the following:

- Food-borne (Ex/avoid raw or undercooked foods)
- Waterborne (Ex/ice cubes, local water at restaurants, as well as standing water, rivers, etc)
- Zoonoses (Ex/animal sources)
- Sexually transmitted diseases (STDs) (Ex/local brothels)
- Blood-borne (including poorly cleaned medical instruments as well as IV Drug Use/IVDU)

- Airborne (respiratory) (crowds, persons exhibiting respiratory signs/symptoms)
- Soil (farms and farm lands can spread disease – footwear can carry soil/feces/animal products, and proximity to animals [Ex/avian influenza], plants (carry insects for example), contribute to disease spread

Respiratory diseases are common community acquired as well as TIA; viruses creating epidemics of more severe viral pneumonia, as was seen when a new coronavirus – SARS – continue to emerged [8,13]. Typically coronaviruses cause low grade respiratory infections. That changed in 2002. By 2003 the World Health Organization (WHO) emphasized the importance of travel history in identifying possible and probably cases – a critically important step in characterizing the epidemiology, and ultimately containing the infection. Soon thereafter SARS coronavirus seemed to disappear, only to have another novel one appear in 2012; MERS CoV. Unlike SARS which emerged from Asia, MERS seems to have originated on the Saudi Peninsula in the Middle East.

Not surprisingly, the several and varying illnesses endemic abroad have a variety of incubation periods. Health care professionals should encourage their patients to discuss travel plans and/or work out of the country, be knowledgeable about travel specialists in their community as important pre-travel resources and referral, as well as some of the more common TAI and emerging global threats. This includes infectious mononucleosis (IM) from Epstein-Barr virus, IM like syndromes (cytomegalovirus – CMV) which have been reported in febrile travelers returning from the tropics.

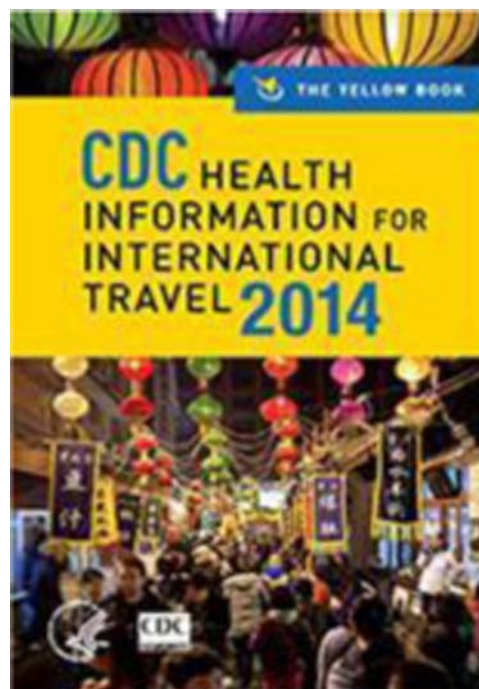
In addition to combat related injuries, PTSD, and other service related comorbidities, it is also important not to forget our servicemen and servicewomen [14] deployed in developing nations are a unique form of ‘travelers.’ To be sure they are source of TAI, who will return from the Middle East and other countries that may harbor endemic illnesses U.S. physicians and health care professionals may be unaware of or unaccustomed to recognizing, let alone treating. As described elsewhere, but worth repeating, malaria is one of the most important infectious diseases of concern for returning military as well as travelers, especially in the Middle East, Asia, and Africa, where many of our troops are deployed.

In anticipation of our troops returning from the Persian Gulf, Afghanistan and elsewhere, it is important to take some time for training and familiarize ourselves with pathogens and symptom cascades – biodromes- that are likely to infect them [14]. Moreover, being aware of the challenges in their acclimation to the US after being abroad; the astute clinician will be proactive in the psychosocial influences on the health of the servicemen and his/her family.

At a minimum, patients presenting with respiratory or gastrointestinal illnesses, especially with an unusual or unexpected cascade of symptoms require a thorough history of travel and contact information. If an illness behaves in an unexpected manner, it may warrant more in depth investigation. An index of suspicion as well as travel, contact, and occupational history are all critically important pieces of information to aid in developing management strategies, especially if the infectious agent is not known or clearly identified.

A useful reference, especially for guiding patients before their journeys is the CDC Health Information for International Travel 2014 (Figure 12) [15,16]

Fig. 12 – CDC Health Information for International Travel 2014 [15,16].



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SELECTED EPIDEMICS & EMERGING PATHOGENS – CONCLUSION

CONCLUSION

As health care professionals, we are tasked with remaining vigilant about the threats our patients may face. These include emerging and reemerging threats, nosocomial infections, travel-related illness, even bioweapons. By being attuned to the situations where our patients can become involved which may predispose them to increased risk of infections, we can provide invaluable support and guidance. This includes proper preventive measures – whether vector control, or places to avoid, how to dine in areas where food hygiene may be limited, medication prophylaxis, even obtaining appropriate travel health insurance, and where to obtain medical care, are all useful. Moreover being knowledgeable where to obtain information and updated treatment strategies is valuable.

While the mainstay of containing emerging threats often rests upon public health expertise – that is the big picture. Science can provide timely antimicrobials, even vaccines to help thwart the spread of infections. But disease and health care live at the street level where person to person transmission occurs. Hospital and emergency department(ED) overcrowding remains a significant problem in containing the spread of infections. While some health care facilities (HCF) have improved access to masks and hand sanitizers, as well as placed cough/sneeze etiquette posters, these can have limited value if manpower shortages, cultural imperatives, for example going to a health care facility with many members of the family, language and education barriers all work against social distancing, personal hygiene and other containment strategies. Some practices and health care facilities have implemented old pediatric strategies of placing potentially contagious patients into separate areas. Clearly this is a space, manpower and resource intensive strategy, but one that may reduce transmission of illness from those who are injured. On the regional and national level, a serious discussion on best practices in terms of how to cohort and isolate potentially contagious people, as well as strategies to alleviate overcrowding, much of which stems from the misuse of ED and HCF for primary care problems is vitally necessary.

It is important to recognize vaccine preventable illness from old but reemerging pathogens, such as whooping cough (pertussis), can be overlooked when patients present with upper respiratory illness. With some vaccines offering protection that wanes over time, and declining vaccine rates across populations, not to mention a growing number of visitors and immigrants from regions that do not have the same immunization capacity, greater awareness of illnesses endemic to such persons can aid in making a more rapid diagnosis.

The prudent clinician should consider a broader range of pathogens based upon endemic infections from a more diverse population, especially the ones trending in your region. Moreover we can better familiarize ourselves with our infection control and public health response colleagues.

We as health care professionals have a responsibility, and play an important role in limiting the spread of disease, if for no other reason than our own protection, given health care providers (HCP) are often at greater risk than patients for infection. HCP can also be spreaders of disease. We can assist in local preparedness efforts, provide appropriate educational information and medical care to patients, promote the use of vaccines and other preventive measures, including social distancing and hygiene practices, and set the stage for rapid recovery.