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Evidence-based Medicine

JOSEPH H. FRIEDMAN, MD
joseph_friedman@brown.edu

What to do?

I am writing an opinion piece on the management of psychosis in Parkinson’s disease. My responsibility is, of course, to review the literature, and propose an algorithm. At risk of being immodest, I like to think I am an expert in this disorder, and have the experience to merit the status of providing an expert opinion. My problem was how to recommend a particular drug that I find very helpful in the face of three, well-performed, adequately powered clinical trials demonstrating a lack of statistically significant benefit. Evidence-based medicine is based on evidence, and the evidence indicates that the drug is not effective. In trials of this medication at much higher doses in a very different population, the drug had some adverse effects, and in meta-analyses, involving very large numbers of patients, the drug has a small but significant increased risk of mortality, large enough to require a “black box warning.” So, we have a drug with “proven” lack of efficacy and a black box warning of increased mortality. While it sounds like an easy decision to state the data and not advise its use, the problem is that I’ve used the drug a lot, probably a lot more for this purpose than all but a few doctors in the world, and I find it to be quite effective.

As I got to the end of my essay and had to write my own advice, I checked some of the published recommendations by others. A recent review from a prominent and estimable European expert group reviewed the data and did not recommend using the drug. An earlier publication by an expert group in the U.S. noted the lack of “proven” benefit but stated that its members thought the drug helpful, not, however, recommending its use, something along the lines of, “despite evidence to the contrary, several members of our committee have found it helpful.” (Not a real quote). Another European expert cited the risk, rather than the benefits, in advising against its use.

In a quandary I decided I’d do my first Survey Monkey and sent out a single question, to be replied anonymously, asking if the recipient found this drug to be helpful and used it sometimes to treat PD psychosis. I chose 40 people, mostly neurologists, but a few psychiatrists as well, whom I regarded as experts in this area. The result was 19 responses, all in favor of the drug’s use. Now, armed with a survey, I can write that I recommend this drug’s use, despite evidence to the contrary, and that 19 experts, all of whom are familiar with the three negative studies, also believe the drug to be useful and safe enough to be recommended.

While I believe this was the correct approach, I cannot keep from thinking that for two thousand or more years, bloodletting was a “clearly” efficacious treatment for a number of disorders until falling out of favor, presumably not related to a placebo or active treatment-controlled research study. “Bloodletting vs. penicillin for the treatment of strep throat” would have been unlikely to gain IRB approval.

Evidence-based medicine is always limited by the subject population, either by design or by happenstance. If you study people with PD and bipolar disorder, you don’t know if the treatment may also work for people with PD and anxiety. A recent study had inclusion criteria that allowed demented people into the study, but the mean score for the subjects indicated that few, if any, were demented. Since the study drug will be used primarily in PD patients with dementia, what can be deduced? Perhaps more problematic is the heavy reliance on “intention to treat” trials, in which subjects are included in the outcome assessment once they sign an informed consent document and are assigned to a treatment arm, whether they get the treatment or not. A person becomes a “subject” once the informed consent is signed. The subject becomes a data-contributor once randomized to a treatment arm. How useful is an anticoagulant in reducing stroke in atrial fibrillation patients if half the subjects drop out in the first few days because of
side effects and the ones who tolerate the medication have fewer strokes? By one analysis, the standard intention to treat, the medication may not be statistically significant, whereas the “per protocol” analysis, which only assesses those who had the intervention, shows a significant benefit. Different interpretations for the final outcome obviously differ considerably. There are always limitations for evidence-based interpretations in the “real world” of the clinic. We are all influenced by our last few patients. Our decision making should not be based on this, however, and surveys of experts may well have led to continuation of bloodletting, continued use of hormone replacement therapy for post-menopausal women, skull surgery for Bell’s palsy, and the extra-cranial intracranial bypass surgery for carotid occlusion to prevent stroke. We doctors, like everyone else, come to believe that what we do must be correct, since everyone else does it too. There is a wonderful fable by James Thurber, in *The Thirteen Clocks*. A character describes how he started a rumor, a complete fabrication, that gold had been discovered someplace, which precipitated a mass exodus of people to mine the gold. The person telling the story reports that he, too, joined the exodus. “Everyone else went, so I figured there must be something to it.”

I don’t see how to resolve this problem, which will continue to dog clinicians forever.

**Author**

Joseph H. Friedman, MD, is Editor-in-chief of the *Rhode Island Medical Journal*, Professor and the Chief of the Division of Movement Disorders, Department of Neurology at the Alpert Medical School of Brown University, chief of Butler Hospital’s Movement Disorders Program and first recipient of the Stanley Aronson Chair in Neurodegenerative Disorders.

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Civil commitment laws for substance abuse treatment: An acceptable option?
HERBERT RAKATANSKY, MD

A recent story in the Providence Journal describes a “life saving” intervention on an unconscious passerby in a car. The driver stopped a passing police vehicle and the passenger was given 4 doses of Narcan. He was sent to a hospital ER where he was treated and released.

Our society currently is ravaged by a disease with a peculiar characteristic. Only 10% of those afflicted receive appropriate treatment. And fully 90% of the untreated (about 17 million adults) think they do not need any treatment in spite of the fact that for many the disease is fatal.

Of course we are talking about addiction, highlighted by the opioid crisis layered over the historical rate of alcoholism and other drug addictions. I cannot think of another disease in which the afflicted know they are ill but do not believe they need medical care. [Some healthy people think they do not need vaccines.]

Generally, a competent adult can refuse any and all treatment for any disease. There are a few exceptions. Persons attempting suicide routinely are held for several days of treatment. Persons with certain infectious diseases may be forcibly isolated, if not treated (remember Ebola?). Persons with mental illnesses who do not have the capacity to understand their illness and/or are dangerous to themselves or others are a separate issue.

In 2015 civil commitment laws (no crime committed) for treatment of adults with addiction existed in 32 states plus Washington D.C. (there may be more now). The length and type of treatment and utilization of this approach varies. Some states use civil commitment more frequently (MA over 4500 cases/yr.) than others (Texas 23 cases/yr.). Rhode Island has a law, but it is almost never invoked. Imminent danger to self or others is required in RI. The case reported above seems to be as close a brush with imminent harm as one could come! Also, in RI, only a family member may petition the court for civil commitment.

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Even in states that try to address addiction by civil commitment there are barriers. There may be no treatment facilities available to treat. And if facilities are available there may be no money to pay. Insurance may not cover the treatment and it is not clear whether a person receiving “unwanted” court-mandated treatment could be forced to pay the bill. Patients may be sent to prison programs if no other facility is available.

But even if all of the difficulties in access disappeared we must ask whether undesired treatment works. In one study, civil commitment was requested for 28 persons with addiction. The court granted the request in only 7. After treatment and release, 6 persons relapsed promptly.

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treatment is a condition of continued ability to practice medicine. This is a patient safety issue. The doctor is free to refuse treatment and pursue another occupation. PHP treatment is a strict regimen and is uniquely highly successful; 70–90% of those enrolled do well for over 5 years.

The successful treatment of addiction, of course, requires state-of-the-art facilities and approaches, including medically assisted treatment [MAT – drugs that block opioid receptors], group and individual therapy, etc.

But there must be an underlying motive for the patient to get into and stay in treatment. The motivation that inspires doctors and others to enter long-term therapy is the desire to not lose some central core value or desire. We know what it is for most doctors. Doctors, almost uniformly, value their ability to practice so highly that they will “stay the course” in an intensive 3–5 year treatment program. But for many others the power of the addiction is greater than their strongest core value.

For all patients it is critically important to determine if there is any such core value and work with the patient to help them understand that continued use of drugs ultimately would deny them this core. This knowledge alone does not cure addiction but is the best motivating force to stay in treatment.

But even if civil commitment along with forced treatment works, should doctors administer it? For example, Vivitrol, an opioid receptor blocker could be administered by injection over the patient’s objection.

An adult patient with the capacity to understand the proposed treatment and make decisions has an absolute right to reject any medical treatment for any disease. A Jehovah’s Witness may refuse blood products even if death is the consequence.

Even if the patient is a criminal and a court orders treatment, the AMA Code of Medical Ethics requires the treating physician to adhere to a 3-step process. An independent expert must confirm the medical diagnosis. The proposed treatment must conform to nationally accepted standards and, most importantly, an independent physician must verify informed consent. Patients ordered by a court to have treatment during civil commitment must have the same protections. Doctors must not participate in treatment of an adult incapacitated patient without freely given informed consent.

Is consent truly voluntary when it is obtained as the alternative to prolonged confinement, when such confinement is not punishment for a crime or necessary to protect the safety of the patient or others? Occasionally persons will ask to be civilly committed as a means of getting motivation for a full course of treatment. These cases have obviously given informed consent. But for the others, does the choice given to the addict of treatment or confinement [in the absence of a crime] place the doctor in the position of being a partner of the government in the forced granting of the consent?

The patient described above who was saved by the police and discharged from the ER has little chance of sustained recovery. We need to do better.

Many simultaneous approaches are necessary:

- We need to avoid unnecessary exposure to opioids in medical practice. Progress has started in this area.
- Sources of illegal supplies of drugs must be reduced. Long-term results have not been encouraging. [The profits are too great.]
- MAT reduces the craving and markedly increases the success rate and should be considered in all cases. New drugs that act directly on the brain [even possibly preventing opioid addiction in some cases] offer significant hope.
- We need to focus on the core value[s] that might motivate the patient to engage in treatment.
- More and better facilities and trained treatment personnel are required. But this requires adequate funding that our society has not seen fit to provide.
- In my opinion, civil commitment with forced treatment is not an acceptable option. Doctors should participate in treatment only if there is voluntary informed consent.

Author
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VIENNA, AUSTRIA

Michael Migliori, MD, RIMS Public Laws Committee Chair, and Ophthalmologist-in-Chief at Rhode Island Hospital, took a moment to look at the journal beside the statue of Asklepius in the garden at Schönbrunn Palace, the 1441-room summer residence of the Hapsburgs emperors. The gardens cover more than a square kilometer, and 32 statues made in 1777 by sculptor Johann Wilhelm Beyer, representing mythological deities and virtues, stand along the parallel hedges that border its Great Parterre.
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LIVING UP TO YOU
This issue of the Rhode Island Medical Journal (RIMJ) is devoted to Antimicrobial Stewardship. Traditionally, infectious disease (ID) clinicians have been the antibiotic stewards in hospitals. Recently, the basic tenets of antimicrobial stewardship programs (ASPs) have been defined and mandated by the Centers for Disease Control (CDC) and The Joint Commission (TJC).

The essential elements of ASP are based on a multidisciplinary approach led by an ID clinician leader supported by a team of ID-trained clinical PharmDs. Effective ASPs are dependent on close cooperation between infection control (IC) and the microbiology laboratory to track and limit antibiotic resistance. Optimal antibiotic therapy recommendations are based on ID/ASP experience and pharmacokinetic–pharmacodynamic (PK/PD) considerations while minimizing resistance and Clostridium difficile potential. Since each hospital is different, ASPs need to be tailored to each hospital staff’s prescribing habits, formulary restrictions, and local antibiotic usage patterns.

Vital to ASP success is enthusiastic and ongoing administrative financial support for ASP MDs and PharmDs as well as robust IT support (personnel and equipment).

Critical to ASP acceptance and success is antimicrobial education of the medical staff to optimize therapy, minimize resistance and control of C. difficile. ASP interventions in support of these principles include educating and implementing effective monotherapy instead of polypharmacy (often with 2–4 antibiotics when one is sufficient). Therapy should be as short as possible to cure the infection. Other important ASP components include a comprehensive IV-to-PO switch program, which decreases drug acquisition costs and adverse effects and which allows earlier discharge and decreases length-of-stay (LOS).

Following acceptance of IV-to-PO switch therapy, the next step is to acquaint the staff with the even greater advantages of entirely oral (PO) therapy.

Physicians need to be aware of each antibiotic’s resistance potential when selecting therapy, e.g., “high resistance potential” drugs (ceftriaxone) vs. “low resistance potential” drugs (clindamycin). Similarly, antibiotics also differ in their C. difficile potential. The antibiotics with a high C. difficile potential are clindamycin, and beta-lactams (excluding ceftriaxone). Many other antibiotics have little or no C. difficile potential, e.g., macrolides, tetracyclines, aztreonam, aminoglycosides, vancomycin, colistin, polymyxin B, TMP-SMX, fosfomycin. Some antibiotics are actually protective against C. difficile, e.g., doxycycline, tigecycline. Furthermore, often overlooked are various other drugs that may cause C. difficile; notably, proton-pump inhibitors (PPIs).

As ASPs are implemented, the effectiveness of various interventions is best assessed by prospective audits. As hospitals are all different, this analytical tool is needed to demonstrate what works best for each hospital.

This issue of the RIMJ is dedicated to Rhode Island practitioners. We are most fortunate in the state to have so many experts with a national reputation in clinical ID, antibiotic resistance, IC and hospital epidemiology, as well as medical microbiology. The articles contained in this issue of the RIMJ on ASP were written by leaders in their fields and should be of great interest and practical use to RI practitioners.

Suggested Reading


**Guest Editor**

Cheston B. Cunha, MD, FACP, Assistant Professor of Medicine, Alpert Medical School of Brown University; Medical Director, Antimicrobial Stewardship Program [Rhode Island Hospital & Miriam Hospital], Providence, RI.
Antibiotic Stewardship Programs (ASPs) are intended to optimize appropriate antibiotic use and decrease inappropriate or suboptimal antibiotic use. Infectious disease clinicians have traditionally held the role of antibiotic stewards. Recently, the basic principles of optimal antibiotic use have been finalized in the Centers for Disease Control (CDC) ASP guidelines. The CDC guidelines consist of 7 principles that should be customized to the hospital’s size, local epidemiology, resistance patterns, staff expertise and pharmaco-economic considerations. One size does not fit all, and effective ASP measures in one hospital may be ineffective or inappropriate in another. Hospital differences may be evaluated using prospective audits to assess the effectiveness of ASP components in each hospital. (Table 1)

The CDC ASP guidelines consist of 7 practical ASP measures. First, there must be administrative support to fund a dedicated infectious disease (ID) clinician team supported by a staff of ID-trained clinical pharmacists (PharmDs). Appropriate antibiotic use is the critical ASP tenet. Antibiotics should not be used to treat non-bacterial causes of fever, e.g., viral infections, drug fever, non-infectious febrile disorders. Furthermore, infection, not colonization, should be treated. The expertise of the ASP ID leader is critical as many non-ID physicians do not understand the importance of differentiating culture results that may represent either colonization (that should not be treated) or infection.

These ASP principles 1) not treating non-bacterial febrile disorders 2) not treating colonization are important cornerstones of effective ASPs. After selecting an antibiotic on the basis of appropriate spectrum, then tissue penetration (related to the site of infection) is an important consideration. Therapeutic serum levels have little relevance in treating non-serum site infections, e.g., meningitis, osteomyelitis, prostatitis.

ASP programs should educate practitioners on optimal dosing based on pharmacokinetic (PK) and pharmacodynamic (PD) considerations. Dosing and duration of treatment are also important. Duration of therapy should be based on clinical response, and not a set number of days. Another key ASP objective is to further encourage IV-to-PO switch therapy or even better, oral (PO) therapy alone. Other ASP objectives are more challenging, especially the reduction of antimicrobial resistance (an institution-related problem). Antibiotic resistance is not necessarily volume/duration dependent and is not antibiotic class related. Resistance determinants are not well understood, but reducing “antibiotic tonnage” or “antibiotic cycling” often has little or no effect on resistance. Antibiotics are best viewed as being either “low or high resistance potential antibiotics.” “Low resistance potential” antibiotics cause little/no resistance independent of volume or duration of use, e.g., nitrofurantoin, doxycycline, ceftriaxone. In contrast, “high resistance potential” antibiotics predispose to resistance even with little use, but resistance further increases with high volume use, e.g., gentamicin, ceftazidime, imipenem. As can be inferred from these “high resistance potential” antibiotics examples, antibiotic resistance is not related to antibiotic class since each antibiotic class has both “low and high resistance potential” antibiotics. Acquired resistance must not be confused with clonal resistance, which is not related to antibiotic use. The spread of clonal resistance is a function of the effectiveness of infection control (IC) efforts to contain/limit the in-hospital spread of resistant strains. The ASP ID clinician should have a close working relationship with IC to be aware of outbreaks unrelated to antibiotic use.

Another ASP problem is minimizing the potential of antibiotic collateral damage, e.g., adverse effects such as C. difficile diarrhea (CDD). Clinical education is critical to overcome long-held misconceptions. It is thought, “only antibiotics cause C. difficile.” Certainly, clindamycin and most β-lactams can, e.g., piperacillin/tazobactam, but CDD is rare with many other antibiotics, e.g., macrolides, tetracyclines, azithromycin, aminoglycosides, TMP-SMX, tigecycline, daptomycin, linezolid, quinupristin/dalfopristin, colistin, polymyxin B, nitrofurantoin, fosfomycin. Quinolones and carbapenems alone may cause CDD, but CDD is much more likely if these drugs are used with proton pump inhibitors (PPIs). Also, physicians need to be aware that non-antibiotic drugs are important causes of CDD, e.g., cancer chemotherapy, some psychiatric medications.

In summary, to be effective, an ASP needs full administrative support, and ID ASP team leadership to educate the medical staff on the most important determinants of optimal antimicrobial therapy. (Table 2)
De-escalation can be harmful if microbiology data is misleading, e.g., represents colonization rather than being reflective of the pathogen. In patients with NP or VAP, it is more prudent to treat the most likely pathogen, e.g., even if not cultured from respiratory P. aeruginosa. De-escalation is problematic if based on microbiology data alone without site-pathogen correlation. De-escalation can be harmful if microbiology data is misleading, e.g., represents colonization rather than being reflective of the pathogen (underlying bone pathogen, not ulcer organisms), e.g., diabetic foot ulcers/chronic osteomyelitis or sacral ulcers/chronic osteomyelitis.

 Colonization vs. Infection
- Treat infection, not colonization.
- Provide empiric coverage primarily directed against the most probable pathogens causing the infection at the body site.
- Avoid “covering” or “chasing” multiple organisms cultured that are not (pathogens and non-pathogens) at the body site cultured.
- Colonization of respiratory secretions, wounds, or urine with “water” (S. maltophilia, B. cepacia, P. aeruginosa) or skin organisms (MSSA, MRSA, CoNS, VSE, VRE) is the rule.

 Narrow vs. Broad Spectrum Therapy
- Narrow vs. broad spectrum doesn’t prevent resistance, e.g., in treating E. coli urosepsis switching from a carbapenem (broad spectrum) to ampicillin (narrow spectrum) may actually increase resistance potential.
- Narrow spectrum vs broad spectrum may not be clinically superior to well-chosen broad spectrum therapy, e.g., switching from ceftriaxone (broad spectrum) to penicillin in treating S. pneumoniae has no clinical rationale or clinical advantage and has no effect on controlling resistance.
- Antibiotic resistance is not related to spectrum narrowing or broadness, e.g., levofloxacin (broad spectrum but “low resistance potential”) vs. ampicillin (narrow spectrum but “high resistance potential”).

 Antibiotic Resistance
- The best way to control resistance is a selectively restricted formulary; restricting “high resistance potential” antibiotics, e.g., imipenem (not meropenem or ertapenem), ceftazidime (not other 3rd or 4th GC), gentamicin/tobramycin (not amikacin).
- Some antibiotics may be restricted for other reasons e.g., excessive vancomycin (IV not PO) use predisposes to VRE emergence and vancomycin may cause cell wall thickening in S. aureus resulting in permeability related resistance (to vancomycin and other antibiotics, e.g., daptomycin).
- Over restriction of antibiotics may impair timely effective therapy and does not, per se, decrease resistance.
- Preferentially select antibiotics (all other things being equal) with a “low resistance potential.” Avoid, if possible, “high resistance potential” antibiotics, e.g., macrolides (for respiratory infections), TMP-SMX (for UTIs).
- Since resistance is, in part, concentration dependent, subtherapeutic or low antibiotic tissue concentrations, (all other things being equal) predisposes to resistance.
- Suboptimal dosing or usual dosing with inadequate tissue penetration, e.g., into the body fluids or undrained abscesses (source control is key) predisposes to resistance.

 Monotherapy vs. Combination Therapy
- Preferably use monotherapy whenever possible to cover the most likely pathogen or cultured pathogen clinically relevant to the site of infection.
- Combination therapy should be avoided if possible. Always try to preferentially use monotherapy.
- Monotherapy is usually less expensive than combination therapy and has less potential for adverse effects and drug-drug interactions.
- Combination therapy is often used for potential synergy (rarely occurs and if used must be based on microbiology laboratory synergy studies), to increase spectrum (preferable to use monotherapy with same spectrum), or to prevent resistance (except for TB).

 PO and IV-to-PO Switch Antibiotic Therapy
- Wherever possible, treat with entirely oral antibiotic therapy instead of IV therapy.
- Switch from IV-to-PO antibiotic therapy after clinical defervescence (usually < 72 hours).
- Early IV-to-PO switch therapy eliminates phlebitis and IV line associated infections.

 C. difficile Diarrhea/Colitis
- Preferentially select antibiotics (all other things being equal) with low C. difficile potential.
- Predisposing factors to C. difficile include relatively few antibiotics, e.g., clindamycin, β-lactams, ciprofloxacin.
- Many antibiotics have little C. difficile potential, e.g., aminoglycosides, aztreonam, macrolides, TMP-SMX, colistin, polymyxin B, daptomycin, Q/D, doxycycline, minocycline, tigecycline, vancomycin, linezolid.
- Some antibiotics are protective against C. difficile, e.g., doxycycline, tigecycline.
- Always consider non-antibiotic factors that may predispose to C. difficile, e.g., cancer chemotherapy, anti-depressants, statins, PPIs.
- Also consider person-to-person spread or acquisition for the environment.

 Pharmacoeconomic Considerations
- The least expensive therapy is usually not the best therapy.
- The least expensive antibiotic (acquisition cost) may, in fact, be expensive (re: total cost) when considering the cost implications to the institution of dosing frequency, C. difficile potential, resistance potential, and degree of activity against the known or likely pathogen, not to mention the cost of potential therapeutic failure vis-à-vis ↑ LOS and medicolegal costs.
- Stewardship savings are best achieved by decreasing duration of antibiotic therapy, and by treating entirely with oral antibiotic therapy or early IV-to-PO switch therapy.
**Biliary Tract Infection and ASP Antibiotic Selection: A Practical Antimicrobial Stewardship Vignette**

Infectious Disease physicians have been the leaders in optimal antibiotic use.

Optimal antibiotic selection is based on an accurate presumptive clinical diagnosis. Without the correct diagnosis, antibiotic therapy is necessarily suboptimal. The first critical step in antibiotic selection is to identify the likely source of infection, which determines the pathogen at the site of infection. For example, in cholecystitis or cholangitis, the usual pathogens are *E. coli*, *Klebsiella pneumoniae*, or vancomycin susceptible enterococci (VSE). In the absence of associated bacteremia that would identify the pathogen, therapy should be directed against all three of the usual pathogens. Therefore, the first consideration in antibiotic selection is spectrum [based on the usual pathogens at the site of infection]. Any antibiotic that covers these pathogens is appropriate in terms of spectrum. Biliary tract bacteremias are caused by single organisms (vs. polymicrobial infections from the colon) but since any one of these are the pathogen, all three should be covered until or if the single pathogen is identified.

When using an antibiotic, it is important to equally consider what organisms to cover, as well as what not to cover. Non-biliary pathogens that do not require coverage empirically are *B. fragilis*, MSSA/MRSA. Using biliary infection as an example, the next ASP consideration is to select not only an antibiotic with the correct antibiotic spectrum, but the antibiotic must also penetrate the site of infection, e.g., bile and gallbladder wall in therapeutically effective concentrations. Antibiotics with therapeutic serum levels may be completely ineffective in biliary sepsis if not able to penetrate adequately into the bile/gallbladder wall. To further illustrate the importance of pharmacokinetic (PK) considerations in the biliary tract, it is assumed the common bile duct (CBD) is unobstructed [an obstructed CBD would further limit antibiotic penetration]. Antibiotic selection solely based on penetration into an obstructed CBD with the requisite PK properties, but not the proper spectrum makes little sense, e.g., clindamycin penetrates even with an obstructed CBD, but doesn’t have proper spectrum/activity against *E. coli*, *K. pneumoniae*, or VSE.

The next consideration in antibiotic selection, using the biliary tract sepsis example, is to understand the “resistance potential” of the antibiotics being considered. Antibiotics may be classified as either “high or low resistance potential” drugs. It is a popular misconception that antibiotic resistance is primarily related to volume or duration of use, which is not the case. Excluding clonal resistance spread, “low resistance potential” antibiotics, for unclear reasons, cause little or no resistance after high volume/prolonged use. Doxycycline, a “low resistance potential” antibiotic has been used extensively worldwide for decades and has few resistance problems. Similarly, in terms of volume of use, the “low resistance potential” antibiotic ceftriaxone has caused virtually no clinically relevant resistance problems after decades of use worldwide. In contrast, “high resistance potential” antibiotics, e.g., ceftazidime, causes widespread resistance even with minimal use, and major resistance problems with high volume use. Resistance is also not an antibiotic class phenomenon since within each class there are “high and low resistance” potential antibiotics, e.g., among carbapenems imipenem [high resistance potential] vs. meropenem, doripenem [low resistance potential].

Taking into account resistance potential, if empiric selection between levofloxacin monotherapy vs. cefazolin plus ampicillin therapy, from a resistance potential alone, levofloxacin would be preferable since ampicillin is a “high resistance potential” antibiotic.

Other considerations include side effects or adverse events, e.g., *C. difficile* potential. In selecting levofloxacin for biliary sepsis, it has the proper spectrum (*E. coli*, *K. pneumoniae*, VSE), penetrates into bile in an unobstructed biliary tract, and has a “low resistance potential.” Furthermore, without concomitant PPI use, it has a relatively low *C. difficile* potential. In contrast, cefazolin and ampicillin are β-lactams which, after clindamycin, have a relatively high *C. difficile* potential.

Levofloxacin has the additional advantage of being one drug and has a PO formulation for oral or IV-to-PO switch therapy which shortens hospital length of stay (LOS) and permits earlier discharge.5,6

The above biliary sepsis example is illustrative of the practical considerations of antibiotic selection taking into account ASP principles.

**References**


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Overview of Antimicrobial Stewardship Activities in Rhode Island

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ABSTRACT
Due to the rise of antibiotic resistance, and the decrease of novel antibiotics coming to market, the Centers for Disease Control and Prevention (CDC) has formally recognized that action must take place to ensure appropriate antibiotic use, and maintain public health. The RI Department of Health (RIDOH) Director responded by initiating the RI Antimicrobial Stewardship and Environmental Cleaning Task Force (RIAMSEC), a multidisciplinary team that set in motion a set of tasks for RIDOH. As a result, a survey of antibiotic stewardship programs (ASP) at the RI acute care hospitals (ACHs) and long-term care (LTC) facilities revealed gaps in addressing HAI prevention and AMS goals for the state. RIDOH has therefore expanded statewide coordination efforts to form the RI Healthcare-Associated Infection Prevention and Antimicrobial Stewardship Coalition which is intended to effectively prevent HAI and ultimately improve the Centers for Medicare and Medicaid Services Hospital-acquired Condition (HAC) Reduction scores in Rhode Island.

KEYWORDS: antimicrobial stewardship, infection control, Rhode Island, acute care facilities, hospitals, long-term care facilities, public health

INTRODUCTION
Antibiotics are considered one of the greatest discoveries for human health in our lifetime. Preserving these important medications, through appropriate use, are critical to maintaining individual health, public health and national security. The CDC recognizes that the overuse of antibiotics has led to an increase in antibiotic-resistant organisms, Clostridium difficile infections (CDI), unnecessary hypersensitivity reactions, and general medication-related adverse events. Consequently, efforts highlighting the importance of antimicrobial stewardship programs [ASP] emerged.

According to the CDC, antibiotic-resistant organisms cause two million illnesses and 23,000 deaths in the United States each year. Development of antimicrobial resistance is directly related to the failure to use the right drug, at the right dose, for the right duration of time, and only when necessary [not for bacterial colonization or viral infections]. As a result, antimicrobial stewardship has become a priority at the national level and has become a priority in Rhode Island as well.

In 2014 the Centers for Medicare and Medicaid Services (CMS) reported the rates of hospital-acquired conditions in hospitals throughout America. In this report, RI was ranked 51/51 in the United States for its rate of Clostridium difficile infections (CDI). This stimulated a call to action by the Rhode Island Department of Health Director, Michael Fine, MD, to establish the Rhode Island Antimicrobial Stewardship and Environmental Cleaning Task Force (RIAMSEC TF), a coalition of stakeholders who recommend strategies and make recommendations to leverage resources to support antibiotic stewardship activities in health care settings as well as in the outpatient setting.

THE RI ANTIMICROBIAL STEWARDSHIP AND ENVIRONMENTAL CLEANING TASK FORCE
In August of 2014, the RIAMSEC TF convened with the mission to reduce antimicrobial resistance throughout the state. The membership, extending from acute care hospitals (ACHs), nursing homes, primary care practices, insurance companies, academia, and public health, is interdisciplinary, and includes infectious diseases, and infection-prevention experts in medicine, pharmacy, nursing, microbiology, and epidemiology throughout the state. From 2014 to 2016, this TF was chaired by the Consultant Medical Director for the Division of Infectious Diseases and Epidemiology at the Rhode Island Department of Health (RIDOH), Nicole Alexander-Scott, MD, MPH, an adult and pediatric and infectious disease physician, who has succeeded Michael Fine and is currently the state’s Director of RIDOH.

To achieve the mission of the RIAMSEC TF, members recommended the following strategies and priorities to the RIDOH Director:

1. Assess antimicrobial stewardship and environmental cleaning practices at hospitals and long-term care facilities, public health

2. Document the number of Full Time Equivalents (FTEs) allocated to infection control at hospitals and long-term care facilities.
care facilities. Questions about the number of infection preventionists, infectious disease physicians and pharmacists at each facility should be added to the survey described above.

3. Establish guidelines for resources and staffing by using CDC guidelines and data from the surveys described above. Establish antimicrobial stewardship and environmental cleaning guidelines tailored to acute and long-term care settings.

4. Identify funding opportunities for implementation of recommended actions for multi-facility learning collaborators and to support staff and resources for facilities.

5. Communicate antimicrobial stewardship and environmental infection control standards by sending a letter to facility executive leadership, explaining the rationale and importance of supporting stewardship and emphasizing expectations for action.

HOSPITAL SURVEY RESULTS

In November 2014, RIDOH surveyed all ACHs and long-term care (LTC) facilities in the state to assess current ASP practices. A 31-question electronic survey, adapted from the CDC’s Checklist for Core Elements of Hospital ASPs, was sent (via online software program, SurveyMonkey®) to the executive hospital administrators at each ACH in RI. To maximize accuracy of responses, we asked respondents to answer questions in a multidisciplinary approach with antimicrobial stewardship (AMS) team members at their respective facilities.

Thirteen RI ACHs responded to the survey (response rate, 100%). Of these, 78% reported having an ASP at their facility which tracked antibiotic prescribing, use and resistance (unpublished data, RIDOH 2015). However, 44% of ACH reported not having a formal, written statement of support from leadership, and 50% did not receive any budgeted financial support for an ASP. Almost three-quarters of the hospitals (72%) reported having a physician leader responsible for ASP outcomes. Similarly, 89% of the ACHs reported having a pharmacist leader, though only 38% of them were trained in infectious diseases. Few hospitals (17%) reported having a process to review antibiotic orders after 48 hours to assess appropriateness. However, pharmacy-driven interventions were implemented in at least 50% of ACH (e.g. a physician or pharmacist needs to approve specified antibiotic agents prior to the pharmacy dispensing at the facility).

We concluded that, ASPs were present in most acute care facilities in RI. To maximize ASP practices, hospital-specific antimicrobial use recommendations should be made more readily available for use, hospital leadership should make an effort to increase the presence of an ASP leader in RI ACHs, and efforts should be made to increase review of antibiotics for appropriateness.

NURSING HOME SURVEY RESULTS

Also in 2014, the RIAMSEC TF developed a survey to assess the scope of AMS among RI LTC facilities. Questions were based on CDC’s Core Elements of Antibiotic Stewardship for Nursing Homes Programs, as well as on Advancing Excellence in America’s Nursing Homes® campaign materials which were designed to evaluate processes to prevent and manage infections in LTC facilities.

RIDOH’s public reporting contractor, Healthcentric Advisors, faxed a written notice to all RI LTC facilities (N= 88), and emailed copies of the survey to a subset of LTC staff on a statewide email distribution list. Notices recommended that each facility complete the survey within 3 weeks, using an online tool as a round-table exercise involving the director of nursing, infection control nurse, and any other staff responsible for infection prevention and/or AMS activities. No incentives were given for participation. Results suggest infection preventionists are largely responsible for ensuring appropriate antibiotic use in long-term care facilities and there is a need for increased interdisciplinary access to individuals with antimicrobial stewardship expertise.

In addition to conducting the survey, the RIAMSEC TF shared the results of the survey with healthcare facilities and developed a website10 to share information and guidance. The Task force is actively seeking funding for statewide stewardship activities.

In December of 2015, RI was further jolted by CMS publishing the fiscal year 16 Healthcare-Acquired Condition (HAC) Reduction Program scores which revealed that seven of 11 RI ACHs were going to suffer reimbursement reductions.11 This score is a cumulative score of quality measures, with 75% attributed to Healthcare Associated Infections. This was a further stimulus to stakeholders and RI Sen. Sheldon Whitehouse, who has long been a champion in this arena and charged the community to take action. In response to an urgent call to action, RIDOH expanded the RIAMSEC TF to include the already existing Healthcare-acquired Infections (HAI) subcommittee (which is the operational arm of a legislatively required RI Healthcare Quality Reporting Program Steering Committee) and formed a statewide Coalition with the goal of consolidating and coordinating resources and expertise. [Figures 1 and 2.]

HAI PREVENTION AND ANTIMICROBIAL STEWARDSHIP COALITION

The HAI Prevention and Antimicrobial Stewardship Coalition was developed under the leadership of the current RIDOH Director, Nicole Alexander-Scott, MD, MPH, appointed in April 2015. Consisting of partners from RIDOH, hospitals, nursing homes, physicians, pharmacists, infection preventionists, academia, community partners, and trade and professional organizations, the objectives of the Coalition are to increase collaboration and communication among
partners, and thereby reduce the duplication of effort while strengthening the effectiveness of statewide strategies. To achieve the goal of protecting the health of Rhode Islanders and reducing costs to the healthcare system, the Coalition established two groups: the “Leadership and Policy Committee” and the “Education and Best Practices Workgroup.”

THE LEADERSHIP AND POLICY COMMITTEE
The Leadership and Policy Committee is comprised of hospital and nursing home executives who control funding and make administrative decisions at their respective facilities. It is essential to engage and educate this population about the importance of antimicrobial stewardship and the cost of antimicrobial resistance, in order to target the necessary resources to establish and support antimicrobial stewardship programs. This Committee is also tasked with developing and supporting state and national policies that align with Coalition goals.

EDUCATION AND BEST PRACTICE WORKGROUP
The Education and Best Practices Workgroup consists of HAI prevention and antimicrobial stewardship leaders, practitioners, and subject matter experts who identify gaps in state or facility programs and develop consistent best practices. The Workgroup will then share its expert information with the Leadership and Policy Committee.

The Coalition hosted a kick-off event on August 25, 2016, with approximately 300 attendees that included hospital and nursing home leadership, infection prevention specialists, quality improvement specialists, pharmacists, infectious disease physicians, laboratorians, insurers, and public health practitioners. This meeting brought all partners together to discuss how Rhode Island’s healthcare community can work together to improve antimicrobial stewardship and prevent HAIs.

The keynote speaker at the event was Captain Lauri Hicks, DO, Director of CDC’s Office of Antibiotic Stewardship. Dr. Hicks, who has been an advocate for appropriate antibiotic use for nearly a decade, shared effective and practical ideas for improving and expanding antimicrobial stewardship programs at healthcare facilities. The various speakers discussed the health impact of HAIs; the financial burden of HAIs; the public health consequences of antibiotic resistance; and the need for antimicrobial stewardship.

Charged with coordinating statewide efforts to effectively prevent HAI and ultimately improve the CMS HAC Reduction scores among healthcare facilities in RI, the kick-off shared how the Coalition will be sustained going forward. With both groups of the RI HAI Prevention and AMS Coalition attending the kick-off in the summer of 2016, the Education and Best Practice Workgroup and the Leadership and Policy Committee would continue to meet at alternating dates every 3 to 6 months, targeting the respective audience for each group. Existing meetings and groups throughout the state with a focus on HAI prevention and AMS would also be leveraged to reduce duplication and to advance coordination of strengthened efforts.

On December 7, 2016 the Coalition hosted the first meeting of the “Education and Best Practice Workgroup”. This meeting provided an opportunity for providers and stakeholders from across healthcare settings and disciplines to come together to coordinate efforts, share best practices, and drive improvement in Rhode Island. During the meeting, attendees reviewed the recommended guidelines for infection prevention and antimicrobial stewardship, discussed barriers to implementing these guidelines, learned about current research, quality improvement, and technical assistance projects; and listened to what colleagues in other facilities were doing to address the problem.
The next meeting organized by the Coalition was the “Leadership and Policy Meeting”, held on May 8, 2017. The meeting brought together executive healthcare administration and board members from various healthcare facilities, state policy leaders, and clinical academic program leaders to discuss strategies to overcome the negative impact that HAIs have on the health of Rhode Islanders and on the financial sustainability of healthcare organizations.

Overall, Rhode Island has made a tremendous effort to increase antimicrobial stewardship and reduce the negative health impact and financial burden that HAIs have on the healthcare system. This multi-disciplinary approach of the Coalition, with the strong communication and outreach efforts, has set the stage for RI to be very successful in promoting antimicrobial stewardship and combating HAIs. Preliminary results of the fiscal year ‘17 HAC Reduction Program scores reveal that the previous results of seven out of 11, has now decreased to four out of 11 acute care hospitals in RI which will be penalized with reimbursement reductions. There is still much more work to be done, but RI has laid the groundwork to strategically reduce HAI and improve the metrics associated with AMS statewide.

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References
7. SurveyMonkeyInc. SanMateo, California, USA. www.surveymonkey.com

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Role of the Pharmacist in Antimicrobial Stewardship

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It is well documented in the primary Antimicrobial Stewardship literature that a multidisciplinary team is an essential element to having a successful program. The Centers for Disease Control (CDC) and the Infectious Diseases Society of America (IDSA) offer excellent guidelines for implementation and recommendations for key members of an Antimicrobial Stewardship Team (AST). The guidelines highlight the interdisciplinary nature of Antimicrobial Stewardship teams, noting that each member has a unique area of expertise and background knowledge base that strengthens the team beyond individual members. These guidelines have existed for more than a decade. Time has passed and technology has advanced since the guidelines were first developed, and the roles of the members of the AST have changed from their initially described roles of years ago.

The role of pharmacists in particular has been expanded in the past several years. Early versions of the stewardship guidance documents had pharmacists playing a narrow role as the medication expert, with the recommendation that clinical questions or therapy guidance be handled by physicians. Numerous specialized pharmacy post-graduate residency programs, stewardship training certificate programs and additional certification exams are now available for pharmacists seeking to gain a greater knowledgebase in infectious diseases and antimicrobial stewardship. Additional post-graduate certifications and training are recommended by the IDSA guidelines as a best practice for a lead stewardship pharmacist.

Each of the individual elements of stewardship can be enhanced with a pharmacist’s assistance. The American Society of Health-Systems Pharmacists (ASHP) highlights areas where pharmacists are uniquely positioned to provide contributions to ASP programs. Each of the elements of stewardship are explored in greater detail below.

PROSPECTIVE AUDIT AND FEEDBACK

Prospective audit with direct intervention and feedback is one of the two main core strategies employed by AST programs. It allows for providers to make their own treatment decisions, but supplemented with input from the AST. It is thought that the education provided in these encounters may not only reduce inappropriate use for an individual patient, but the increase in knowledge can be applied to similar future encounters, thus decreasing the burden of inappropriate antimicrobial use. The pharmacists are uniquely situated to intervene using prospective audits, as their workflow includes chart review for appropriateness and indication when approving inpatient orders, filling outpatient prescriptions, or doing medication reconciliation as part of their daily activities in their practice site. Pharmacists can promote optimal use of antimicrobials through individualized patient dosing when intervening on medication issues.

FORMULARY RESTRICTION AND PREAUTHORIZATION REQUIREMENTS

The second core strategy of many AST programs includes formulary restriction and preauthorization of selected antimicrobials. These interventions may lead to immediate reductions in use and the costs associated with these selected antimicrobials. Restrictions, additions, deletions to Formulary in the inpatient setting, development of drug therapy and disease state guidelines or pathways for appropriate use of antimicrobials are generally handled as part of the duties of the Pharmacy and Therapeutics (P&T) Committee. All of these interventions are important components to promote optimal antimicrobial use. Pharmacist involvement for shepherding stewardship initiatives is vital to achieve the needed buy-in from members of the P&T Committee who may not have a level of comfort or understanding of the elements of stewardship.

The literature cites as supporting evidence of Formulary restriction, a study published by Gross, et al, focused on the clinical and economical outcomes of their stewardship program. They highlighted that their stewardship team consisting of a clinical pharmacist and an infectious diseases attending physician who reviewed requests for restricted antimicrobials was “more effective than an off-hours approval by infectious diseases fellows in recommendation appropriateness (87% vs 47%; P < .001), cure rate (64% vs 42%; P = .007), and treatment failures (15% vs 28%; P = .03).”

EDUCATION

Education targeting patients and the general public about antimicrobial stewardship is an important piece in the stewardship armamentarium to combat inappropriate use.
a recent Gallup poll, pharmacists were noted to be ranked among the most honest and ethical professionals. They were ranked second, with a 67% rating of “high” or “very high” ethical standards, second only to nurses in a survey of which 1028 US residents responded. In an era where misinformation is rampant, and dissemination of factual information is imperative, pharmacists fulfill an important role in the community to provide unbiased and scientifically accurate information to their patients. Noting the importance of community education, the CDC has created educational literature as part of the Get Smart about Antibiotics campaign that is specifically designed for use in community pharmacy practice. The CDC’s recently released Core Elements of Outpatient Antimicrobial Stewardship again highlights the importance and impact of pharmacist involvement for a successful stewardship program.

PHARMACY-DRIVEN INTERVENTIONS

Automatic IV to oral substitution for selected antimicrobials with excellent oral bioavailability is an intervention that is commonly cited in the stewardship literature as having a positive impact on not only use of antimicrobials, but also a reduction in harm and costs associated with intravenous administration of antimicrobials. For many disease states, an oral option is not only safe and effective, but it is highly appropriate. Antimicrobials such as fluoroquinolones, linezolid, and fluconazole are excellent targets for and automatic substitution protocol completed by a pharmacist. Protocols containing these drugs and others are well described in the literature and are associated with decreased length of stay, reduced treatment complications and increase cost savings. Additional pharmacist-driven initiatives include; individualized dose adjustments for patients with organ dysfunction (e.g. renal or hepatic adjustment), dose optimization based on therapeutic drug monitoring, and detection and prevention of antibiotic-related drug-drug interactions. Pharmacists may also help with drug selection to avoid unnecessarily duplicative therapy in patients simultaneously receiving multiple agents, or suggesting alternatives when a desired medication may be unavailable due to drug shortage. Use of automated alerts to highlight situations such as duplicate therapies with overlapping spectra can be reviewed and actioned on by a trained pharmacist, thus allowing higher acuity interventions to be assessed by the infectious diseases physician. Time-sensitive indications, especially antibiotics administered for surgical prophylaxis can be monitored for discontinuation by pharmacists.

REGULATORY COMPLIANCE

The elements of performance for the Joint Commission (TJC) Medication Management Standard for Antimicrobial Stewardship prescribe that a pharmacist be included on an AST. Pharmacy involvement helps to ensure compliance with the standards set by various regulatory agencies, not limited to TJC and Centers for Medicare and Medicaid Services (CMS). In addition to compliance, collection and evaluation of antimicrobial utilization data is vitally important for assessing the impact of your stewardship interventions. The data associated with length of therapy and tonnage of antimicrobials used resides with the Pharmacy department. Working closely with pharmacists to review use patterns and report metrics on use will be at the forefront as mandatory reporting of antimicrobial use to the National Healthcare Safety Network (NHSN) by inpatient stewardship programs is anticipated by the end of 2018.

The role of the pharmacist in an individual AST will vary based upon the structure and needs of the individual organization. However, the guidance on stewardship from IDSA, CDC, SHEA, ASHP and other key stakeholders makes it abundantly clear that a pharmacist is a resource that is vital to the success of any antimicrobial stewardship team. As antimicrobials become an increasingly scarce resource, it will be imperative to have the input from our pharmacy professionals to guide us in these increasingly challenging times.

References


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Antimicrobial Stewardship Metrics: Prospective Audit with Intervention and Feedback

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INTRODUCTION
Prospective audit with intervention and feedback (PAIF) is one of two core antimicrobial stewardship program (ASP) strategies recommended by the Infectious Diseases Society of America (IDSA) and Society for Healthcare Epidemiology of America.1 The PAIF strategy consists of a case-by-case review of patients prescribed antibiotics, typically by an infectious diseases (ID) physician or clinical pharmacist. Cases are reviewed for antibiotic appropriateness and feedback is delivered directly to the provider caring for the patient, with the goal of improving antibiotic use while minimizing unintended consequences such as bacterial resistance and adverse effects. A PAIF can be employed in a variety of ways depending on the healthcare setting (inpatient vs. outpatient), available resources, and can target a variety of interventions (e.g. duplicate antibiotic coverage, unnecessary antibiotic use, dose adjustments, route changes, indication/infection-specific, treatment duration). While PAIF can be costly and labor intensive, providers are able to maintain their prescribing autonomy. In addition, PAIF allows the antimicrobial stewardship team to provide education to prescribers at the time of intervention.1 In this article, we review PAIF in various healthcare settings including inpatient acute care hospitals, long-term care facilities, and outpatient settings.

INPATIENT ACUTE CARE HOSPITALS
The first ASP guidelines were primarily focused on the establishment of antimicrobial stewardship (AMS) strategies in inpatient acute care settings.2 In comparison to outpatient settings, the implementation of AMS strategies in acute care settings is easier since members of the AMS team, provider, and patient are usually in the same location. Published literature on the implementation of PAIF has shown this strategy to improve antibiotic utilization and reduce antibiotic resistance, without negatively affecting patient outcomes.2,3,4 A 7-year prospective study evaluated the impact of a limited PAIF on patients receiving parenteral third-generation cephalosporins, aztreonam, parenteral fluoroquinolones, or imipenem. It noted a 22% decrease in the use of parenteral broad-spectrum antibiotics nosocomial C. difficile infections, and nosocomial resistant Enterobacteriaceae.

The structure of PAIF can vary depending on the resources of the practice setting. One study prospectively evaluated the impact of two different PAIF methods compared to no PAIF in adult intensive care units (ICU).4 The first PAIF method involved an ID specialist physician who communicated with the ICU team via the ICU pharmacist. The second PAIF included the ID physician participating in interdisciplinary ICU rounds three times a week with the ICU pharmacist participating daily. Both PAIF methods resulted in improved rates of appropriate antimicrobial selection and lower frequencies of resistance emergence compared to no PAIF. This study demonstrated that different PAIF methods improve antibiotic use without any deleterious effects. Another study conducted in a 253-bed community hospital using limited resources demonstrated a 64% reduction in antibiotic days of therapy per 1000 patient-days and a 37% decrease in antibiotic expenditures.

In the inpatient setting, clinical decision support software (CDSS) systems are also utilized to assist in PAIF. These systems are able to target specific patient populations, antibiotics, or culture results based on the needs of the ASP. A study, utilizing CDSS to target patients who were on redundant antibiotic combinations, found that CDSS decreased the number of patients requiring review by 84% and of the patients reviewed, an intervention was made in 71%. Recommendations to discontinue redundant therapy were accepted in 98% of cases. This study involving 137 patients concluded an annualized cost savings of approximately $48,000. While PAIF can be labor intensive, adopting a computerized support system can increase efficiency and maximize intervention opportunities.

PAIF allows for a multidisciplinary approach to optimize patient care and enhance appropriate antibiotic use in the inpatient setting. The implementation of PAIF is one of the most valuable strategies in a comprehensive ASP.

LONG-TERM CARE FACILITIES (LTCFS)
Antimicrobials represent almost half of all prescriptions in LTCFs, and approximately 50%-70% of residents receive at least one antibiotic course annually.5 Many of these prescriptions, unfortunately, represent overuse or inappropriate use of antibiotics.5 The implementation of PAIF can likely improve antibiotic use in LTCFs.

Limited published evidence is available for determining
the most effective AMS strategies in LTCFs, and even fewer studies specifically evaluate PAIF. A prospective quasi-experimental study implementing an ASP team consisting of an ID-trained pharmacist and physician targeted urinary tract infections [UTIs] at three community LTCFs. Two seven-month phases included baseline data collection on facility-level antimicrobial utilization and susceptibility patterns, followed by an intervention phase with weekly site visits by the ID pharmacist who conveyed recommendations to the primary treating provider via telephone or fax. Only 8% of cases initiated in the acute care setting or the entire antibiotic course was completed in between the weekly visits. A therapy change recommendation was made in 38% of those reviewed, but only 10% (25%) were accepted. The most common recommendations included discontinuing antibiotics [24%], shortening the course [11%] and streamlining therapy [2%]. Despite the low acceptance rate, an immediate 26% decrease in UTI antibiotic prescriptions was seen during the intervention phase with a 6% reduction continuing through the rest of the period [95% CI -8 to -3%], and an immediate 25% reduction in all antibiotic prescriptions with a continued 5% reduction throughout the phase. The authors concluded that this approach has the potential to be effective but also identified many barriers which need to be overcome in order for the PAIF strategy to be successful in LTCFs.

One barrier identified in this study was the difficulty in establishing relationships with prescribers in this setting. Lack of a prior provider-to-provider relationship and the absence of face-to-face interaction are limitations in LTCFs since much of the medical care occurs remotely. Provider buy-in and recommendation acceptance can prove challenging if this relationship deficiency exists. The addition of educational seminars, face-to-face meetings and collaboration in design of the program with an identified ASP champion from within the LTCF may help strengthen the benefits of a PAIF strategy.

Secondly, there were many missed opportunities for intervention with an antibiotic review completed once weekly. Since duration of therapy for UTI is often 7 days or less, many treatment courses were completed in between the weekly review or close to completion, and feedback to providers was not provided in these cases [81% of opportunities]. If a once weekly frequency is all that is feasible, feedback to providers on completed antibiotic courses should be attempted in an effort to broadly change prescribing habits for future cases. An ASP with more frequent review might prove to be more useful, though this is unlikely to be feasible with limited resources and general unavailability of ID physicians and pharmacists in LTCFs. Although utilization of ID specialists for PAIF would be ideal, involving any physicians, mid-level practitioners, pharmacists or nurses trained in antimicrobial stewardship to act as peer champions may be a more practical approach. Fortunately, there are AMS certification or informal training programs which provide learning opportunities for interested practitioners. Additional ways to improve access to ID specialists include sharing consultants amongst facilities, utilizing telemedicine, and partnering with local hospitals or academic medical centers which may be able to incorporate LTCF activities into medical and pharmacy residency and student training.

While once weekly PAIF is already less than ideal, even this frequency may not be feasible in many LTCFs. In most cases, a comprehensive medication review is completed by a consultant pharmacist once per month on each resident. While this method could be used to provide a retrospective review with feedback to providers for future case improvement, prospective audit at this frequency would likely be a futile effort. Many LTCFs use central pharmacies which fill prescriptions for several institutions. With additional AMS training, central-fill pharmacists are in a unique position to ensure the antibiotic has an appropriate indication, dose, duration and is the best choice for the resident based on the facility’s antibiogram and treatment pathways, however, these pharmacists likely lack protected time for these activities and often do not have access to resident medical records which would be necessary requirements for them to play a role in PAIF.

Aside from limited personnel resources, the availability of antibiotic use data could be a challenge in some LTCFs. An electronic record with the ability to generate reports [e.g. active antibiotic orders, antibiotics completed within the last 48 hours, etc.] could serve as an ideal system for identifying opportunities; however, some LTCFs still utilize paper records or electronic systems without robust reporting capabilities. In such cases, the ASP clinician would need to rely on manual tracking mechanisms often filled out by nursing personnel which may be incomplete and add an additional task to nursing’s daily workload.

Lastly, family expectations are an important barrier to primary provider acceptance of PAIF recommendations. Providers report feeling pressured by nursing staff, residents and families to send urinalyses and cultures for indications such as cloudy urine or temporary behavioral changes, and to prescribe antibiotics. A recent study of 35 Boston-area nursing homes reported increased antibiotic use [adjusted OR 3.43, 95% CI 1.94-6.05] and hospital transfer [adjusted OR 3.00, 95% CI 1.19-7.53] when health care proxies were involved in decisions on residents with advanced dementia. It is therefore extremely important to involve families, residents and nurses in educational opportunities discussing the risks associated with antibiotic misuse in order to increase the acceptance of PAIF recommendations in LTCFs.
OUTPATIENT

The Centers for Disease Control recently reported that approximately half of outpatient antibiotic prescribing may be suboptimal, due to antibiotic selection, dosing and duration, and at least 30% of prescriptions are unnecessary. With this much room for improvement, there may be opportunity for a PAIF strategy, although data regarding how best to implement this on the outpatient side is even more lacking than in LTCFs. Audit and feedback strategies in outpatient clinics have been described with success in decreasing antibiotic misuse; however, these mechanisms utilize retrospective data and peer prescriber comparisons as feedback mechanisms. A truly prospective mechanism in which a member of an ASP provides patient-specific recommendations to outpatient providers in real time is not well described.

Pharmacists in community dispensing pharmacies could play a role in PAIF; however, pharmacy business models would need to change before this type of activity could occur. These pharmacists are not allotted time for clinical activities, lack access to clinic medical records, and usually do not have an established relationship with prescribers unless a collaborative practice agreement is in place. While these pharmacists can play a vital role in counseling patients regarding their prescribed antibiotic, large drugstore companies need to invest in AMS nationwide efforts before community pharmacists could truly participate in PAIF.

Opportunities for PAIF in the outpatient setting may exist with ambulatory care pharmacists. Many clinic settings now have pharmacists on site to provide medication therapy management services. With additional training in AMS, these pharmacists could serve as clinic ASP champions along with a physician or mid-level practitioner and may be able to develop mechanisms to evaluate antibiotic prescriptions prior to patients leaving the office visit. Similar barriers as discussed above in LTCFs could be identified, including reporting abilities in electronic records, lack of ID training and expertise, protected time to perform these services, and patient and family pressure to prescribe antibiotics.

As AMS efforts expand beyond acute care hospitals, it is critical that LTCFs and outpatient practices start thinking outside the box to implement important strategies such as PAIF.

References


Disclaimer

The views expressed herein are those of the authors and do not necessarily reflect the views of The Miriam Hospital and Kent Hospital.

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**Antimicrobial Stewardship Program Perspective: IV-to-PO Switch Therapy**

CHESTON B. CUNHA, MD, FACP

**INTRODUCTION**

In the past, initial antibiotic therapy was via the intravenous (IV) route. Over the years, there has been increased confidence and experience with oral (PO) antibiotic therapy. The preferred antibiotics used for PO therapy are those with excellent GI absorption, i.e., high bioavailability (> 90% absorption). Given the pharmacokinetic (PK) and pharmacodynamic (PD) properties of selected oral antibiotics, there has been widespread acceptance of “transitional antibiotic therapy,” now known as IV-to-PO switch therapy. Early experience with this therapy demonstrated that some or most antibiotic therapy in hospital could be transitioned to PO following initial IV therapy. It became clear that patients treated with IV-to-PO therapy for common infectious diseases, e.g., community acquired pneumonia (CAP) had comparable outcomes/cure rates to patients treated with entirely IV courses of antibiotics. Therefore, it became evident that a key element of antibiotic stewardship programs (ASP) is to support IV-to-PO switch therapy. Currently, IV-to-PO switch therapy is a key component of ASP hospital IV-to-PO switch initiatives. The basis of the interchangeability of IV and equivalent PO antibiotics is obvious, i.e., if, at any given dose, serum/tissue levels are the same as IV, outcomes are the same. This most easily applies to IV and PO formulations of the same antibiotics, e.g., 100 mg of doxycycline IV/PO, 500 mg levofloxacin IV/PO or 400 mg of moxifloxacin IV/PO. Since serum/tissue time curves are the same, the why not use PO antibiotic therapy whenever possible if outcomes are the same? There are only two clinical scenarios where IV therapy may be preferred to PO therapy. Obviously, even when using antibiotics with high bioavailability (> 90%) effectiveness may be less if GI absorption is decreased. The other clinical situation is that of the “septic patient” who may succumb within an hour of initiating treatment. In this setting, initial IV therapy is preferred. After clinical response to the initial IV antibiotic, its PO equivalent may then be used to complete/therapy.

**IV-TO-PO SWITCH THERAPY USING THE SAME ANTIBIOTIC CLASS**

The easiest IV-to-PO antibiotic switch therapy for various infections is using antibiotics with both IV and PO formulations. Highly bioavailable PO antibiotics are clinically equivalent to their IV formulations. Commonly used antibiotics with dose equivalent PO and IV formulations are presented with their respective bioavailabilities in tabular form. Since PO = IV, antibiotic regimens that begin

<table>
<thead>
<tr>
<th>Oral Antibiotic therapy</th>
<th>Advantages</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower antibiotic acquisition cost (at same dose)</td>
<td>Avoid if markedly impaired gastrointestinal absorption</td>
<td></td>
</tr>
<tr>
<td>No IV antibiotic administration costs ($10/dose)</td>
<td>If therapeutic effect is needed in &lt; 1 h (patient in shock), begin therapy intravenously (IV) and later switch to oral (PO) to complete therapy</td>
<td></td>
</tr>
<tr>
<td>Rapid gastrointestinal absorption (~ 1 h even in critical ill patients)</td>
<td>Eliminates phlebitis and IV line related infections</td>
<td></td>
</tr>
<tr>
<td>Decreases length of stay (LOS)</td>
<td>Patients pleased with earlier discharge</td>
<td></td>
</tr>
</tbody>
</table>

**Table 1. Clinical and Pharmacoeconomic Advantages of Oral Antibiotic Therapy**

<table>
<thead>
<tr>
<th>Bioavailability</th>
<th>Antimicrobials</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excellent (&gt; 90%)</td>
<td>Amoxicillin</td>
</tr>
<tr>
<td></td>
<td>Cephalexin</td>
</tr>
<tr>
<td></td>
<td>Cefprozil</td>
</tr>
<tr>
<td></td>
<td>Cefadroxil</td>
</tr>
<tr>
<td></td>
<td>Clindamycin</td>
</tr>
<tr>
<td></td>
<td>Quinolones</td>
</tr>
<tr>
<td></td>
<td>Chloramphenicol</td>
</tr>
<tr>
<td></td>
<td>Linezolid</td>
</tr>
<tr>
<td></td>
<td>Tedizolid</td>
</tr>
<tr>
<td></td>
<td>Isavuconazole</td>
</tr>
<tr>
<td></td>
<td>Voriconazole</td>
</tr>
<tr>
<td></td>
<td>Rifampin</td>
</tr>
<tr>
<td></td>
<td>Isoniazid</td>
</tr>
<tr>
<td></td>
<td>Pyrazinamide</td>
</tr>
</tbody>
</table>

| Good (60 – 90%) | Cefixime | Valacyclovir |
|                | Cefpodoxime | Famciclovir |
|                | Ceftibuten  | Valganciclovir |
|                | Cefuroxime  | Macrolides |
|                |            | Cefaclor |
|                |            | Nitrofurantoin |
|                |            | Ertapenem |
|                |            | 5-Flucytosine |
|                |            | Posaconazole |
|                |            | Itraconazole (solution) |
|                |            | Nitazoxanide (with food) |

| Poor (< 60%) | Vancomycin | Cefdinir |
|             | Acriflavine | Cefditoren |
|             |            | Nitazoxanide (without food) |
|             |            | Fosfomycin |

<table>
<thead>
<tr>
<th>Bioavailability</th>
<th>Antimicrobials</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poor (&lt; 60%)</td>
<td>Vancomycin</td>
</tr>
<tr>
<td></td>
<td>Acriflavine</td>
</tr>
<tr>
<td></td>
<td>Nitazoxanide (without food)</td>
</tr>
</tbody>
</table>
with an IV antibiotic may be switched to its PO equivalent at any time during therapy, i.e., usually after clinical response/defervesce or after 72 hours.\textsuperscript{17-20}

**GIVEN ANY DOSE, IV-TO-PO SWITCH USING ANTIBIOTICS FROM DIFFERENT ANTIBIOTIC CLASSES**

IV-to-PO switch therapy using the same antibiotic, e.g., IV-to-PO levofloxacin is straightforward. However, if there is no oral formulation of a particular antibiotic, the ASP infectious disease [ID] clinician can advise which PO antibiotic will provide equivalent therapy. Often, a different class of antibiotic is used at a different dose. For example, if initial IV therapy for an uncomplicated methicillin sensitive \textit{S. aureus} (MSSA) skin abscess is with cefazolin, then IV to PO switch is best accomplished with cephalexin. Spectrum and activity of both are comparable, but differ in PK/PD aspects. Comparing the peak serum levels after cefazolin IV dose of 1 gram peak serum levels are \( \sim 185 \) mcg/ml. This is clearly far in excess above the minimal inhibiting concentration [MIC] for MSSA, i.e., usually < 1 mcg/ml. Therefore, as long as serum levels exceed the MIC of MSSA, with an equally active drug against MSSA, e.g., cephalexin [serum levels of 18 mcg/ml], PO therapy should be more than adequate [if the skin abscess is not yet encapsulated requiring incision and drainage in addition to antibiotic therapy]. Other oral [2\textsuperscript{nd} and 3\textsuperscript{rd} generation] cephalosporins are less active than cephalexin against MSSA, and for this reason (not PK/PD related), it is preferable to use cephalexin.\textsuperscript{2,21,22}

The same principle pertains in treating cellulitis due to group A streptococci (GAS) with initial ceftriaxone IV therapy. Since there is no PO formulation of ceftriaxone, an antibiotic with a comparable anti-GAS spectrum and activity may be used. The MIC for GAS is lower than with MSSA, i.e., \(-0.1\) mcg/ml. Once again, cephalexin is preferred since a 1-gram (PO) dose results in peak serum levels of 18 mcg/ml, more than sufficient to effectively treat GAS cellulitis.

**ANTIBIOTIC SPECTRUM AND ACTIVITY CONSIDERATIONS**

Before initiating PO therapy, practitioners must be sure that different class antibiotics [IV ~ PO] have the same spectrum and a high degree of activity against the target pathogen. The PO drug equivalent need not achieve the serum level of the IV antibiotic, but serum levels should exceed the MIC of the pathogen.\textsuperscript{2,4}

The most difficult concept for non-infectious disease practitioners to comprehend is that antibiotic susceptibility is not the same as activity. Comparing the relative activity of two different antibiotics, that are susceptible against the same organism, it is often believed in error, that the antibiotic with the lower MIC is more active and therefore preferable. Instead, the ratio of the MIC to achievable serum levels [drug serum levels can be found in chapter 11 of reference 2] of different antibiotics must be compared. All other things being equal, the drug with a serum level of 20 mcg/ml and an MIC of 1 (20:1) is more active than one with an MIC of 0.5 mcg/ml and a peak serum level of 1.5 mcg/ml (3:1).

Another key concept to be aware of is the difference between \textit{in vitro} susceptibility and \textit{in vivo} effectiveness. For example, TMP-SMX is \textit{in vitro} susceptible to GAS and MSSA/MRSA. Clinical experience has shown that TMP-SMX is suboptimal against GAS and MRSA, but is excellent clinically against MSSA. Doxycycline is commonly reported as MRSA susceptible. However, with MRSA soft tissue abscesses, doxycycline frequently fails clinically. In spite of susceptibility, its use creates its own inactivation/resistance. For these reasons, minocycline is preferable to doxycycline for MRSA.\textsuperscript{23-25} \textsuperscript{[Table 3]}

**Table 3. Antibiotic-Organism Combinations for Which In Vitro Susceptibility Testing Does Not Predict In Vivo Effectiveness**

<table>
<thead>
<tr>
<th>Antibiotic</th>
<th>“Susceptible” Organism</th>
</tr>
</thead>
<tbody>
<tr>
<td>Penicillin</td>
<td>H. influenzae, Yersinia pestis, VSE*</td>
</tr>
<tr>
<td>TMP-SMX</td>
<td>Klebsiella, VSE, Bartonella</td>
</tr>
<tr>
<td>Polymyxin B</td>
<td>Proteus, Salmonella</td>
</tr>
<tr>
<td>Imipenem</td>
<td>Stenotrophomonas maltophilia</td>
</tr>
<tr>
<td>Vancomycin</td>
<td>Erysipelothrix rhusiopathiae</td>
</tr>
<tr>
<td>Gentamicin</td>
<td>Mycobacterium tuberculosis</td>
</tr>
<tr>
<td>Aminoglycosides</td>
<td>Streptococci, Salmonella, Shigella</td>
</tr>
<tr>
<td>Clindamycin</td>
<td>Fusobacteria, Clostridia, Listeria</td>
</tr>
<tr>
<td>Macrolides</td>
<td>P. multocida</td>
</tr>
<tr>
<td>1st, 2nd generation cephalosporins</td>
<td>Salmonella, Shigella, Bartonella</td>
</tr>
<tr>
<td>3rd, 4th generation cephalosporins</td>
<td>Listeria, Bartonella, MRSA†</td>
</tr>
<tr>
<td>Quinolones</td>
<td>MRSA†</td>
</tr>
</tbody>
</table>

\*In spite of apparent \textit{in vitro} susceptibility of antibiotics against MRSA, only vancomycin, minocycline, quinupristin/dalfopristin, linezolid, tedizolid, daptomycin, ceftaroline fosamil, telavancin, dalbavancin, ortavancin, and tigecycline are \textit{effective in vivo}.

\*Effective penicillin therapy for systemic enterococcal infections due to VSE requires an amino-glycoside, e.g., gentamicin.


**ADVANTAGES OF ANTIBIOTIC PO THERAPY: BEYOND IV-TO-PO SWITCH**

Practitioners are slow to change practice habits.\textsuperscript{2,4} Clinical logic and reasoning should be considered while gaining the confidence that comes from successful experience. Such is
Table 4. Oral Antibiotic Therapy of Selected Infectious Diseases

<table>
<thead>
<tr>
<th>Acute infections</th>
<th>Subacute/chronic infections</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anthrax</td>
<td>Q fever</td>
</tr>
<tr>
<td>Plague</td>
<td>Brucellosis</td>
</tr>
<tr>
<td>Tularemia</td>
<td>Leptospirosis</td>
</tr>
<tr>
<td>Rocky Mountain spotted fever (RMSF)</td>
<td>Nocardia</td>
</tr>
<tr>
<td>Typhoid fever</td>
<td>Actinomycosis</td>
</tr>
<tr>
<td>Legionnaire's disease</td>
<td>Melioidosis</td>
</tr>
<tr>
<td>Diphtheria</td>
<td>Bartonellosis</td>
</tr>
<tr>
<td>Vibrio vulnificus</td>
<td>Lung abscesses†</td>
</tr>
<tr>
<td>Cholera</td>
<td>Liver abscesses†</td>
</tr>
<tr>
<td>Clostridium difficile</td>
<td>Intraabdominal abscesses†</td>
</tr>
<tr>
<td>Pneumocystitis (jiroveci) carinii pneumonia (PCP)</td>
<td>Pelvis abscesses†</td>
</tr>
<tr>
<td>Malaria</td>
<td>Renal abscesses†</td>
</tr>
<tr>
<td>Lyme disease</td>
<td>Sinusitis</td>
</tr>
<tr>
<td>(neuroborreliosis, myocarditis)</td>
<td></td>
</tr>
<tr>
<td>Febrile neutropenia</td>
<td>Pyelonephritis</td>
</tr>
<tr>
<td>Nosocomial pneumonia</td>
<td>Prostatitis</td>
</tr>
<tr>
<td>Acute bacterial endocarditis in IVDAs (MRSA)</td>
<td>Complicated skin/soft tissue infections (cSSSI)</td>
</tr>
<tr>
<td></td>
<td>Osteomyelitis</td>
</tr>
<tr>
<td></td>
<td>Pulmonary and extrapulmonary TB</td>
</tr>
</tbody>
</table>

† may also require abscess drainage

the case with entirely PO antibiotic therapy, i.e., if IV-to-PO switch is good [and it is], PO only is even better!5,6 [Table 4]
Antibiotic PO only therapy is the next step beyond IV-to-PO switch therapy. If with CAP, after initial 3 days of IV therapy and the next 11 days [total therapy IV/PO = 14 days] PO only therapy is not inferior to 14 days of IV therapy. Excluding immediate life threatening infection, it is not a great leap of faith to treat for the full course entirely with a PO antibiotic. Antibiotic PO therapy, using antibiotics with high bioavailability > 90%, e.g., levofloxacin, moxifloxacin, doxycycline for PO therapy should be used as often as possible for CAP. Entirely PO therapy results in shorter LOS and earlier discharge. The patient goes home earlier and is not burdened by home IV therapy and eliminates IV associated phlebitis or IV line infections. Furthermore, as with IV-to-PO therapy, the cost of PO antibiotic therapy is markedly less than for equivalent IV therapy. Antibiotic cost is always much lower PO [except with linezolid] than IV [at the same dose]. There are no IV administration costs [which may exceed the cost of the IV antibiotic] with PO therapy. While certain PO medications may result in GI upset, this is usually manageable and should not dissuade providers from using PO therapy whenever possible. Risk of C. difficile is antibiotic specific and there is no difference in risk whether the IV or PO route is selected. However, many PO options, e.g. doxycycline, are C. difficile protective. In short, entirely PO antibiotic therapy for nearly all outpatient and inpatient infections [non-septic] is clinically equivalent and preferred for the above reasons to IV therapy.2-6

As experience increases, confidence in entirely PO antibiotic therapy will become as established and accepted as the PO component of IV-to-PO switch therapy. In ASPs, oral therapy is to the natural extension of antibiotic IV-to-PO switch therapy.

References


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Infection Control and Antimicrobial Stewardship

JOHN R. LONKS, MD

ABSTRACT
Infection Control measures can reduce the transmission of bacteria in the hospital. Reduction in the use of antibiotics via Antimicrobial Stewardship programs can reduce antibiotic resistance. The combination of Infection Control measures and Antimicrobial Stewardship can lead to a greater reduction in antibiotic resistant bacteria.

KEYWORDS: infection control, antimicrobial stewardship, antibiotic resistance, Clostridium difficile

Infection control involves preventing the transmission of infectious agents from patient-to-patient, patient-to-staff, staff-to-patient, visitor-to-patient, visitor-to-staff, etc. Commonly encountered infectious agents include viruses and bacteria. Among the bacteria some are antibiotic susceptible and others resistant. During the 1980s with concern for transmission of the HIV in healthcare settings, universal precautions was developed. The concept of universal precautions is such that any patient should be considered potentially infectious without having direct evidence of infection because patients may be asymptomatic yet seropositive.1 Over time the concept of considering all patients as potentially infectious has evolved into the practice of Standard Precautions.2

During the 1970s and 1980s methicillin-resistant Staphylococcus aureus (MRSA) started to emerge in the hospital setting. S. aureus is a gram-positive bacterium. About 30% of adults at any given time are colonized with S. aureus. Some people are transiently colonized, others are colonized for a prolonged period. S. aureus may be methicillin susceptible or methicillin resistant. One of the strategies to reduce the transmission of MRSA in hospitals is the use of Contact Precautions. Contact Precautions involves the use of gowns and gloves upon entry into the patient’s room. Gowns and gloves protect healthcare workers from contaminating their hands or clothing. Gowns and gloves are removed when exiting a patient’s room, hands are then cleaned; thus, preventing the transmission of bacteria from one patient to another.

During the late 1980s and early 1990s vancomycin resistant enterococcus (VRE) emerged. The use of Contact Precautions was recommended for the prevention of transmission of VRE. Additionally, the prudent use of vancomycin was recommended including situations in which vancomycin use should be discouraged.3 This recommendation was probably based upon the concept that the use of antibiotics may drive antibiotic resistance.

Community-acquired MRSA emerged during the late 1990s. This was initially noticed among pediatric patients who had no predisposing risk factor for MRSA.4 Treatment failure and deaths occurred among children empirically treated with a beta-lactam antibiotic.5 Soon thereafter there was an emergence of community-acquired MRSA among children and adults in the United States. With the emergence of community-acquired MRSA there was an increase in the empiric use of vancomycin.

Hospital-acquired Clostridium difficile is a serious problem. A recent study using data from 10 geographically distinct areas in the United States showed that C. difficile is the most common hospital-acquired pathogen, more common than S. aureus.6 Pseudomembranous colitis associated with antibiotic use was recognized during the 1950s and 1960s. C. difficile was identified as the causative agent of antibiotic-associated pseudomembranous colitis in 1978.7 C. difficile is a gram-positive rod that produces two different toxins, toxin A and toxin B. It is the toxin that causes pseudomembranous colitis and the clinical symptom of diarrhea.

Antibiotic treatment disrupts the normal flora of the intestinal tract allowing C. difficile to grow and produce toxins. Early on it was noted that pseudomembranous colitis due to C. difficile was associated with the use of clindamycin.7 Since that time other antibiotics, including the third-generation cephalosporins and fluoroquinolones, were identified as a risk for the development of C. difficile infection. Third-generation cephalosporins, fluoroquinolones and clindamycin are associated with a higher risk while penicillin, tetracyclines, trimethoprim/sulfamethoxazole are associated with a lower risk of developing C. difficile infection.8–10 From an Antimicrobial Stewardship point of view, antibiotics with a lower risk of developing C. difficile are preferable to other antibiotics provided they have the same clinical efficacy. Hence, strategies to reduce C. difficile infection include reduction of the total use of antibiotics and when an antibiotic is necessary then choose an antibiotic that has a lower risk for the development of C. difficile. Infection Control practices used to reduce the transmission of C. difficile include Contact Precautions, daily room cleaning and using cleaning agents that are sporidal, for example, sodium hypochlorite.
There is a quantitative association between antibiotic use and antibiotic resistance. From a conceptual point of view, it seems plausible that a very low use of an antibiotic would not drive antibiotic resistance and a very high use of an antibiotic could lead to high rates of resistance.

Reducing the use of an antibiotic can reduce the rate of resistance to that antibiotic. In one hospital, an 80% reduction of third-generation cephalosporin use was associated with a 44% reduction of the rate of ceftazidime resistance among *K. pneumoniae*. In Finland, the outpatient reduction in the use of macrolide antibiotics (erythromycin, azithromycin, clarithromycin, roxithromycin) was associated with a reduction in the rate of macrolide resistance among Group A streptococci. Hence, reduction in use of a specific antibiotic or class of antibiotic can lead to a reduction in the rate of resistance. However, in the ceftazidime-resistant *K. pneumoniae* study, there was an increase in the use of imipenem, a carbapenem, that was associated with an increase in the rate of imipenem resistance among *Pseudomonas aeruginosa*, and in the macrolide-resistant group A streptococcus study the reduction in the use of macrolide antibiotics was compensated for by using other antibiotics. Hence, reducing antibiotic use may lead to a decrease in resistance, however, this reduction should not be compensated for by using another antibiotic.

The exact magnitude of the impact of the use of infection control practices such as contact precautions involving the use of gowns and gloves on the transmission of certain bacteria including MRSA, VRE and ESBL has not been fully elucidated. Additionally, it seems as if transmission, albeit at a lower rate, still occurs despite these efforts. Another or an additional approach would be to decrease the amount of antibiotic use that occurs in healthcare settings. By decreasing and possibly eliminating the use of antibiotics may help decrease the transmission of resistant bacteria in the hospital.

The rate of prescription of antibiotics for acute respiratory tract infections in the outpatient setting decreased from 1995 to 2006. There was a 36% reduction in antibiotic prescription for acute respiratory tract infections in those less than 5 years and an 18% reduction among those 5 years of age and older. Although among adults there was an overall decrease in antibiotic prescription, the prescription of quinolones increased 5-fold. A Blue Cross Blue Shield report showed an overall 9% reduction in outpatient antibiotic prescription fill rate during the period 2010 to 2016. There was a 22% reduction among infants, 16% reduction among...
children and a 6% reduction among adults. Hence, there is some data showing a reduction in the use of antibiotics in the outpatient setting. A report from the CDC showed that 55.7% of hospitalized patients in that study received an antibiotic during their hospitalization. It was also shown that there could be a 37% improvement in the use of antibiotics in two specific areas, one area was selected urinary tract infections and other was the use of intravenous vancomycin.19 They also showed, using mathematically modeling, that a 30% reduction in the use of broad-spectrum antibiotics would lead to a 26% reduction in *C. difficile* infection.

A recent systematic review and meta-analysis showed that antimicrobial stewardship programs reduced the incidence of multidrug resistant gram-negative bacteria, ESBL producing gram-negative bacteria, MRSA and *C. difficile*. The combination of antimicrobial stewardship and infection control was more effective than antimicrobial stewardship alone.14

**SUMMARY**

Infection control measures can reduce the transmission of infectious agents such as multidrug resistant bacteria and *C. difficile* in the hospital. Antimicrobial stewardship can reduce the unnecessary or inappropriate use of antibiotics leading to a reduction in the prevalence of antibiotic resistance. Together, infection control measures and antibiotic stewardship can lead to a further decline in *C. difficile* and multidrug-resistant bacteria.

**References**


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Antimicrobial Stewardship in Community Hospitals
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ABSTRACT
Antimicrobial Stewardship Programs (ASP) help hospitals optimize antibiotic utilization, minimize the risk of developing antibiotic resistance and improve patients’ health outcomes. Community hospitals can successfully implement an ASP that incorporates CDC-defined core elements of hospital ASP. The antimicrobial stewardship model should be customized to leadership, available resources and targeted interventions.

KEYWORDS: Antimicrobial, stewardship, community hospital

INTRODUCTION
Antibiotic misuse is associated with antibiotic-related adverse events, toxicity, antibiotic resistance, *C. difficile* infection, and overall worse outcomes and mortality for patients. Antimicrobial Stewardship has been defined as “coordinated interventions designed to improve and measure the appropriate use of antibiotic agents by promoting the selection of the optimal drug regimen including dosing, duration of therapy, and route of administration.” 1 Optimization of antibiotic prescribing will improve patients’ safety and outcomes and secondarily deliver cost-effective therapy.

The implementation of Antimicrobial Stewardship Programs (ASP) across all health-care settings as an effort to promote appropriate antibiotic use and combat antibiotic resistance in the community has become a public health and national security priority in recent years.2 Effective January 2017, The Joint Commission required that all hospitals (including community hospitals) and nursing-care centers have ASP implemented.3 Expansion of antimicrobial stewardship interventions for all inpatient and eventually outpatient practices will ultimately result in better antibiotic use and reduce antibiotic resistance at a population level.

BENEFIT OF ASP IN COMMUNITY HOSPITALS
About half of patients admitted to the hospital receive an antibiotic during their hospital stay.4 The most common infections treated with antibiotics in hospitalized patients include respiratory infections, followed by urinary tract infections, and presumed gram-positive resistant infections. However, up to 50% of those antibiotics prescribed in hospitals are unnecessary4 Longer use than recommended, noninfectious or nonbacterial syndromes and treatment of colonizing or contaminating microorganisms are among the most common reasons of inappropriate inpatient antibiotic use.5 This data supports the crucial need of ASP in the inpatient setting.

Most of the evidence on the impact of antimicrobial stewardship derives from large tertiary academic centers. Multiple studies have demonstrated that antimicrobial stewardship interventions reduce unnecessary antibiotic use, shorten hospital stay, decrease the rates of *C. difficile* and nosocomial infections, decrease the prevalence of drug-resistant infection and reduce costs.1 Data from smaller community hospitals have shown similar outcomes (Table 1).

Table 1. Impact of Antimicrobial Stewardship in Community Hospitals

<table>
<thead>
<tr>
<th>Setting</th>
<th>Location</th>
<th>ASP Team</th>
<th>Intervention</th>
<th>Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>174-bed community teaching hospital 4</td>
<td>Boston, MA</td>
<td>ID physician, clinical pharmacist</td>
<td>Prospective audit and feedback, IV to PO conversion, use of practice guidelines, pharmacy restrictions and education</td>
<td>22% reduction in parenteral antibiotic use, significant decrease in <em>C. difficile</em> incidence (2.2 to 1.4 cases per 1000 patient-days), significant decrease in nosocomial infections by resistant Enterobacteriaceae.</td>
</tr>
<tr>
<td>120-bed community hospital 7</td>
<td>West Monroe, LA</td>
<td>ID physician, clinical pharmacist, infection control</td>
<td>Prospective audit and feedback</td>
<td>Reduction in total antimicrobial cost of 19% and total estimated savings of $177,000 over 1 year.</td>
</tr>
<tr>
<td>344-bed urban community hospital 8</td>
<td>Philadelphia, PA</td>
<td>Pharmacy team and database</td>
<td>Restriction of ceftriaxone and ceftazidime use</td>
<td>95% reduction of ceftriaxone use and 97% reduction in ceftazidime use, and a 22% (non significant) reduction in ESBL-EK* prevalence.</td>
</tr>
</tbody>
</table>
ASP STRUCTURE FOR COMMUNITY HOSPITALS

Community hospitals are responsible for a large portion of US health care. In 2015, over 70% of hospitals in the United States had less than 200 beds. These hospitals have similar rates of antibiotic use compared to large tertiary hospitals [median, 436 Days of Therapy/1000 patients-days]. However, less than half of community hospitals have implemented a structured ASP. 

ASP can be successfully implemented in community hospitals. The Infectious Diseases Society of America and the Society for Healthcare Epidemiology of America have published evidence-based guidelines for implementation of inpatient ASP. These guidelines are complemented by the Centers for Disease Control and Prevention (CDC) Core Elements required for a successful hospital ASP released in 2016 [Table 2]. Both documents emphasize the success of an ASP is defined by its leadership and a coordinated multidisciplinary approach. Ideally the team should be led by an infectious disease-trained physician and co-led by a pharmacist with experience in antimicrobial stewardship. Collaboration with the microbiology department, hospital infection control and epidemiology, clinical providers and information technology staff as well as support from the hospital administration and medical staff leadership are essential.

Most community hospitals have an assigned infection-control preventionist, on-site pharmacist and microbiology capabilities. But a singular ASP structure will not fit all medical facilities. Different ASP models have been proposed for specific community hospital settings (rural vs. urban vs. affiliated teaching facility). Targeted interventions should be customized to local needs, prescriber behaviors, hospital size, resources and barriers. A wide variety of antimicrobial stewardship interventions have been recommended, most of which have been implemented successfully in community hospitals [Table 3].

Successful incorporation of all CDC Core elements in community hospitals ASP can be challenging, particularly if there is no designated salary support for a physician leader or pharmacist. An initial crucial initial step in implementing an ASP team is engagement of the hospital administration to recognize antimicrobial stewardship as a quality and safety issue and a commitment to support the program. Then, based on the available resources, create the team. If the hospital does not have a dedicated infectious disease specialist to lead, it will be important to assign a local physician champion that can work with the local pharmacist to establish a formulary and review antimicrobial use and outcomes infectious diseases expertise. Additional actions will include assessment of resources, determine priority areas and decide which of the above-mentioned interventions will be feasible and most helpful. One of the initial activities should be to create a hospital antibiogram if it is not already available to identify current institutional-resistance patterns and individualize antibiotic choices. Tracking and reporting antibiotic use can be a difficult step to implement in community hospitals as the preferred metric to measure antibiotics (Days of Therapy or DOT) can be difficult to calculate and may limit successful reporting to the National Healthcare Safety Network [NHSN].

<table>
<thead>
<tr>
<th><strong>Table 2. CDC's Core Elements for Hospital ASP.</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Leadership Commitment</strong></td>
</tr>
<tr>
<td>Dedicated human, financial and information technology resources.</td>
</tr>
<tr>
<td><strong>Accountability</strong></td>
</tr>
<tr>
<td>Appointing a single leader responsible for program outcomes.</td>
</tr>
<tr>
<td>A physician with formal training in Infectious Diseases and/or antimicrobial stewardship will benefit the program.</td>
</tr>
<tr>
<td><strong>Drug Expertise</strong></td>
</tr>
<tr>
<td>Appointing a single pharmacist leader responsible for working to improve antibiotic use.</td>
</tr>
<tr>
<td><strong>Action</strong></td>
</tr>
<tr>
<td>Implementing specific interventions for ongoing evaluation of antibiotic treatment after initiation.</td>
</tr>
<tr>
<td><strong>Tracking</strong></td>
</tr>
<tr>
<td>Monitoring antibiotic prescribing and resistance patterns.</td>
</tr>
<tr>
<td><strong>Reporting</strong></td>
</tr>
<tr>
<td>Periodic measurement of antibiotic use by use of specific metrics and track clinical outcomes to report NHSN*, inpatient quality committees and feedback to providers and relevant staff.</td>
</tr>
<tr>
<td><strong>Education</strong></td>
</tr>
<tr>
<td>Educating clinicians about resistance and optimal prescribing.</td>
</tr>
</tbody>
</table>

*NHSN: National Healthcare Safety Network

ASP AND COMMUNITY HOSPITALS IN RI

In Rhode Island, there are 16 acute-care hospitals licensed by the Department of Health. The majority are non-federal short-term hospitals that serve a particular community. Nonetheless, 55–77% of Rhode Island’s hospitals have implemented ASP following the CDC’s Core Elements. Newport Hospital is a 129-bed non-teaching community hospital that offers acute care and community health services to Newport County, greater Rhode Island, and nearby Massachusetts. Newport Hospital has successfully established an antimicrobial stewardship program since 2014. The infectious disease specialist, an infection control RN and a clinical pharmacist form the antimicrobial stewardship team. Prospective audit and feedback is performed on a daily basis by the lead physician using Theradoc, a commercially-licensed software that allows active clinical surveillance. Alerts are preselected but not limited to detect drug-bug mismatches, indications for antimicrobial use, targeted drugs, targeted organisms, and renal dysfunction. Feedback focusing in antibiotic de-escalation, discontinuation of antibiotics if inappropriate or no longer necessary, and parenteral to oral conversion is provided, written in the patient’s chart or by direct verbal communication when
<table>
<thead>
<tr>
<th>Intervention</th>
<th>Description</th>
<th>Recommendation Grade*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Formulary restriction and pre-authorization</td>
<td>Physicians are required to request an approval before using certain antibiotics</td>
<td>Strong</td>
</tr>
<tr>
<td>Prospective audit and feedback</td>
<td>Daily review of antimicrobial use followed by direct feedback to prescribers.</td>
<td>Strong</td>
</tr>
<tr>
<td>Education</td>
<td>Didactic lectures and materials directed to medical, nursing, pharmacy staff and trainees focusing on appropriate use of antibiotics and antimicrobial stewardship interventions.</td>
<td>Weak</td>
</tr>
<tr>
<td>Facility-Specific Clinical Practice Guidelines</td>
<td>Guidelines that provide guidance on initial choice of antibiotics and duration of therapy for specific syndromes.</td>
<td>Weak</td>
</tr>
<tr>
<td>Syndrome specific interventions</td>
<td>Targeted toward specific infection syndromes and may include electronic order sets, recruitment of physician champions, and quarterly feedback to providers of compliance with the guidelines.</td>
<td>Weak</td>
</tr>
<tr>
<td>Interventions designed to reduce the use of antibiotics associated with a high risk of <em>Clostridium difficile</em> infection</td>
<td>Restriction of high-risk and broad spectrum antibiotics</td>
<td>Weak</td>
</tr>
<tr>
<td>Prescriber-led review strategies</td>
<td>Antibiotic time-outs, automatic stop orders, review of indications for antibiotic use when ordering are some of the strategies to encourage prescribers to perform routine review of antibiotic regimen.</td>
<td>Weak</td>
</tr>
<tr>
<td>Computerized Clinical Decision Support Systems</td>
<td>Implementation of computerized decision support systems for prescribers to facilitate interventions</td>
<td>Weak</td>
</tr>
<tr>
<td>Dedicated pharmacokinetic monitoring and adjustment program</td>
<td>For dose optimization of aminoglycosides. For dose optimization of vancomycin and cost effective dosing of B-lactam drugs.</td>
<td>Strong Weak</td>
</tr>
<tr>
<td>Parenteral to oral conversion strategies</td>
<td>Prompt transition to oral therapies</td>
<td>Strong Weak</td>
</tr>
<tr>
<td>Promote allergy assessments</td>
<td>Penicillin skin testing for patients with listed B-lactam allergies and desensitization strategies to enhance use of first-line agents.</td>
<td>Weak</td>
</tr>
<tr>
<td>Interventions to reduce the length of antibiotic therapy</td>
<td>Written guidelines specifying duration of therapy, as part of patient specific prospective audit interventions or electronic order sets with pre-set duration.</td>
<td>Strong</td>
</tr>
<tr>
<td>Development of stratified antibiograms</td>
<td>Hospital based antibiograms stratified by specific populations such as patient location and age.</td>
<td>Weak</td>
</tr>
<tr>
<td>Selective and cascade antibiotic susceptibility reporting by microbiology laboratory</td>
<td>Release of a limited number of antibiotics followed by a report of secondary antibiotics only if an organism is resistant to the primary antibiotic class.</td>
<td>Weak</td>
</tr>
<tr>
<td>Rapid viral testing</td>
<td>Use of rapid viral testing for respiratory pathogens to reduce the use of inappropriate antibiotics</td>
<td>Weak</td>
</tr>
<tr>
<td>Rapid diagnostic blood testing</td>
<td>Use rapid diagnostic testing such as rapid molecular assays and mass spectrometry in addition to conventional culture.</td>
<td>Weak</td>
</tr>
<tr>
<td>Serial procalcitonin measurements in Intensive Care</td>
<td>In patients admitted to intensive care units to guide early discontinuation of antibiotics.</td>
<td>Weak</td>
</tr>
<tr>
<td>Non culture-Based Fungal Markers in patients with haematologic malignancies</td>
<td>Such as galactomannan, 1,3-β-D-glucan or single- or multi-pathogen fungal PCR for patient with hematologic malignancies at risk of invasive fungal infections to optimize antifungal use.</td>
<td>Weak</td>
</tr>
<tr>
<td>Use of Days of Therapy (DOT) to measure antibiotic use</td>
<td>DOTs are preferred, but Defined Daily Dose s remains an alternative for sites that cannot obtain patient-level antibiotic use data.</td>
<td>Weak</td>
</tr>
</tbody>
</table>

*Strength of recommendation was based on rating the quality of evidence and using the GRADE methodology.
necessary. Pharmacy staff also reviews antibiotic dosing and helps streamline parenteral to oral conversions. In addition, physicians have access to our annually updated antibiogram and utilize facility-based evidence-based guidelines available for Lifespan-affiliated hospitals. In 2016, we reviewed 1364 charts that yielded 173 recommendations; 94% of recommendations were followed (50% were related to discontinuation or de-escalation of antibiotics and 36% were related to IV to PO conversion]. Measurement of specific antimicrobial stewardship metrics has been challenging but future efforts are dedicated to upgrade our electronic medical records with a specific infection control and antimicrobial stewardship module that will allow us to calculate standardized metrics and report to NHSN.

Successful implementation of ASP in all community hospitals in Rhode Island is the ultimate goal. The Antimicrobial Stewardship and Environmental Cleaning Task Force was created by the Department of Health to provide resources to healthcare facilities and help them implement ASP and improve infection control practices throughout the state of Rhode Island. Acute-care hospitals and skilled nursing facilities have committed with the State’s Department of Health to expand and implement antimicrobial stewardship programs in their facilities. The ASP at Newport Hospital can serve as a model for other community hospitals with similar resources.

References

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Antimicrobial Stewardship in Long-Term Care Facilities

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ABSTRACT
Antimicrobial stewardship (AMS) has become a major component of patient safety across all healthcare settings. The risk of *Clostridium difficile*, increasing antibiotic-resistant organisms, and potential adverse events from antibiotic misuse have led to the demand for AMS programs in long-term care facilities (LTCFs). LTCFs face several unique barriers in implementing antibiotic stewardship; however, with a change in culture through leadership, education, and accountability to the whole team these barriers can be overcome.

KEYWORDS: Antimicrobial stewardship, long-term care, nursing homes, asymptomatic bacteriuria

INTRODUCTION
A substantial proportion of our older population reside in long-term care facilities (LTCF) with around ~1.5 million residents in the US, when adding in those who are admitted to LTCF for post-acute care and short term rehabilitation, it is closer to 4 million [Centers for Disease Control and Prevention (CDC)]. This is a population with more comorbidities and risk for infections than the general population. Antibiotics are one of the most commonly prescribed medication classes, and up to 70% of residents receive at least one course of antibiotics each year. Studies estimate that 40-75% of the time these antibiotics are inappropriate or unnecessary. Furthermore, the long-term care (LTC) population is at an increased risk for harm from antibiotics including: *clostridium difficile* infection, adverse drug events, and increased risk of antibiotic resistance. For these reasons, LTCFs are one of the most important health-care settings for antimicrobial stewardship programs. The Centers for Medicare and Medicaid Services (CMS) recently released the “mega-rule” requiring antimicrobial stewardship programs and an infection control officer be in place for all LTCFs by November 28, 2017.

Though the need for antimicrobial stewardship in a LTCF is well understood, this setting faces barriers that are unique, making it more difficult to develop and implement. In this article, we will review some of these unique barriers, as well as highlight some solutions.

BARRIERS IN LTCF
The barriers faced in LTCFs for antimicrobial stewardship include patient characteristics, resource limitations, structure of on-site vs. off-site care, family engagement and the home aspect of the facility [Table 1]. As mentioned above, residents may have multiple comorbidities that increase the risk of infection (ie: diabetes, vascular disease, COPD, chronic wounds, indwelling devices), as well as immunosenescence. It can be difficult to recognize infections due to the lack of typical signs (fever, leukocytosis) and the high prevalence of cognitive deficits that make it difficult to confirm symptoms. Furthermore, they are at increased risk of resistant bacteria [both colonization and infection] given prior antibiotic exposure and increased healthcare exposure, particularly hospitalizations. Given the “home” aspect of LTCFs, residents travel back and forth from common areas to their private or semi-private rooms. This makes it difficult to fully isolate those who are colonized with or have a history of resistant organisms, leading to an unintentional spread of antibiotic resistance among residents. Further complicating this situation is the concern for missing an infection, leading to the initiation of unnecessary antibiotics.

<table>
<thead>
<tr>
<th>Table 1. Barriers to Antimicrobial Stewardship in Long Term Care Facilities</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Medically complex patients with multiple comorbidities</strong></td>
</tr>
<tr>
<td><strong>Many residents colonized with resistant organisms</strong></td>
</tr>
<tr>
<td><strong>Inability of LTCF to completely isolate patients</strong></td>
</tr>
<tr>
<td><strong>Delay in return of diagnostic information needed for decision making</strong></td>
</tr>
<tr>
<td><strong>Medial provider attitude and limited on-site coverage</strong></td>
</tr>
<tr>
<td><strong>Limited infectious disease consultation or pharmacy availability</strong></td>
</tr>
<tr>
<td><strong>Cost factor with Medicare Part A and the use of expensive broad spectrum antibiotics</strong></td>
</tr>
<tr>
<td><strong>Back and forth hospital transfers</strong></td>
</tr>
<tr>
<td><strong>Heavily engaged families with their own misconceptions about antibiotic use</strong></td>
</tr>
<tr>
<td><strong>Many residents are end of life and goals of care not consistent with aggressive testing/treatment</strong></td>
</tr>
</tbody>
</table>
limited funding for dedicated antimicrobial stewardship programs. Salary support for pharmacists, physicians, nursing champions or IT remains a challenge for many institutions. In a 2014 survey of RI LTCFs, only 23 of 87 (26%) reported one dedicated AMS-specific FTE for the infection preventionist and even less support for physician or pharmacy FTE. These findings were similar to other state surveys in Nebraska and Michigan.9

LTCFs face additional resource limitations as most diagnostics are off-site, including routine labs, microbiology, and imaging. This leads to a delay in results that could help guide the clinician in diagnosis and treatment. Couple these challenges with the limited on-site provider coverage in the LTC setting. In a 2009 report, less than 20% of LTCFs employed full-time staff physicians. Most LTCFs have physicians that are covering at multiple facilities, splitting time between office-based practices and LTCFs.10 Though in some areas on-site coverage is provided by mid-level providers, many facilities are relying on off-site phone coverage by the physician with nursing assessment of the patient.11 The communication by nursing of the patient’s status has significant influence on treatment decision by the provider. This can be difficult for nursing to provide detailed status change in residents as they face high nurse-resident ratios and at times family pressure for an antibiotic order.

Family (or patient) pressure is a barrier to antimicrobial stewardship across healthcare facilities, but in LTCFs it can be more significant. With geriatric patients who may not have the cognitive faculties to speak for themselves, as in severe dementia, the family may feel obligated to advocate for antibiotics based on their own assessment of their loved one.12 Their demand for action/treatment in the absence of face-to-face discussion with a physician (as in an office visit) can lead to unnecessary antibiotic use that can cause more harm than good.13 Along with this is the notion that the facility is, in fact, their home. To keep them at home, and not transfer to a hospital, providers are more likely to start antibiotics before confirmation of bacterial infection, continue for longer than recommended guidelines, and to not de-escalate even if indicated.14

These are some of the barriers that are unique to LTCFs in antimicrobial stewardship development and implementation. Additional barriers include limited access to infectious disease consultation or an infectious disease-trained pharmacist, medical cost limitations with expensive broad-spectrum antibiotics, as well as the goals of care for patients at the end of life.6,7

**SOLUTIONS FOR LTCF ANTIMICROBIAL STEWARDSHIP**

Though LTCFs face multiple barriers to antimicrobial stewardship (AMS) implementation, success has been shown with several different approaches that involves changing the culture and expectations of providers, nurses, and families. The CDCs 7 Core Elements for Nursing Homes include: 1. Leadership commitment; 2. Accountability; 3. Drug expertise; 4. Action; 5. Tracking; 6. Reporting, and 7. Education.3 In LTCFs, the importance of leadership commitment and accountability cannot be over stated given the staffing and resource limitations described above. Without an on-site pharmacist or on-site physician available, the task for AMS (as well as infection control) is usually given to senior nursing leads who already juggle multiple roles. Instead, a team approach including representation from the medical director, director of nursing, infection preventionist, and pharmacist leads to better outcomes with increased support and accountability.5

In addition to identifying champions and leadership commitment, putting into place routine protocols that address the decision to start, continue, or stop an antibiotic has been successful in different studies.5,12 This is most useful in the decision to treat for suspected urinary tract infections, the most common reason antibiotics are prescribed in LTCFs. However, a significant proportion of the time (~33%), it is asymptomatic bacteruria rather than a true infection.16,17,18 Some LTCFs have developed a urinary tract protocol where a resident is placed on a 24–48 hour symptom watch when concern of UTI is raised rather than ordering urine analysis and culture at the start. In the older population, pyuria and bacteriuria are common even in absence of infection, and it is the result of a positive culture that often triggers initiation of antibiotics.16 By having a protocol to assess for objective signs of UTI (using recommended guideline criteria in the literature), staff can assure the resident/family that action is being taken without misuse of antibiotics and unnecessary harm. Several facilities in RI have urinary tract protocols in place with success in decreasing treatment of asymptomatic bacteriuria.

Another protocol that is used more frequently in acute care hospitals, but being encouraged as well in long-term care, is the antibiotic “time-out.” In hospitals with electronic medical records (EMR), ordering of antibiotics can be structured to allow only for a certain number of days before the clinician must renew the order, and thus decide if it is still warranted. This can work well given the daily rounds by providers in the hospital. In LTCFs, this can be more difficult with many orders provided off-site and not reassessed daily by the provider.

One solution is a protocol where, at the initiation of treatment, the clinician must provide the diagnosis, dose, and duration of the antibiotic for the nurse to document. Then at 24-48 hrs., a “time-out” is held to determine if antibiotics should be continued, de-escalated based on sensitivities, or discontinued if there are no findings of infection.19 The antibiotic “time-out” is a protocol that could be initiated by either nursing or pharmacy with the support of the clinicians in the facility.
Finally, a vital part of the solution to implementing antimicrobial stewardship programs is the education and engagement of residents and their families.\textsuperscript{11,20} In LTCFs, the families of many residents are interested in not only the care of their loved one, but also in the activities and programs of the facility. If they are educated on the commitment to antimicrobial stewardship and how the facility plans to reduce misuse of antibiotics, they will likely become partners in it. For example, as part of a UTI protocol, a family member could help monitor for subtle symptom changes. By engaging families in the process, it can help to reduce the pressure for starting antibiotics that are unnecessary and potentially harmful.

These are examples of ways to overcome some of the barriers to antimicrobial stewardship in LTCFs. This does not address how to access drug expertise, i.e., ID-trained pharmacist, or the difficulties in tracking and reporting that facilities experience with fewer staff, limited IT capability, and lack of training. However, as the landscape changes with increased focus on antimicrobial stewardship and infection prevention across all healthcare settings, LTCFs will need to ensure that they have AMS champions who are supported, educated, and trained in implementing a full antimicrobial stewardship program.\textsuperscript{20}

**CONCLUSION**

Long-term care facilities are a key player in the fight against increasing antibiotic resistance and adverse events such as *Clostridium difficile*. The culture of antibiotic use must change, not only because of increasing pressure from federal guidance and potential penalties, but more importantly for the safety and health of our current and future residents in LTCFs.

References


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The views expressed herein are those of the authors and do not necessarily reflect the views of the Rhode Island Department of Health.

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ABSTRACT
Up to 50% of hospital-administered and 70% of nursing home-administered antimicrobials are inappropriately prescribed. There is a great need to focus local, national and global efforts on appropriate antibiotic use. Formal programs dedicated to appropriate antibiotic use have been established in most US hospitals. These antimicrobial stewardship programs (ASP) exist to ensure that the correct drug, dose and duration of an antimicrobial is given, and only when there is a true bacterial infection (as opposed to bacterial colonization or a viral infection). These programs increase patient safety and reduce unintended consequences including *Clostridium difficile* infections, medication-related adverse effects, and antimicrobial resistance. Most of these programs are co-lead by an interdisciplinary team consisting of an infectious diseases (ID) pharmacist and an ID physician. However, consistent and meaningful metrics to study the impact of ASPs have not been elucidated. With the Joint Commission Standards for Acute Care facilities, and Centers for Medicare and Medicare (CMS) for long-term care facilities making antimicrobial stewardship (AMS) a condition of participation, both facilities will be scrambling to create appropriate quality care indicators to measure program success. One major theme across all healthcare settings is that ASPs must collaborate with facility leadership and key stakeholders at each institution in order to have an impactful benefit on patient quality of care, and safety. It is the purpose of this review to offer several economic, process, and patient-outcome measurements for ASP to optimally communicate with facility leadership.

KEYWORDS: antimicrobial stewardship, outcome assessment, process assessment, hospitals, long-term care facilities

INTRODUCTION
Antimicrobial stewardship programs (ASP) consistently demonstrate a reduction in antimicrobial utilization, favorable patient outcomes, and cost savings in both large academic medical centers and smaller community hospitals. The demand for ASPs follows studies which indicate that up to 50% of hospital-administered antimicrobials, and up to 70% of long-term care facility-administered antimicrobials are prescribed inappropriately. Misuse of antimicrobial agents (i.e. incorrect selection of drug, dose, frequency, duration or indication) has led to a rapid rise in antimicrobial-resistant bacteria that are estimated to cause at least 2 million illnesses and 23,000 deaths, annually. The most common antimicrobial-related adverse events are *Clostridium difficile* infection (CDI), hypersensitivity reactions, and general medication-related adverse events.

In acute care facilities, ASPs are ideally comprised of multidisciplinary teams consisting of an infectious diseases physician, an infectious diseases clinical pharmacy specialist, a clinical microbiologist, an infection control professional, an information system specialist, and a hospital epidemiologist. These programs have repeatedly demonstrated a positive influence on patient outcomes (e.g. reduction in adverse drug events, CDI, morbidity and mortality, length of stay, antimicrobial resistance, and inappropriate prescribing), as well as healthcare expenditures. In long-term care facilities, the responsibilities of AMS typically fall on the infection control and prevention nurse, ideally with assistance from consultant pharmacists, the directors of nursing and medical center directors.

Appropriate antimicrobial utilization aims to improve patient outcomes and minimize multi-drug resistance (MDR). Appropriate antibiotic use is a national priority (National Action Plan for Combating Antibiotic-Resistant Bacteria) that calls for establishment of ASPs in accordance with the Centers for Disease Control and Prevention (CDC) “Core Elements of Hospital Antibiotic Stewardship Programs” (Table 1). The 2017 Joint Commission and Centers for Medicare and Medicaid Services will require hospitals and long-term care facilities to develop ASPs following these elements. Two of these CDC core elements relate to tracking and reporting measures of ASP success. However, selecting metrics to evaluate ASPs, their impact on patient outcomes, and development of resistance is challenging for a variety of reasons, including patient complexity, confounding factors, and metric selection that accurately depicts the program’s impact. The purpose of this review is to discuss available metrics and provide guidance for selecting metrics within institutions.
### Table 1. Centers for Disease Control and Prevention (CDC) Core Elements of Hospital Antibiotic Stewardship Programs

<table>
<thead>
<tr>
<th>Element</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leadership commitment</td>
<td>Dedicating personnel, as well as financial and information technology resources</td>
</tr>
<tr>
<td>Accountability</td>
<td>Appointing single leader to be responsible for program outcomes</td>
</tr>
<tr>
<td>Drug Expertise</td>
<td>Appointing single pharmacist leader to support optimal antimicrobial utilization</td>
</tr>
<tr>
<td>Action</td>
<td>Implementing at least one actionable recommendation (e.g. antimicrobial time-out 48 hours post-empiric therapy)</td>
</tr>
<tr>
<td>Tracking</td>
<td>Monitoring antimicrobial prescribing and resistance patterns</td>
</tr>
<tr>
<td>Reporting</td>
<td>Regular reporting of tracked data to relevant staff</td>
</tr>
<tr>
<td>Education</td>
<td>Educating clinicians on optimal prescribing and resistance</td>
</tr>
</tbody>
</table>

### Table 2. Metrics and Target Interventions

<table>
<thead>
<tr>
<th>Measure (Level of Ease)</th>
<th>Conceivable Metrics*</th>
<th>Application of conceivable metrics to sample syndrome-specific targets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Process (Least difficult)</td>
<td>• Days of therapy (DOT)</td>
<td>• Optimize therapy for bloodstream infections after implementation of molecular rapid diagnostic testing (e.g. MALDI-TOF MS, Film Array [BioFire], Verigene [Nanosphere], Accelerate Pheno and Accelerate PhenoTest [Accelerate Diagnostics], etc.)</td>
</tr>
<tr>
<td></td>
<td>• Unnecessary days of therapy avoided</td>
<td>• Reduce inappropriate antimicrobial prescribing for respiratory viral infections ruled in via PCR-respiratory panel without signs of bacterial infection</td>
</tr>
<tr>
<td></td>
<td>• Provider adherence to syndrome-specific guideline/clinical pathway</td>
<td>• Reduce or eliminate inappropriate antimicrobial prescribing for asymptomatic bacteriuria</td>
</tr>
<tr>
<td></td>
<td>• Time to effective antimicrobial therapy</td>
<td>• Optimize antimicrobial use for infections in immunocompromised hosts</td>
</tr>
<tr>
<td></td>
<td>• Time to optimal antimicrobial therapy after organism identification and sensitivity report</td>
<td>• Reduce or eliminate inappropriate antimicrobial prescribing for skin and soft tissue infections</td>
</tr>
<tr>
<td></td>
<td>• Proportion of patients converted from intravenous to oral medication</td>
<td>• Reduce vancomycin use in low-MRSA risk patient population with pneumonia</td>
</tr>
<tr>
<td></td>
<td>• Number of urinalyses ordered in the ED</td>
<td>• Optimize empiric antimicrobial use toward common resistance patterns in nursing home and/or long-term facilities</td>
</tr>
<tr>
<td>Outcomes (Moderately difficult)</td>
<td>• Hospital length of stay</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Intensive care unit (ICU) length of stay</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• 30-day mortality</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Infection-related mortality</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Unplanned 30-day hospital readmission</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Proportion of patients with hospital-acquired CDI</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Proportion of patients with clinical failure</td>
<td></td>
</tr>
<tr>
<td>Resistance (Most difficult)</td>
<td>• Resistance patterns via annual antibiogram</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Pathogen-specific resistance</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Patient population-specific resistance</td>
<td></td>
</tr>
</tbody>
</table>

*Does not represent a complete list; MALDI-TOF MS= matrix-assisted laser/desorption ionization time of flight mass spectrometry

## Metrics

### Process and Antimicrobial Use Measures

Tracking and reporting antimicrobial use and outcomes data is critical to not only evaluating the success of the ASP, but also in identifying areas for improvement. Generally, interventions are implemented to evaluate process and/or outcome measures (Table 2). Process measures are easiest to evaluate as they utilize surrogate indicators to demonstrate whether an ASP successfully changed processes (e.g. guidelines/clinical pathway adherence), prescriber behavior (e.g. accurate diagnosis; appropriate drug-indication pairing, correct antimicrobial dose, frequency, and duration; appropriate and timely therapeutic modifications), resource utilization, or expenditure. From the administrative standpoint, process measures, particularly resource utilization and expenditures, are critical to track as they highlight the need for continued support of ASPs. ASPs are associated with substantial cost savings that often stabilize after an initial period. However, continued support is warranted as costs increase after program termination.

Antimicrobial consumption can be evaluated using metrics such as days of therapy (DOT) or defined daily doses (DDD). These metrics reflect an aggregate amount of antimicrobial consumption, and are often standardized with patient-days in the denominator to allow for comparison between hospitals, regions, and/or countries. Despite multiple available metrics, the CDC recommends utilizing DOT as the primary antimicrobial consumption metric because it provides more clinically relevant data than other metrics, including DDD. However, calculating DOTs requires patient-level antimicrobial use data, which may not be feasible for all facilities. Under such circumstances, DDD may be utilized as an alternative despite several key disadvantages. DDD reflects the amount of drug a typical, adult patient would receive for any given day utilizing World Health Organization (WHO)-approved DDD values, and therefore cannot be used for pediatric patients requiring weight-based dosing, as DDD interpretation is not translatable into meaningful data for that population. This measure was not originally designed as an antimicrobial stewardship (AMS)
Table 3. Days of Therapy (DOT) versus Defined Daily Doses (DDD)

<table>
<thead>
<tr>
<th>Description</th>
<th>DOT</th>
<th>DDD</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DOT</strong></td>
<td><strong>DDD</strong></td>
<td></td>
</tr>
<tr>
<td>• Summation of days patient receives at least one dose of antimicrobial agent without regard to dose</td>
<td>• Average maintenance dose for main indication in 70kg-adults</td>
<td></td>
</tr>
<tr>
<td>• Total grams used* / Word Health Organization (WHO)-approved DDD value**</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Example</strong></td>
<td><strong>Example</strong></td>
<td></td>
</tr>
<tr>
<td>• Patient receives ceftriaxone 2gm Q12h plus ampicillin 2gm Q4h for 42 days</td>
<td>• Patient receiving ceftriaxone (CRO) 2gm Q12h plus ampicillin (AMP) 2gm Q4h for 42 days</td>
<td></td>
</tr>
<tr>
<td>• 2 antimicrobials X 42 days = 84 DOT</td>
<td>• DDD-values for ceftriaxone and ampicillin =2gm</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• DDD&lt;sub&gt;CRO&lt;/sub&gt; = (4gm dose/ 2gm DDD) x 42 days= 84 DDD; DDD&lt;sub&gt;AMP&lt;/sub&gt; = (12gm dose/ 2gm DDD) x 42 days= 252 DDD; total= 336 DDD</td>
<td></td>
</tr>
<tr>
<td><strong>Standardization</strong></td>
<td><strong>Standardization</strong></td>
<td></td>
</tr>
<tr>
<td>• DOT/ patient-days</td>
<td>• DDD/ patient-days</td>
<td></td>
</tr>
<tr>
<td>• DOT/ patient-admission</td>
<td>• DDD/ patient-admission</td>
<td></td>
</tr>
<tr>
<td><strong>Advantages</strong></td>
<td><strong>Advantages</strong></td>
<td></td>
</tr>
<tr>
<td>• Clinically relevant data</td>
<td>• Easy to obtain and does not require patient-level data</td>
<td></td>
</tr>
<tr>
<td>• Expanded utilization in both adult and pediatric patients</td>
<td>• Standardizing DDDs can be used as benchmark to compare antimicrobial consumption between facilities, and regions</td>
<td></td>
</tr>
<tr>
<td>• Standardizing DOT can be used as benchmark to compare antimicrobial consumption between facilities, and regions</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Limitations</strong></td>
<td><strong>Limitations</strong></td>
<td></td>
</tr>
<tr>
<td>• Requires patient-level antimicrobial use data</td>
<td>• Assumes all dosing is routine and may overestimate DDD in patients who require appropriately higher dosing (e.g. central nervous system infections, obesity, high-MIC pathogen infections, etc.)</td>
<td></td>
</tr>
<tr>
<td>• Optimal DOT unknown</td>
<td>• May underestimate DDD in patients that appropriately require lower doses (e.g. renal impairment)</td>
<td></td>
</tr>
<tr>
<td>• Combination therapy yields higher DOT regardless of spectrum of activity</td>
<td>• Combination therapy yields higher DDD regardless of spectrum of activity</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Institutions must have similar antimicrobial composition/formulary to allow for comparison</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Cannot be utilized for pediatric patients</td>
<td></td>
</tr>
</tbody>
</table>

* Obtained from purchased, dispensed, or administered data
** Available at: https://www.whocc.no/atc_ddd_index/

metric, and should not be used as such, when possible, as it has numerous flaws and biases. DOT is not without flaws either. Although it provides useful overall antimicrobial consumption data, the optimal DOT number to target remains unknown. Reduction in DOT may not be beneficial for hospitals with already lean numbers. Indication-specific DOT data may be more optimal; however, data is currently unavailable. Comparison between DOT and DDD is further detailed in Table 3.

Other metrics, including length of therapy [i.e. sum of day’s patient received antimicrobials regardless of drug or dose], grams used [obtained from purchased, dispensed, or administered data] and expenditures [i.e. monetary value spent obtained from purchased, dispensed, or administered data] are available. However, they are not recommended as a consumption measure as these metrics cannot be used to compare specific antimicrobial usage, are inaccurate, and may be affected by changes in cost, respectively.

Outcome measures

Although process measures are substantially easier to collect and provide useful data, particularly during early program design, it is not enough to meet goals of ASPs. The primary goals of ASPs include: 1) minimizing the progression of resistance; 2) optimizing antimicrobial selection [i.e. drug, dose and duration], and 3) reducing adverse drug events [i.e. CDIs, morbidity and mortality, length of stay and healthcare expenditures]. These goals cannot be evaluated through process measures alone. For example, while improvement in antimicrobial utilization has demonstrated reduction in CDI, it cannot be completely explained by this process measure as additional unmeasured factors, including the role of infection control measures, can influence CDI rates. Regardless, data on CDI rates are often collected and may be useful when interventions targeting reduction of highly CDI-associated antimicrobials [e.g. fluoroquinolones] are implemented.

Other helpful metrics evaluating outcomes related to ASPs in acute care facilities include: length of stay, 30-day mortality, unplanned hospital readmission, proportion of patients with clinical failure, days of avoided hospitalization [readmission, emergency room visits], as well as days of avoided central venous access and parenteral therapy administration. Measuring such outcomes is challenging, particularly...
for new programs and may become more feasible in the future as clear definitions and guidance is provided.7 Interventions focused on syndrome-specific outcomes may be more practical.5 With development and implementation of molecular rapid diagnostic testing (mRDT), measuring patient outcomes in bloodstream infections has demonstrated a reduction in mortality, particularly in institutions with ASPs.17 Likewise, directing AMS efforts to antimicrobial discontinuation in institutions with high rates of inappropriate prescribing for respiratory tract infections18, particularly in setting of polymerase chain reaction (PCR)-positive respiratory panels and low procalcitonin levels, is reasonable.19

Resistance
Antimicrobial resistance is perhaps the most challenging outcome to measure due to its multi-factorial development and dispersal.3,5 Implementation of ASPs has been associated with a reduction in both Gram-positive and Gram-negative resistance20, but similar to CDI rates, these findings may be confounded by other factors that impact antimicrobial resistance, including infection control measures, changes in prevalent organisms within an institution, patient demographics, and other care practices.5 Tracking resistance of select pathogens, or patient populations that benefit most from AMS intervention may provide additional benefit to solely tracking and reporting overall resistance patterns.5

SELECTING AND APPLYING METRICS AT YOUR INSTITUTION
Expert consensus studies focusing on metric selection have been conducted.7-9 These groups propose six patient-level metrics ready for immediate use in acute care settings and we offer personnel expertise that may best assist in data collection. These six areas include; hospital-onset CDI [infection control and prevention]; healthcare-associated CDI [infection control and prevention]; incidence of drug-resistant infections [microbiology and infection control and prevention]; antimicrobial DOT per patient-admission [pharmacy]; DOT per patient-days [pharmacy]; and redundant therapy events [pharmacy].7 Clinical outcome measures were not selected due to concerns with accurately associating outcomes to AMS intervention in setting of unmeasured confounding factors [e.g. severity of illness, infection-control activities].7 Similarly, unmeasured confounding factors including improved infection control measures, may influence CDI rates. Another structured panel used to identify quality-improvement metrics had several similarities to the patient-level expert consensus.8 However, these panel members chose to include clinical outcome measures (i.e. antimicrobial-related organism mortality, 30-day mortality, conservable days of therapy, and unplanned 30-day hospital readmission).8 Ideal metrics have yet to be elucidated as no single metric demonstrated superiority to others. Metrics should be individualized for each facility and aimed to satisfy short-term [e.g. reduction in antimicrobial consumption, patient outcomes] and long-term [e.g. resistance] goals.3

CONCLUSION
Tracking and reporting measures that ensure ASP success and highlight areas for improvement is challenging as ideal metrics remain unknown. Regardless of metric selection, ensuring accurate and consistent data collection is critical. The CDC assists providers through various resources. Particularly helpful is the National Healthcare Safety Network (NHSN), a widely used tracking system designed to measure antimicrobial utilization with risk adjustment that allows for inter- and intra-facility comparison. NHSN website provides several useful resources including various slide-sets and YouTube videos that assist providers with several components of ASP development. Other helpful resources are outlined in Table 4.

Table 4. Helpful Resources

<table>
<thead>
<tr>
<th>Description</th>
<th>Link</th>
</tr>
</thead>
<tbody>
<tr>
<td>Joint Commission new antimicrobial stewardship standard</td>
<td><a href="https://www.jointcommission.org/assets/1/6/New_Antimicrobial_Stewardship_Standard.pdf">https://www.jointcommission.org/assets/1/6/New_Antimicrobial_Stewardship_Standard.pdf</a></td>
</tr>
<tr>
<td>CDC Long-term Care Facility infections prevention guidance</td>
<td><a href="https://www.cdc.gov/longtermcare/index.html">https://www.cdc.gov/longtermcare/index.html</a></td>
</tr>
<tr>
<td>CMS guidance for long-term care facilities</td>
<td><a href="http://www.cms.gov">http://www.cms.gov</a></td>
</tr>
<tr>
<td>University of Rhode Island antimicrobial stewardship treatment pathways</td>
<td><a href="http://web.uri.edu/antimicrobial-stewardship/treatment-pathways/">http://web.uri.edu/antimicrobial-stewardship/treatment-pathways/</a></td>
</tr>
<tr>
<td>Rhode Island Department of Health antimicrobial stewardship</td>
<td><a href="http://www.health.ri.gov/healthcare/about/antimicrobialstewardship/">http://www.health.ri.gov/healthcare/about/antimicrobialstewardship/</a></td>
</tr>
</tbody>
</table>
References


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KerryLaPlante@uri.edu
Malignant lung cancer leads all causes of cancer-related deaths in both the U.S. and Rhode Island. Lung cancer deaths in the U.S. and Rhode Island have steadily decreased during the last two decades, thanks in part to reduced tobacco use; however, lung tumors still account for 25% and 30% of all cancer-related mortality in the U.S. and Rhode Island, respectively – more deaths than cancers of the breast, prostate, colon, and rectum combined. Despite advancements of diagnostic technologies and promising new therapies, lung tumors when diagnosed at advanced stages often predict poor treatment outcomes and low survival rates. Most lung cancers are diagnosed at advanced stages; earlier screening could detect some of these malignancies at earlier stages, when prognoses are better, and ultimately more lives could be saved.

Lung cancer has histologically and molecularly distinct subtypes. Subtypes impact how each tumor is detected, managed and treated. To better address lung cancer burden among Rhode Islanders, this report assesses (1) statewide trends of lung cancer incidence by sex and subtype; and (2) stage at diagnosis by subtype. It is hoped that this assessment will help to guide providers and community partners in implementing evidence-based cancer control strategies.

**METHODS**

Using the Rhode Island Cancer Registry (RICR) data, newly diagnosed malignant cancers of the lung and bronchus were identified (ICD-O-3 site/behavior: C340-C349/3), and subtypes were categorized [Table 1]. Stage at cancer diagnosis was classified, as “localized”, “regional” or “distant”, using the “Derived Summary Stage 2000” system [https://training.seer.cancer.gov/ss2k/2000/]. Since this system has been used to stage cancers diagnosed since 2004, data in this report were limited to cancers diagnosed between 2004 and 2015, the most current full year of data in the RICR.

SEER*Stat software v8.3.4 was used to summarize count and age-adjusted rates per 100,000 residents, using the 2000 US standard population [http://www.seer.cancer.gov/seerstat/index.html]. For the trend analyses during the studied period, annual percentage change (APC) of incidence was computed and the statistical significance was evaluated (p value <0.05).

**RESULTS**

A total of 10,740 malignant lung cancers, averaging approximately 900 per year, were reported to RICR between 2004 and 2015. Over this period, the annual incidence and mortality of lung cancers steadily decreased among Rhode Island males [Figure 1a]. The cancer incidence and mortality rates among females during this period were lower than among males, but remained unchanged [Figure 1b].

For both sexes, adenocarcinoma was the most common subtype of lung cancer, comprising 40% of all newly diagnosed lung cancers. Among women, adenocarcinomas showed a noticeable increase – from 22 per 100,000 in 2004 to 38 per 100,000 in 2015 [Figures 2b]. For the first time in RICR data reporting, adenocarcinoma diagnosis among females surpassed those of males (30 per 100,000) in 2015.

Approximately 20% of all Rhode Island lung cancers

---

**Table 1. Histologic Subtypes of Lung Cancer**

<table>
<thead>
<tr>
<th>Subtype</th>
<th>Histology code (International Classification of Disease for Oncology, 3rd edition, [ICD-O-3])</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-Small Cell Lung Cancer (NSCLC)</td>
<td></td>
</tr>
<tr>
<td>Adenocarcinoma*</td>
<td>8015, 8050, 8140-1, 8143-5, 8147, 8190, 8201, 8211, 8250-5, 8260, 8290, 8310, 8320, 8323, 8333, 8401, 8440, 8470-1, 8480-1, 8490, 8503, 8507, 8550, 8570-2, 8574, 8576</td>
</tr>
<tr>
<td>Squamous cell carcinoma*</td>
<td>8051-2, 8070-6, 8078, 8083-4, 8090, 8094, 8120, 8123</td>
</tr>
<tr>
<td>Non-small cell carcinoma*</td>
<td>8046</td>
</tr>
<tr>
<td>Large cell carcinoma</td>
<td>8012-4, 8021, 8034, 8082</td>
</tr>
<tr>
<td>Other specified carcinoma</td>
<td>8003-4, 8022, 8030-3, 8035, 8200, 8240-1, 8243-6, 8249, 8430, 8525, 8560, 8562, 8575</td>
</tr>
<tr>
<td>Carcinoma, unspecified (NOS)</td>
<td>8010-1, 8020, 8230</td>
</tr>
<tr>
<td>Small Cell Lung Cancer (SCLC)</td>
<td></td>
</tr>
<tr>
<td>Small cell carcinoma*</td>
<td>8002, 8041-5</td>
</tr>
</tbody>
</table>

* Major 4 subtypes were presented in the figures 2 & 3.
were squamous cell carcinoma, a type twice as likely to be diagnosed in males than females (Figures 2a and 2b). Squamous cell carcinoma, the second most common lung cancer among males, declined from 2004 to 2015, but this trend did not attain a statistically meaningful significance.

Non-small cell carcinoma’s rapid and significant decline was observed both among males and females (Figures 2a and 2b).

Small cell carcinoma reporting rates overall were not different between males and females (Figures 2a & 2b). Small cell carcinoma diagnoses declined over the study period, particularly among males; the decreasing trend among females was less significant.

Stages at diagnosis were summarized by lung cancer subtype. No significant differences were noted when analyzed by sex and year, thus, presented in the Figure 3 are for both sexes and all study years.

Of all subtypes of lung cancers, most were diagnosed at regional or distant stages. Non-small cell carcinomas and small cell carcinomas were more likely to be diagnosed at distant stages than were adenocarcinomas and squamous cell carcinomas.

Figure 1a. Lung Cancer Incidence and Mortality among Rhode Island Males, 2004–2015

Figure 1b. Lung Cancer Incidence and Mortality among Rhode Island Females, 2004–2015

Figure 2a. Lung Cancer Incidences by Major Subtype among Rhode Island Males, 2004-2015

Figure 2b. Lung Cancer Incidences by Major Subtype among Rhode Island Females, 2004-2015
Advances in subtyping and staging of carcinomas have helped to reveal a more complete picture of lung cancer trends in Rhode Island. Among males, there has been a steady decline in overall lung cancer incidence, along with significant parallel reductions in three major subtypes – squamous cell, non-small cell, and small cell carcinomas. By contrast, among females, the overall incidence change is comparatively minimal, attributable to a rapid increase of adenocarcinomas along with a slow-paced decrease of other subtypes (i.e., squamous and small cell carcinomas).

A declining trend of lung cancer overall, since the 1990s, was reported for the U.S representative population.1,4 Rhode Island’s temporal changes varied by sex and histologic type were similar to the U.S trend.4 Incidence rates of males and females, the overall incidence change is comparatively minimal, attributable to a rapid increase of adenocarcinomas along with a slow-paced decrease of other subtypes (i.e., squamous and small cell carcinomas).

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References


Authors

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Disclosure

The authors declare no conflict of interest.

Correspondence

Junhie.Oh@health.ri.gov
Rhode Island Monthly Vital Statistics Report
Provisional Occurrence Data from the Division of Vital Records

<table>
<thead>
<tr>
<th>VITAL EVENTS</th>
<th>REPORTING PERIOD</th>
<th>12 MONTHS ENDING WITH NOVEMBER 2017</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NOVEMBER 2017</td>
<td>Number</td>
</tr>
<tr>
<td>Live Births</td>
<td>943</td>
<td>11,533</td>
</tr>
<tr>
<td>Deaths</td>
<td>839</td>
<td>10,366</td>
</tr>
<tr>
<td>Infant Deaths</td>
<td>12</td>
<td>76</td>
</tr>
<tr>
<td>Neonatal Deaths</td>
<td>6</td>
<td>55</td>
</tr>
<tr>
<td>Marriages</td>
<td>421</td>
<td>7,174</td>
</tr>
<tr>
<td>Divorces</td>
<td>220</td>
<td>3,075</td>
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<tr>
<td>Induced Terminations</td>
<td>123</td>
<td>1,761</td>
</tr>
<tr>
<td>Spontaneous Fetal Deaths</td>
<td>83</td>
<td>866</td>
</tr>
<tr>
<td>Under 20 weeks gestation</td>
<td>77</td>
<td>805</td>
</tr>
<tr>
<td>20+ weeks gestation</td>
<td>6</td>
<td>61</td>
</tr>
</tbody>
</table>

* Rates per 1,000 estimated population
# Rates per 1,000 live births

<table>
<thead>
<tr>
<th>Underlying Cause of Death Category</th>
<th>REPORTING PERIOD</th>
<th>12 MONTHS ENDING WITH MAY 2017</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MAY 2017</td>
<td>Number (a)</td>
</tr>
<tr>
<td>Diseases of the Heart</td>
<td>211</td>
<td>2,336</td>
</tr>
<tr>
<td>Malignant Neoplasms</td>
<td>188</td>
<td>2,284</td>
</tr>
<tr>
<td>Cerebrovascular Disease</td>
<td>39</td>
<td>459</td>
</tr>
<tr>
<td>Injuries (Accident/Suicide/Homicide)</td>
<td>62</td>
<td>887</td>
</tr>
<tr>
<td>COPD</td>
<td>50</td>
<td>492</td>
</tr>
</tbody>
</table>

(a) Cause of death statistics were derived from the underlying cause of death reported by physicians on death certificates.
(b) Rates per 100,000 estimated population of 1,056,298 (www.census.gov)
(c) Years of Potential Life Lost (YPLL).

NOTE: Totals represent vital events, which occurred in Rhode Island for the reporting periods listed above.
Monthly provisional totals should be analyzed with caution because the numbers may be small and subject to seasonal variation.
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*it could be zebras.*

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Contact Sarah if you’ve missed an issue, sstevens@rimed.org.
Working for You:
RIMS advocacy activities

May 1, Tuesday
RIMS Physician Health Committee: Herbert Rakatansky, MD, Chair
Conference call with Physicians for Fair Coverage regarding “surprise billing” legislation
RIAFP Advocacy Day, RI State House
Interested parties meeting, Senate Policy Office, regarding “surprise billing”
Interview with WJAR-TV regarding physician office billing
Legislative hearings

May 2, Wednesday
Legislative hearings
Sen. Harold Metts fundraiser

May 3, Thursday
Legislative hearings

May 5, Saturday
AMA New England Delegation Meeting, Mystic, CT: Alyn L. Adrain, MD, Yul Ejnes, MD, and Nitin S. Damle, MD

May 7, Monday
RIMS Board of Directors Meeting: Bradley Collins, MD, President

May 8, Tuesday
Governor’s Overdose Prevention and Intervention Task Force Workgroup on Harm Reduction
Legislative hearings

May 9, Wednesday
Board of Medical Licensure and Discipline
Governor’s Overdose Prevention and Intervention Task Force: Sarah Fessler, MD, Immediate Past President
Legislative hearings
Sen. Gayle Goldin fundraiser

May 10, Thursday
Fentanyl test strips press conference
Legislative hearings, Kara Stavros, MD, made a House Call at the State House.
SIM Grant Steering Committee: Peter Hollmann, MD, President-elect
Rep. Daniel McKiernan fundraiser

May 14, Monday
RIMS ad hoc Committee on Advocacy Principles: Health Care System Consolidation and the Evolving Health Care Landscape in Rhode Island

May 15, Tuesday
Improving End of Life Care Coalition
Legislative hearings
Sen. Adam Satchel fundraiser

May 16, Wednesday
Workers’ Compensation Advisory Commission
Legislative hearings
Sen. Maryellen Goodwin fundraiser: Michael E. Migliori, MD, Public Laws Chair

May 17, Thursday
RIMS / Massachusetts Medical Society conference for CME directors, Waltham, MA: Patrick Sweeney, MD, PhD, MPH
Legislative hearings

May 18, Tuesday
Legislative hearings
Governor Raimondo fundraiser

May 24, Thursday
Legislative hearings
RI Foundation Annual Meeting (Care Transformation Collaborative honored)
Rep. Jason Knight fundraiser

May 25, Friday
RIMS Harm Reduction Committee community meeting
Advocacy Presentation, Warren Alpert Medical School: Sarah Fessler, MD, Immediate Past President, RIMS staff
Student Awards, Warren Alpert Medical School: Bradley Collins, MD, President

May 29, Tuesday
Legislative hearings
Sen. Minority Leader Dennis Algiere fundraiser

May 30, Wednesday
School Start Times Study Commission: Susan Duffy, MD
Legislative hearings
Sen. Frank Lombardi fundraiser

May 31, Thursday
Legislative hearings
ACO Learning Collaborative, Boston: Peter A. Hollmann, MD, President-elect
Speaker Pro-tempore Brian Kennedy fundraiser: Michael Migliori, MD, Public Laws Chair
The Rhode Island Medical Society now endorses Coverys.

Coverys, the leading medical liability insurer in Rhode Island, has joined forces with RIMS to target new levels of patient safety and physician security while maintaining competitive rates. Call to learn how our alliance means a bright new day for your practice.

401-331-3207
The Rhode Island Medical Society continues to drive forward into the future with the implementation of various new programs. As such, RIMS is expanded its Affinity Program to allow for more of our colleagues in healthcare and related business to work with our membership. RIMS thanks these participants for their support of our membership.

Contact Marc Bialek for more information: 401-331-3207 or mbialek@rimed.org

**RIMS CORPORATE AFFILIATES**

**Neighborhood Health Plan of Rhode Island**

Neighborhood Health Plan of Rhode Island is a non-profit HMO founded in 1993 in partnership with Rhode Island's Community Health Centers. Serving over 185,000 members, Neighborhood has doubled in membership, revenue and staff since November 2013. In January 2014, Neighborhood extended its service, benefits and value through the HealthSource RI health insurance exchange, serving 49% the RI exchange market. Neighborhood has been rated by National Committee for Quality Assurance (NCQA) as one of the Top 10 Medicaid health plans in America, every year since ratings began twelve years ago.

**RIPCPC is an independent practice association (IPA) of primary care physicians located throughout the state of Rhode Island. The IPA, originally formed in 1994, represent 150 physicians from Family Practice, Internal Medicine and Pediatrics. RIPCPC also has an affiliation with over 200 specialty-care member physicians. Our PCP's act as primary care providers for over 340,000 patients throughout the state of Rhode Island. The IPA was formed to provide a venue for the smaller independent practices to work together with the ultimate goal of improving quality of care for our patients.**
RIMS gratefully acknowledges the practices who participate in our discounted Group Membership Program

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Partners HealthCare, Care New England sign definitive agreement

PROVIDENCE – Partners HealthCare and Care New England Health System on May 23rd announced the signing of a definitive agreement formalizing Partners’ planned acquisition of Care New England (CNE).

“Today marks an important milestone for Rhode Island health care,” said Care New England President and CEO JAMES E. FANALE, MD. “Care New England has made significant progress in the last year to strengthen our financial outlook, and now while we will work through this important regulatory process, I am confident our affiliation with Partners will help us further invest in quality local care for the community, building upon the tremendous successes already in place.”

“We believe that this partnership will further strengthen an already robust local health care system and provide opportunities for new investments in patient care, research, and health care innovation in Rhode Island,” said DAVID F. TORCHIANA, MD, President and CEO, Partners HealthCare.

The goals of the affiliation include building on the existing clinical relationships between the parties, ensuring ongoing clinical research and educational collaboration in support of the parties’ charitable missions, enabling the organizations to more efficiently use their resources, and establishing effective and expanded approaches to population health management.

This agreement builds upon the successful clinical affiliation between Partners’ Brigham and Women’s Hospital and CNE’s Kent Hospital on cardiology and surgical services, a partnership that’s provided Rhode Island patients with a collaborative care model that has enhanced local services since 2009.

“On behalf of the Care New England board, we are extremely pleased to reach this agreement today. We are excited about the opportunities this presents for CNE and Partners, but perhaps even more importantly for patients and their families in our state and the region,” said CHARLES R. REP-PUCCI, chair, CNE Board of Directors.

“Partners has enjoyed a decade-long relationship with Care New England that’s brought specialized Brigham Health services to patients right here in Rhode Island,” said Brigham Health President ELIZABETH NABEL, MD. “Our agreement today will solidify our collaboration, deepen that commitment to quality local care, and will also mean new investments in Brown University-led research, with the important goal of continuing to strengthen the relationship with The Warren Alpert Medical School.”

“Preserving and strengthening health care and biomedical research and innovation in Rhode Island continues to be an important priority,” Brown University President CHRISTINA PAXSON said. “As Brown’s discussions with Partners and Care New England continue, I am optimistic that we can address the various concerns that I raised earlier this year.

“Brown has a long and productive partnership with Care New England, and the continued success of Care New England is important to the University and to the people of Rhode Island. Brown will continue to support collaboration among organizations dedicated to serving the health needs of Rhode Islanders and economic development in the state,” Paxson said.

The agreement follows extensive due diligence, internal reviews, and collaborative discussions between the two health care systems. With the signing of the definitive agreement, both organizations agree to move forward to prepare and file all necessary Rhode Island, Massachusetts, and federal regulatory filings, and, upon approval, move forward on Partners’ integration of CNE.

With the signing of the definitive agreement, Partners and CNE will continue discussions with Lifespan. Partners and CNE invited Lifespan to the affiliation conversations earlier this year because the parties share a mutual desire to improve access, quality, and efficiency of care for all Rhode Islanders.

5TH ANNUAL RIMS MEMBERS
CONVIVIUM

SAVE THE DATE SEPTEMBER 28
Members and guests are invited to schmooze, graze, and relax with colleagues while enjoying live music
WATCH FOR YOUR INVITATION THIS SUMMER!
Rhode Island Free Clinic Adding Dental Care for Uninsured Adults

SOUTH PROVIDENCE – The Rhode Island Free Clinic (Clinic), which has been serving the state for nearly 20 years providing health care to uninsured, working poor and low-income Rhode Island adults, will soon be offering dental care to uninsured adults. Initially, the Clinic will provide basic dental services including routine cleanings, oral examinations, simple extractions, and health education for Clinic patients.

Dental care remains a critical need for the 2,000 Clinic patients as identified by patient satisfaction surveys and patient inquiries. In a 2016 dental survey of 200 Clinic patients, results confirmed this need. More than 88% of patients surveyed did not currently have a dentist and 70% had dental issues. Most of the patients said they would use dental services at the Clinic if they were available.

Medical-dental integration
The medical-dental integration at the Clinic was planned by the Clinic’s Medical Advisory Clinic team led by JERRY FINGERUT, MD, and CAROLINE TROISE, MD, the Clinic’s medical director. Volunteer dentists, MARIA SACCOCCIO, DMD, and JOHN WADE, DMD, are serving as Dental Directors and have already donated over 200 hours towards the dental program. SHIRLEY SPATER, DMD, MARTY NAGER, DMD, ROBERT BARTRO, DDS, SAM ZWETCHKENBAUER, DDS, and other dental leaders have also been an integral part of the process.

With the support of Delta Dental Rhode Island (DDRI), collaboration with community dentists and existing dental programs, and planning with dental leaders, the Clinic’s Board developed a strategic plan to integrate dental care into the Clinic’s comprehensive health care model. Generous support from The Champlin Foundation funded facilities and equipment and early this year construction began for a two-chair dental suite, which is expected to be completed by July. Working closely with dental supplier, Benco Dental, the Clinic has secured new state of the art equipment and in-kind services. Additional support came from CVS Health, the Rhode Island Foundation, Blue Cross Blue Shield of RI, Amica, Ocean State Job Lot, Lifespan, Coastal Medical, and other many other donors.

Volunteers needed for program
Volunteers are the heart and soul of the Rhode Island Free Clinic; 50% of the Clinic’s team are AmeriCorps VISTAs – college graduates who commit to a year of service at the Clinic. The Clinic’s Dental Care VISTA will work to build the dental volunteer team. The Clinic is currently recruiting for a bilingual dental assistant and part-time dental hygienist and have already donated over 200 hours towards the dental program. SHIRLEY SPATER, DMD, MARTY NAGER, DMD, ROBERT BARTRO, DDS, SAM ZWETCHKENBAUER, DDS, and other dental leaders have also been an integral part of the process.

About the RI Free Clinic
Over 50,000 Rhode Islanders do not have healthcare because they do not have access to it, cannot afford to buy insurance, or have no means to acquire it. The Clinic is nationally recognized as a dynamic volunteer model, mobilizing a statewide corps of nearly 600 health care professionals, and community partners. The Clinic provides primary care, nearly 30 medical specialties, wellness programs and preventive services on-site, as well as medicine and Minute Clinic care from CVS – all free to patients.
RIH researchers publish findings on stem cells, osteoarthritis

Found aberrant stem cells may play a role in osteoarthritis

PROVIDENCE – A group of researchers at Rhode Island Hospital and Brown University, along with two international co-authors, had a study published recently in Scientific Reports that found aberrant stem cells may play a previously unexamined role in osteoarthritis.

The researchers discovered that a small population of stem cells found in the joint cartilage of osteoarthritis patients may contribute to the development and worsening of this joint disease. The research team names these cells as OA-MSC (osteoarthritis-mesenchymal stem cells). These stem cells, whose numbers increase as the patient ages and the disease progresses, express tissue-degrading enzymes and may also promote the mineralization of cartilage.

“This holds real promise for future therapies,” says CHATHURAKA T. JAYASURIYA, PhD, of Rhode Island Hospital and the Alpert Medical School, the lead author of the study. “These stem cells are a precursor to the chondrocytes that we’ve long associated with osteoarthritis. We may be able to target the stem cells, eliminating them or preventing their proliferation, and saving valuable cartilage for a longer period of time.”

QIAN CHEN, PhD, also of Rhode Island Hospital and Brown, and the corresponding author of the study comments, “Since we have generated these OA stem cell lines, they will be very useful for screening drugs for treating OA.”

The study, “Molecular characterization of mesenchymal stem cells in human osteoarthritis cartilage reveals contribution to the OA phenotype,” is supported by two major research grants held by the hospital and the university – the Center of Biomedical Research Excellence (COBRE) in Skeletal Health and Repair and the Advance Clinical and Translational Research, both funded by the National Institute of General Medicine (NIGMS).

The other authors are Richard Terek, MD, Michael G. Ehrlich, MD, and Nicholas Lemme, BS, of Rhode Island Hospital/Brown University and Nan Hu, PhD and Jing Li, PhD of Xi’an Jiaotong University in Xi’an, China.
VA expands telehealth, allowing providers to treat patients across state lines

WASHINGTON — On May 11 the U.S. Department of Veterans Affairs (VA) announced a new federal rule that will allow VA doctors, nurses and other health-care providers to administer care to veterans using telehealth, or virtual technology, regardless of where in the United States the provider or veteran is located, including when care will occur across state lines or outside a VA facility.

Previously, it was unclear whether VA providers could furnish care to veterans in other states through telehealth because of licensing restrictions or state-specific telehealth laws. This new rule exercises federal preemption to override those state restrictions, paving the way for VA to expand care to veterans using telehealth. VA worked closely with the White House Office of American Innovation and the Department of Justice for implementation of the new rule.

“This new rule is critical to VA’s ‘Anywhere to Anywhere’ initiative,” said VA Acting Secretary ROBERT WILKIE.

“Now that the rule has been finalized, VA providers and patients can start enjoying the full benefits of VA’s telehealth services.”

By enabling veterans nationwide to receive care at home, the rule will especially benefit veterans living in rural areas who would otherwise need to travel a considerable distance or across state lines to receive care. The rule also will expand veterans’ access to critical care that can be provided virtually — such as mental health care and suicide prevention — by allowing quicker and easier access to VA mental health providers through telehealth.

In the announcement, VA also unveiled VA Video Connect, a video conferencing app for veterans and VA providers. Through this new rule, VA providers will be able to use VA Video Connect and other forms of telehealth to furnish care to veterans anywhere in the country, including in the veteran’s home.
VA Center funding for Neurorestoration and Neurotechnology renewed

Providing $4.5M over five years

PROVIDENCE – Funding for the VA Rehabilitation Research and Development Service (RR&D) Center for Neurorestoration and Neurotechnology (CfNN) located at Providence VA Medical Center, will be renewed June 1, providing $4.5 million in funding over five years to support the center’s research activities.

“We’re honored to have the opportunity to continue developing, testing and implementing neurotechnologies and other restorative therapies for veterans with disorders affecting mobility, limb function or mental health,” said DR. LEIGH HOCHBERG, a neurologist and neuroscientist, and director of CfNN. “Together with our academic partners, we look forward to creating a new generation of extraordinary rehabilitation therapies for veterans.”

One of 12 centers funded by VA RR&D, CfNN brings together scientists, engineers and clinicians from the VA, Brown University and its Carney Institute for Brain Science, and affiliated hospitals, dedicated to advancing neurotechnology to restore lost function for veterans with injuries or illness of the nervous system. Since the center’s launch in 2012, its researchers, as part of the BrainGate consortium, have led the development of advanced neural interfaces for veterans and others with amyotrophic lateral sclerosis (ALS), spinal cord injury and other forms of paralysis.

The center also expanded its research in using brain imaging and new brain stimulation methods to develop and improve treatments for other conditions important to veterans, such as post-traumatic stress disorder, major depression and chronic pain.

Among CfNN’s successes are studies of Veterans with upper limb loss, which enabled Food and Drug Administration approval of the Life under Kinetic Evolution – or LUKE – arm, the first commercially-available prosthetic arm that translates signals from a patient’s muscles into complex motions. The work contributed to CfNN’s DR. LINDA RESNIK receiving the 2017 Paul B. Magnuson Award for Outstanding Achievement in Rehabilitation Research and Development, VA’s highest honor in the field.

Roger Williams University’s public health program partners with RIDOH

BRISTOL – Roger Williams University’s public health program has begun a new partnership with the Rhode Island Department of Health (RIDOH), in policy, research and quality initiatives.

RWU President DONALD J. FARISH and Director of Health NICOLE ALEXANDER-SCOTT, MD, MPH, signed the memorandum of understanding just as RWU is about to create a Department of Public Health on July 1. The University’s public health program has experienced rapid growth since it began working with the RIDOH about nine years ago. At first, the University offered a public health minor, and it began offering a public health major in 2015.

The newly formalized partnership calls for student “public health scholars” at the RIDOH Academic Center, research opportunities for students and faculty members, summer programs for high school students interested in public health fields, joint quality-improvement programs, a healthcare speakers’ bureau, and the sharing of data for research and public policy matters.

The University is currently working with RIDOH on their Health Equity Zone initiatives in Bristol, Providence, Newport and Central Falls/Pawtucket.
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Recognition

Penelope Dennehy, MD, receives Hamolsky Outstanding Physician Award

PROVIDENCE – The Rhode Island Hospital medical staff awarded the 2017 Hamolsky Outstanding Physician Award to PENELÖPE DENNEHY, MD, director of the division of pediatric infectious diseases at Hasbro Children’s Hospital, the pediatric division of Rhode Island Hospital.

“We are extremely fortunate that Dr. Dennehy has chosen to devote her career to Rhode Island and Hasbro Children’s hospitals. She has distinguished herself as a committed professional with outstanding scholarly credentials, and as a fabulous person and clinician who has spent countless hours and effort in support of patients and colleagues alike,” said PAMELA HARROP, MD, FACP, immediate past president of the Rhode Island Hospital Medical Staff Association and a Lifespan board of director, who nominated Dennehy for the distinction.

A resident of Barrington, Dennehy is also a professor of pediatrics and chief of pediatric infectious diseases at the Warren Alpert Medical School of Brown University. Her primary areas of research include the study of viral gastroenteritis and viral respiratory diseases.

A past president of the Pediatric Infectious Diseases Society and past secretary of the Infectious Diseases Society of America, Dennehy has authored numerous peer-reviewed publications, written book chapters and presented numerous abstracts at both national and international venues. She is currently board member and secretary for the World Society of Pediatric Infectious Diseases.

The Hamolsky Outstanding Physician Award is presented each year to a physician who has made exceptional contributions to medicine, medical education and research, has demonstrated leadership, and has been an exemplary role model.

Yale honors URI nursing dean Barbara Wolfe

KINGSTON – University of Rhode College of Nursing Dean BARBARA WOLFE, PHD, has been honored by the Yale School of Nursing for her achievements and distinction within her career.

The Yale School of Nursing’s Distinguished Alumna/us Award recognizes a select few individuals each year for demonstrating “achievement or distinction in their career, their contributions to their communities or to” the School of Nursing.

Wolfe was chosen as one of this year’s recipients because “her accomplishments encompass more than 30 years of experience in clinical, research and academic nursing,” according to Yale Communications.

During her two years at URI, Wolfe has committed herself to further advancing the success of the College of Nursing, which in the last year saw undergraduate students score a first-time pass rate of higher than 90 percent on the National Council Licensure Exam (NCLEX). She has worked to expand the graduate offerings in the college, including overseeing the opening of the Rhode Island Nursing Education Center in Providence and introducing new programs, including a nurse practitioner concentration in psychiatric mental health and a post-master’s nursing education certificate program.

Before taking on her position at URI, Wolfe worked as the associate dean for research at the Connell School of Nursing at Boston College. Prior to that, she served as director of the Center for Nursing Research at the Connell School at BC. Since 2004, she has lectured in psychiatry at Harvard Medical School and served as a research associate at Beth Israel Deaconess Medical Center. From 1997 to 2004, she was assistant professor of psychiatry at Harvard Medical Center.

Wolfe holds Adult Psychiatric and Mental Health Clinical Nurse Specialist Board Certification from the American Nurses Credentialing Center. Her psychiatric/mental health nursing research, and specifically her work on eating disorders, has been published in numerous academic and medical journals. She is a past president of the American Psychiatric Nurses Association and has served on numerous national committees, including scientific review panels for NIH.

She earned her bachelor of science degree in nursing from Syracuse University, her master’s degree in psychiatric mental health nursing from Yale University and her doctorate in nursing from Boston College.

Wolfe was honored by her alma mater at an alumni banquet on May 11 as part of the Yale School of Nursing’s annual Alumni Weekend.

Dr. Betty Vohr receives distinguished alumna award

BETTY R. VOHR, MD, director of the Neonatal Follow-Up Program at Women & Infants Hospital, and medical director of the Rhode Island Hearing Assessment Program, was the recipient of the Albany Medical College Alumni Association 2018 Distinguished Alumna Award for her pioneering work as a clinician and researcher dedicated to improving the lives of high-risk premature infants and infants with hearing loss.

The award honors an alumnus who has earned national recognition for outstanding leadership in health care. A 1966 graduate of Albany Medical College, Dr. Vohr is a professor of pediatrics at The Warren Alpert Medical School of Brown University. She was national coordinator of follow-up studies for the National Institute of Child Health and Human Development Neonatal Research Network between 1990 to 2016 and has published more than 300 manuscripts in peer-reviewed journals.
Recognition

**Angela C. Anderson, MD, FAAP, named Woman Physician of the Year**

ANGELA C. ANDERSON, MD, FAAP, has been named Woman Physician of the Year by the Rhode Island Medical Women’s Association (RIMWA). Dr. Anderson is Director, Division of Children’s Integrative Therapies, Pain Management and Supportive Care (CHIPS) at Hasbro Children’s Hospital. CHIPS provides comfort and support, as well as pain and symptom management, for children with serious or chronic illnesses. The RIMWA annual meeting was held Wednesday, May 2, 2018, at the Providence Marriott Hotel.

**BU honors R. James Koness, MD, at Roger Williams’ Cancer Center**

DR. R. JAMES KONESS, Director of the Breast Health Program at the Roger Williams’ Cancer Center, has been named Educator of the Year in Clinical Sciences by Boston University School of Medicine (BUSM). Dr. Koness is the surgery site director at Roger Williams for medical school students from BUSM.

This award is designed to recognize, honor and reward BUSM faculty who give special effort to ensure the best education for students. Only a small handful of educators receive this honor out of hundreds affiliated with BUSM. The recognition is initiated by students and affirmed by faculty peers.

Dr. Koness is a graduate of Boston College and SUNY-Buffalo School of Medicine. He completed his internship and residency in general surgery at Rhode Island Hospital/Brown University and fellowship in complex surgical oncology at Roger Williams Medical Center/Brown University. A fellow in the American College of Surgeons, he is a Clinical Assistant Professor of Surgery at Brown University School of Medicine with a pending academic appointment at BUSM.

**Dr. Ana Tuya Fulton named Fellow of American Geriatrics Society**

ANA TUYA FULTON, MD, FACP, executive chief of geriatrics at Care New England and medical director of Integra Community Care Network, LLC, was recently inducted into the newest class of American Geriatrics Society (AGS) Fellows. AGS Fellows represent a distinguished cohort of geriatrics experts recognized for a deep commitment to advancing high-quality, person-centered care for all older adults.

“Across her career, Dr. Fulton has demonstrated her commitment to the unique health care needs of older adults. With increasing life expectancy of Americans, the health care needs of older adults is rapidly changing, as these patients often present with multiple chronic illnesses that require, complex, integrated, and well-coordinated care. This fellowship designation is a true testament to Dr. Fulton’s commitment, expertise, and professionalism,” said James E. Fanale, MD, president and chief executive officer, Care New England.

“My commitment to caring for older adults and their families spans my entire career. Since the opportunity to volunteer with the division of geriatrics as a college student, I’ve loved the practice of geriatric medicine, and I’m thankful and proud of this fellowship recognition,” said Dr. Fulton. “I look forward to continuing to grow the geriatric medicine program across Care New England and to providing the very best quality care to this very special population.”

Dr. Fulton is a graduate of the George Washington University School of Medicine and completed a residency in internal medicine, chief residency, and geriatric fellowship at Brown University.

An associate professor of medicine and associate professor of psychiatry and human behavior at The Warren Alpert Medical School of Brown University, Dr. Fulton received a Geriatric Academic Career Award from the Health Resources and Services Administration (HRSA). Dr. Fulton’s major focus of clinical and academic work is on improving end-of-life and transitional care for persons with cognitive impairment and building an age friendly care system across CNE. Dr. Fulton is the Care New England site director and co-project director for the Rhode Island Geriatric Workforce Enhancement Project (RI-GWEP).

Each year, a small contingent of highly qualified AGS members earn fellowship status following a rigorous application process, which includes assessing everything from continuing education and public service to geriatrics scholarship and health care leadership. This year’s fellows hail from all four corners of the country and reflect the increasingly interprofessional nature of geriatrics as a field attracting influential practitioners.
AMS graduates receive Rakatansky, Throop awards

SAMIA KATE ARTHUR-BENTIL, MD ‘18, and EDUARDO GARZA, MD ‘18, received the Herbert Rakatansky Award this year during Commencement weekend at Brown. The award, endowed by the Rhode Island Medical Society (RIMS), is given annually to the graduating Alpert Medical School (AMS) student or students in recognition of their efforts to promote the health and well-being of fellow students over the previous four years.

HYUNWOO JUNE CHOO, MD ‘18, received the Amos Throop Award, named for RIMS’ first president. It is presented to graduating medical students who have demonstrated outstanding engagement with public policy issues and process relating to health care.

Bradley J. Collins, MD, left, President of the Rhode Island Medical Society (RIMS), presented the Society’s annual Herbert Rakatansky Award on May 25th to graduating medical students Samia Kate Arthur-Bentil, MD, and Eduardo Garza, MD, (not shown). The photo was taken at the reception following the annual awards ceremony at the Warren Alpert Medical School. Herbert Rakatansky, MD, at right, is the founder and chair of RIMS’ Physician Health Committee for 40 years.

[PHOTO BY KATHLEEN BOYD]
Medical School Commencement

The Warren Alpert Medical School of Brown University held its Commencement and Awarding of Degrees Ceremony on Sunday, May 27th at the First Unitarian Church. The medical students walked with members of the faculty and alumni in the procession from the green, through the Van Wickle Gates, and down College Hill to the church on Benefit Street, where they took the Physician’s Oath before receiving their degrees.

Dean Jack Elias addressed the class of 2018 at the First Unitarian Church.

The medical students stood to recite the Physician’s Oath before receiving their hoods and degrees.

The newly-graduated physicians gathered on Benefit Street to greet family and friends after the ceremony.
Rena Wing, PhD, receives Distinguished Research Achievement Award

RENA WING, PHD, a professor of psychiatry and human behavior at The Warren Alpert Medical School, recently was presented a 2018 Distinguished Research Achievement Award by Brown University.

“Professor Wing was cited as an internationally recognized researcher on the treatment of obesity and related health problems, especially Type 2 diabetes,” according to a university announcement. “She has served as president of many national organizations, won dozens of awards, including a lifetime achievement award from the American Psychological Association, and has had continuous National Institutes of Health funding since 1983. Her extraordinary mentorship was also cited, as she has helped dozens of young investigators become major researchers on their own.”

Dr. Wing directs a research center that is part of The Miriam’s Centers for Behavioral and Preventive Medicine. She is well known for her programmatic research investigating the most effective strategies for long-term weight loss and weight gain prevention in overweight children and adults. She was responsible for designing and implementing the lifestyle intervention in the Diabetes Prevention Program, a NIH multi-center trial that provides the strongest proof to date of the health benefits of weight loss.

Jill Pipher, vice president for research at Brown, presented the award with Brown Provost Richard M. Locke during an April 19 Celebration of Research ceremony at Brown’s Faculty Club.

Preetha Basaviah, MD, named Brown trustee

PREETHA BASAVIAH, MD, a 1991 Brown biology graduate who earned an MD from the Warren Alpert Medical School in 1995, was elected one of four new trustees by the Corporation of Brown University.

She is assistant dean of pre-clerkship education and a clinical professor of medicine at Stanford University. At Stanford since 2006, she is an educator for CARE (Compassion, Advocacy, Respect, Advocacy), a teaching academy member and an attending physician.

Dr. Basaviah has earned national, regional and institutional awards for teaching, mentoring and scholarship in medical education, including honors as Educator of the Year from the Society of General Internal Medicine.

RWMC Geriatric Oncology team presents at Rhode Island Cancer Summit

The Geriatric Oncology program from the Roger Williams Cancer Center gave a presentation at the Partnership to Reduce Cancer in Rhode Island’s annual Cancer Summit on May 18 at the Crowne Plaza.

DENISE DRAKE, RN, Geriatric Oncology Nurse Navigator, DR. PONNANDAI SOMASUNDAR, Director of Geriatric Oncology, and SAMANTHA MOSSMAN, RD, LDN, Oncology Dietician spoke on “Multidisciplinary Team Care for the Geriatric Oncology Patient.”

Roger Williams is home to the state’s first Geriatric Oncology Program, which is called COPE [Comprehensive Oncology Program for Elders].

Presenters were Denise Drake, RN, Geriatric Oncology Nurse Navigator; Dr. Ponnandai Somasundar, Director of Geriatric Oncology, and Samantha Mossman, RD, LDN, Oncology Dietician.
Brookdale Overview

Independent Living *An ideal retirement living experience*
- Spacious apartments with minimal maintenance
- Restaurant-style dining
- Plenty of planned activities every day

Assisted Living *The right choice for people who need extra help with daily activities*
- Qualified staff assists with taking medication, dressing, bathing, etc.
- Floor plans, from studio to two-bedroom apartments
- Activities and events for various levels of acuity

Alzheimer’s & Dementia Care *Person-centered care for people at various stages*
- Programs that leverage the latest dementia care research
- A care philosophy defined by more than the symptoms of Alzheimer’s & dementia
- An experienced staff who help residents thrive

Rehabilitation & Skilled Nursing *For short-term surgerical recovery or long-term rehabilitation*
- Around-the-clock, licensed nursing care
- Providing clinical resources in a comfortable setting that feels like home
- A mission and focus to helping residents get well and then get home as quickly as possible

Personalized Living *For people who just need a little help with things*
- One-on-one non-medical services for home care needs
- Additional personal needs for those in assisted living or home such as escorts to doctor appointments and more

Home Health *For qualified people in need of therapy or rehabilitation — all in the comfort of home*
- Get Medicare-certified assistance from experienced professionals
- Many healthcare services such as wound care and stroke therapy

Therapy *Specialized programming personalized to encourage recovery*
- An emphasis on education, fitness and rehabilitation that helps seniors retain or enhance their independence
- Most insurances accepted

Hospice *Promoting comfort by addressing the full range of needs of patients and families*
- Primary focus of quality of life
- Specially trained staff help families and patients cope with overwhelming feelings accompanying end-of-life care

Not all services are available at all communities. Contact community for details

The Rhode Island Network

Brookdale Center of New England
Brookdale Cumberland
Brookdale Smithfield
Brookdale Greenwich Bay
Brookdale Pocasset Bay

Brookdale Sakonnet Bay
Brookdale East Bay
Brookdale West Bay
Brookdale South Bay

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Rick Majzun named president, COO at W&I

Rick Majzun, FACHE, has been named president and chief operating officer of Women & Infants Hospital effective July 23, 2018. Majzun, who has more than 25 years of leadership experience, comes to Women & Infants from Barnes Jewish Hospital and St. Louis Children’s Hospital in St. Louis, MO.

The appointment of Majzun follows a year-long national search during which the search committee, led by Care New England Senior Vice President of Planning and Finance Gail Robbins, engaged physicians, staff, and management.

“With a demonstrated track record of success in hospital operations, including 10 years of leadership in an organization that, like Women & Infants, provides services to women and newborns, Rick is a perfect complement to the strong leadership team at Women & Infants Hospital and across Care New England,” said James E. Fanale, MD, president and chief executive officer, Care New England.

Majzun has been associated with BJC Healthcare since 1999, serving as regional director of BJC Medical Group, executive director of strategic planning and then vice president of strategic planning at BJC HealthCare, and vice president of strategic operations and planning of St. Louis Children’s Hospital.

Since 2013, he has served as vice president of operations at St. Louis Children’s Hospital and as vice president of the 212-bed Women & Infants Service at Barnes Jewish Hospital and St. Louis Children’s Hospital. Barnes Jewish is a 1,300-bed adult facility, and St. Louis Children’s is a 430-bed pediatric hospital. During his leadership tenure, Majzun grew deliveries and neonatal intensive care unit admissions in a declining market; increased revenue, margin, and market share; improved major quality indicators; and achieved patient satisfaction goals.

In addition, he worked with physician and nursing partners to create a process to align the cultures of three institutions.

A graduate of the University of Missouri-Columbia, Majzun earned a master of health administration at Washington University School of Medicine. He is a fellow of the American College of Health Care Executives (ACHE), from which he received the 2014 Service Award and the 2006 Early Career Healthcare Executive Regent’s Award. He was a 2011 Eisenhower Fellow and studied pediatric health care systems for five weeks in Kenya and Sweden.

Majzun serves in a number of roles for the Children’s Hospital Association, including a member of the Education Committee of the Board of Trustees, a member of its Chief Operating Officer Steering Committee, member of the Editorial Advisory Committee, and member of the Annual Leadership Conference Advisory Committee. He has spoken before the National Association of Health Services Executives, the Children’s Hospital Association, the American College of Healthcare Executives, and the American Public Health Association.

OFFICE SPACE AVAILABLE
The Rhode Island Medical Society has 442 square feet of newly renovated office space (3 contiguous offices of 200 sq ft, 121 sq ft and 121 sq ft), complete with convenient sheltered parking and the opportunity for tenants to share three well-equipped meeting spaces, break room, office machinery, etc. on the western edge of downtown Providence. Suitable for a small non-profit organization, boutique law firm, CPA firm or other office-based small business.

Inquiries to Newell Warde, nwarde@rimed.org

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¹ www.cdc.gov/tobacco/data_statistics/fact_sheets/cessation/quitindex.htm
Appointments

Dr. David Savitz named Inaugural Associate Dean for Research at School of Public Health

David Savitz, PhD, professor of epidemiology at Brown, has been appointed the Inaugural Associate Dean for Research in the School of Public Health effective on April 10. In this role, Dr. Savitz will provide leadership and vision in planning and implementing the School’s research agenda, including strengthening school-wide systems for the preparation and implementation of research initiatives and the attainment of research funding. He will also represent the School with the Office of the Vice President of Research and relevant university committees.

A graduate of Brandeis University, Dr. Savitz continued his studies at Ohio State University (MS, preventive medicine) and the University of Pittsburgh (PhD, epidemiology). He began his academic career in preventive medicine and biometrics at the University of Colorado School of Medicine in 1981. He moved to what is now the University of North Carolina Gillings School of Public Health as an assistant professor of epidemiology in 1985. He advanced through the ranks, becoming chair of the department of epidemiology and the Cary C. Boshamer Distinguished professor.

In 2006, Dr. Savitz became the Bluhdorn Professor of Preventive Medicine and director of Disease Prevention at the Public Health Institute at Mount Sinai School of Medicine in New York, from which he moved to Brown’s School of Public Health in 2010. He holds secondary appointments in the departments of Obstetrics and Gynecology and Pediatrics in the Warren Alpert Medical School.

His epidemiological research has addressed many important public health issues including reproductive health outcomes and cancer, evaluating the influences of a wide range of environmental toxicants, health behaviors, ethnicity, drugs, and clinical interventions.

Dr. Savitz is an elected member of the National Academy of Medicine and he is the author of over 350 papers in professional journals.

Dennis F. Lynch elected Chairman of South County Health Board of Trustees

Dennis F. Lynch was elected Chairman of the South County Health System’s Board of Trustees at its May 1 meeting. Mr. Lynch has served on the board since 2012 in such capacities as Vice Chairman of the Board, Chairman of the Planning and Market Development Committee and member of the Finance and Performance Improvement Committees.

Among the priorities for the South County Health Board of Trustees are continued emphasis on Behavioral Health, and ongoing innovation such as the recent addition of robotic technology for urologic and general surgery.

“As we approach our 100 year anniversary in 2019 we will continue to invest in the future to bring the highest level of health care to residents of Washington County and beyond.” Mr. Lynch said.

Southcoast names Dani Hackner, MD, new Physician-in-Chief for Medicine

New Bedford – Southcoast Health announced recently that Dani Hackner, MD, has joined Southcoast Health as Physician-in-Chief for Medicine.

Dr. Hackner is an intensivist and is board certified in internal medicine, critical care and pulmonary medicine.

Most recently, Dr. Hackner served as Vice President and Chief Medical Officer for Care Management at Memorial Hermann Health System in Houston. Prior to his work at Memorial Hermann, he was Medical Director for Case Management at Cedars-Sinai Medical Center in Los Angeles.

In this role, he will collaborate with health system leadership to lead Southcoast’s hospital-based clinical programs and specialty services within its Medicine Care Center. He will also devote a percentage of his time to active clinical practice.

Elizabeth Roche Smith, MD, named president of Southcoast Physicians Group

New Bedford – Elizabeth Roche Smith, MD, has joined Southcoast Health as the President of Southcoast Physicians Group (SPG).

Most recently, Dr. Smith served as Vice President, Medical Operation, for the Allina Health Group, Primary Care Service Line in Minneapolis, MN. She also served as Chief Medical Officer at Core Physicians in Exeter, NH, and at Texas Children’s Pediatric Associates in Houston, TX. Previously, Dr. Smith served as Medical Director at Dartmouth Hitchcock Clinic in Concord, NH.

Dr. Smith is a practicing pediatrician and will continue to devote a portion of her time to active practice. She earned her Bachelor of Science from Yale University, and graduated from the Johns Hopkins School of Medicine. She completed her pediatric internship and residency at Yale-New Haven Hospital and earned a Master of Medical Management from Tulane University in New Orleans, LA. She is a Fellow of the American Academy of Pediatrics.
St. Joseph School of Nursing graduates 116th class

The St. Joseph School of Nursing, located on the campus of Our Lady of Fatima Hospital in North Providence, held graduation ceremonies for its 116th class on May 11, 2018. Close to 1,000 family members and friends attended the celebration at the Cathedral of SS Peter and Paul in Providence. Reverend Timothy Reilly, J.C.L., Chancellor, Diocese of Providence, Rhode Island, and St. Joseph School of Nursing Dean Betty T. Sadaniantz, DNP, RN, presented diplomas, pins, and awards to 85 members of the graduating class of 2018 – the last 43 graduates of the three-year curriculum and the first 42 graduates of the newly-revised two-year curriculum.

Diane Cocozza Martins, PhD, RN, delivered the commencement address. Lauren O’Flanagan, Class of 2018 New Curriculum class Valedictorian, offered the welcoming address and Carly VanOrden, Class of 2018 Old Curriculum class Valedictorian, delivered the farewell address. Tabitha Walker and Jessica Marfeo were Salutatorians for the Class of 2018 Old Curriculum and Class of 2018 New Curriculum classes respectively.

The following awards were given to the members of the 116th graduating class:

- The Faculty Certificate of Merit for outstanding ability in Medical/Surgical Nursing was awarded to Treasure Asian (Class of 2018 Old Curriculum) and Lauren O’Flanagan (Class of 2018 New Curriculum).
- The Faculty Certificate of Merit for outstanding ability in Mental Health Nursing was awarded to Treasure Asian (Class of 2018 Old Curriculum) and Lauren O’Flanagan (Class of 2018 New Curriculum).
- The Faculty Certificate of Merit for outstanding ability in Maternal Child Health Nursing was awarded to Carly Van Orden (Class of 2018 Old Curriculum) and Lauren O’Flanagan (Class of 2018 New Curriculum).
- The Mother Mary Evangelist award given by the Alumni Association of St. Joseph School of Nursing in recognition of scholastic achievement, professional leadership and nursing performance was awarded to Tabitha Walker (Class of 2018 Old Curriculum) and Jessica Marfeo (Class of 2018 New Curriculum).


The St. Joseph School of Nursing is the state’s only hospital-based diploma program. Upon receiving their diploma, graduates are eligible to take the national licensing exam for registered nurses. To learn more, visit www.nursingri.com
Southcoast Health opens Wound Care Center at St. Luke’s Hospital

NEW BEDFORD—Southcoast Health opened its second Wound Care Center in May, which will bring advanced, specialized care for acute and chronic wounds to St. Luke’s Hospital.

It opened its first location, the Southcoast Health Center for Wound Care and Hyperbaric Medicine, in 2010, at Charlton Memorial Hospital in Fall River.

Southcoast decided to open a second outpatient location because of the high demand for advanced care for chronic wounds caused by diabetes, venous insufficiency, radiation treatment and other conditions.

A team of specialty physicians, nurses and one nurse practitioner will staff the new Wound Care Center. All staff are clinical experts in wound care and hyperbaric medicine.

The Southcoast Health Wound Care Center is affiliated with Healogics Inc., which is the nation’s largest provider of advanced wound care with nearly 800 partners nationwide. Healogics maintains the largest database of wounds in the world and serves as a resource for wound care research. Southcoast Health contributes to the database with its own patient population and experience.

Last month, Healogics recognized the Wound Care Center at Charlton Memorial as a Center of Excellence. To be eligible for the award, the Center had to achieve outstanding clinical outcomes for a minimum of two consecutive years, including a patient satisfaction score higher than 92 percent, a wound healing rate of at least 91 percent in less than 30 median days to heal.

“The Wound Care Center strives to deliver quality care that addresses the wound healing process. Last year, we were able to successfully achieve a median of 28 days,” said Cheryl Thompson, RN, program director of the Southcoast Health Wound Care Center.

“We take great pride in this achievement,” said Dr. Robert Sandfort, medical director of the new Southcoast Health Wound Care Center at St. Luke’s. “It is our privilege to bring advanced, specialized wound care to many hundreds of patients every year. The St. Luke’s center will work seamlessly with the Charlton Memorial center, to ensure that patients receive the same level of care no matter which site they visit.”

The Southcoast Health Wound Care Center offers the latest treatments and dressings, such as negative pressure dressings that remove drainage from the wound, specialty products, compression therapy for lower leg, ulcers, and full contact casting that eases pressure on diabetic foot ulcers. In addition, hyperbaric oxygen treatment is available at Charlton Memorial for all eligible Wound Care Center patients. The single person pressurized chamber delivers 100 percent oxygen to reduce swelling and promote healing.

From left: Gerald Monchik, MD, Medical Director, Wound Care Center, Charlton Memorial Hospital; Renee Clark, Chief Operating Officer, Southcoast Health; Keith A. Hovan, President & CEO, Southcoast Health; Patricia Webster, Area Vice President Healogics, Inc.; Robert Sandfort, MD, Medical Director, Wound Care Center, St. Luke’s; Cheryl Thompson, Director, Wound Care Center; Jason Rua, Chair, Southcoast Health Board of Trustees; and Timothy Eixenberger, Chief Nursing Officer, Southcoast Health.
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ROBERT S. BURROUGHS, MD, of Seekonk, Massachusetts passed away on May 19, 2018. He was the husband of the late Carol Ann [Kenney] Burroughs who predeceased him in 2002.

Dr. Burroughs was a 1960 graduate of the College of the Holy Cross in Worcester, and Boston University Medical School. Dr. Burroughs served his residency at Rhode Island Hospital in Providence and was an internist in private practice in Pawtucket for over 40 years. He was on the staff at the former Memorial Hospital of Rhode Island in Pawtucket. Dr. Burroughs was a Captain in the United States Army during the Vietnam War.

He was an avid golfer and a long time member of the Pawtucket Country Club.

Dr. Burroughs is survived by his children; Christopher J. Burroughs of Attleboro, Massachusetts, James S. Burroughs of Seekonk, Massachusetts, Brian R. Burroughs of Holden, Massachusetts and Leigh Ann Burroughs of Provincetown, Massachusetts. He also leaves his grandchildren, Alexandra, Ashleigh, Jane, William and Samuel, his two sisters Beverly Kane and Bernadette Plesniak and his faithful dog Fenway. Dr. Burroughs was the brother of the late William Burroughs.

GARY B. WITMAN, MD, 68, passed away unexpectedly on April 30, 2018. He is survived by his wife Dee Dee [Zarum] Witman.

He was an Eagle Scout, a lover of sports, an avid traveler, and an accomplished skier on the U.S. Ski team. A graduate of Rutgers University, Dr. Witman received his medical degree from SUNY Medical School, Downstate. He continued his training at the Mayo Clinic in Minnesota, followed by Brown University and then Yale – as the American Cancer Society scholar in medical oncology – and became a program director at the National Cancer Institute as the head of all twelve comprehensive cancer centers throughout North and South America. During his accomplished career in oncology research and internal medicine, he never put aside his hands-on work treating patients whose lives were on the line. He ran several Boston area emergency rooms where he thrived in what he called “battlefield” conditions. With an uncanny talent to counsel, comfort and diagnose, he demonstrated his great love for all around him with warmth, humor, confidence and a depth of great humanity. His was the first and second medical opinion of countless friends and relatives, and was regarded within the medical community as a “physician’s physician.”

In addition to his wife, he is survived by his three children, Samantha Witman Friedland, Zachary Witman, and Amanda Rose Witman Speiser; two sons-in-law, Michael Friedland and Brian Speiser; three grandchildren, Emmanuelle, Juliette and Hershel Friedland; and three brothers Leonard, Philip, and Michael.

As accomplished as he was in his younger life, his achievements paled in comparison to his last eight years, when he suffered a life-altering accident, rendering him a quadriplegic. Despite his injury, his brilliance and passion for others only grew stronger; he relished his expanding family, and continued to work as a fulltime physician.

In lieu of flowers, contributions may be made to Temple Emanu-El Providence, RI, or the United Spinal Association www.unitedspinal.org, in memory of Dr. Gary B. Witman.