ASP programs. Imperative to the success of program validation is the necessity of data collection and its analysis. The inclusion of a dedicated project manager allows for ongoing critical data analysis as well as interdisciplinary coordination across departments to improve the efficiency of the program while broadening the impact and scope of the ASP to improve patient care. We encourage other institutions interested in developing an ASP to reach out to their quality department for individuals trained in process improvement and program implementation.

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Verbal Communication With Providers Improves Acceptance of Antimicrobial Stewardship Interventions

To the Editor—Antibiotic-resistant bacteria are the greatest threat in modern medicine today.[1] The Centers for Disease Control and Prevention (CDC) estimate that more than 2 million illnesses and 23,000 deaths are attributable to antibiotic-resistant bacteria.[2] In recent years, collaborative efforts to mitigate the impact of these resistant organisms have arisen. As part of these efforts, the Society for Healthcare Epidemiology of America (SHEA) and the Infectious Diseases Society of America (IDSA) released a joint position statement emphasizing implementation of antimicrobial stewardship in all healthcare facilities.[3] Additionally, the National Action Plan for Combating Antibiotic-resistant Bacteria, stemming from President Barack Obama's recent Executive Order, calls for a 20% reduction in inpatient antibiotic misuse by 2020 and mandates antimicrobial stewardship (AMS) in all acute-care hospitals.[4,5]

While AMS is a multifaceted strategy, IDSA recommends 2 core approaches: prospective audit and feedback and formulary restriction.[6] As part of prospective audit and feedback, AMS teams review patients receiving antibiotics for appropriateness of drug, duration, dose, and route. Proposed changes to antimicrobial regimens (interventions) are then relayed to the provider, often in the form of (1) a written or electronic notification placed in the patient's chart or electronic medical record (EMR) or (2) verbal communication, including face-to-face or telephone conversations.

Although overall acceptance of AMS interventions is well documented in the literature, acceptance according to different communication methods is unknown.[7–10] We believe this gap in the current literature to be important and worthy of exploration because less effective methods of communication for AMS may be detrimental to patient care. In an effort to optimize patient care through our AMS services, we recently retrospectively evaluated the acceptance of all verbal and EMR interventions made by the AMS team at the Providence Veterans Affairs Medical Center between March 1, 2014, and February 28, 2015. Our AMS program has been existence since September 2012.

As part of prospective audit and feedback conducted every Monday through Friday, infectious diseases (ID) pharmacy fellows reviewed all patients admitted to the medical center receiving intravenous or oral antibiotics, antifungals, or antivirals. Appropriateness of antimicrobial selection, dose, duration, route, and indication were assessed according to current evidence in ID guidelines, primary literature, as well as our facility-specific antimicrobial guidebook. Interventions were organized into 11 categories: antimicrobial discontinuation, vancomycin dosing, drug dose or duration

TABLE 1. Frequency and Acceptance of Electronic Medical Record (EMR) and Verbal Interventions According to Intervention Type

	No. of Verbal Interventions (N = 152)	Verbal Acceptance, %	No. of EMR Note Interventions (N = 391)	EMR Note Acceptance, %	*P* Value[a]
Vancomycin dosing	20	100	80	62.5	<.01
ID consult	16	100	3	33.3	.02
Drug, dose, or duration optimization	27	88.9	75	58.7	<.01
IV to PO Switch	8	87.5	53	77.4	.51
Therapeutic drug monitoring	8	87.5	6	83.3	1
Broaden antimicrobial spectrum	8	87.5	12	58.3	.32
Order lab test	6	83.3	5	60	.55
De-escalation	22	81.8	32	78.1	.74
Discontinuation	37	73	121	71.1	.82
Change antibiotic due to allergy	1	100	0	…	…
Antibiotic drug interaction	3	100	0	…	…

NOTE. EMR, electronic medical record; ID, infectious diseases; IV, intravenous; PO, oral.
[a]Assessment of differences between verbal and EMR note acceptance.

optimization, intravenous (IV) to oral (PO) switch, de-escalation of therapy, therapeutic drug monitoring, ordering of a pertinent lab test for monitoring purposes, broadening of antimicrobial spectrum, ID consultation, change in antimicrobial regimen due to reported allergic reaction, or addressing a drug–drug interaction between an antimicrobial and another medication.

The ID pharmacy team presents patients potentially needing a change in antimicrobial regimen to a physician or lead clinical pharmacist formally trained in infectious diseases. Interventions deemed necessary by the ID physician or clinical pharmacist were then communicated to the patient's primary provider (usually a medical resident) either by verbal communication (in person or face-to-face) or by placing a note in the patient's electronic medical record. Notes entered into the EMR included all pertinent clinical information, the suggested intervention(s), and an evidence-based rationale for the suggested change. The provider is added as a note co-signer, alerting the provider of an intervention. The AMS team follows up on EMR notifications the following day to assess intervention acceptance status. Interventions were considered accepted if the provider implemented the intervention following EMR notification or discussion with the ID pharmacist or physician.

During the 1-year period, the AMS service reviewed 1,064 unique admissions, making 543 interventions on 384 admissions (36.1% of total admissions), with 73.1% of interventions accepted. Of these interventions, 391 (72%) were EMR notes and 152 (28%) were verbal communications. Verbal intervention acceptance was higher than EMR note acceptance (86.2% vs 68.0%; $P < .0001$). Subsequent subgroup analyses according to intervention type revealed only vancomycin dosing (100% vs 62.5%, $P = .001$), drug dose or duration optimization (88.0% vs 59.5%; $P = .009$), and ID consultation (100.0% vs 33.3%; $P = .02$) had significantly higher acceptance in the verbal arm than the nonverbal arm (Table 1).

Our results suggest the importance of verbal communication in the implementation of AMS services. For example, of the EMR note interventions not accepted, 33% were notes that were not signed and, therefore, were likely not seen by the provider. This may have been attributable to the unfamiliarity of medical residents with the EMR system, as they spend limited time within the VA, or to potential fatigue associated with the large number of notes that need to be signed by the provider.

Our results were limited in their scope due to lack of randomization according to communication method and a relatively small number of verbal interventions. Selection of communication used was largely dependent upon the ID fellow conducting AMS. However, we provide a real-world analysis that may represent many AMS program practices. As a result of our findings, verbal communication is now the primary method of providing AMS interventions at our facility, utilizing EMR notes in instances where the provider cannot be reached by pager, phone call, or face-to-face discussion. Our analysis has demonstrated the importance of effective communication as part of AMS activities. Because AMS programs have become a primary defense mechanism against antibiotic-resistant bacteria, their effectiveness is vital. By limiting the use of potentially less effective communication methods, stewardship practices may be improved, potentially reducing inappropriate antimicrobial use, improving patient outcomes, and decreasing resistance rates.

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Seamless Suits: Reducing Personnel Contamination Through Improved Personal Protective Equipment Design

To the Editor—Healthcare personnel frequently use incorrect technique when putting on and removing isolation gowns and gloves.[1–3] Such lapses in technique increase the risk for contamination of the skin and clothing of personnel during personal protective equipment (PPE) removal.[1,3] Contamination of the hands and wrists may be particularly common due to exposed skin at the wrist or incorrect technique during glove removal.[1,3,4] In surgical settings, the gown–glove interface has also been described as the weakest point in the gown and glove barrier system.[5,6] In studies simulating removal of contaminated gloves, education to improve technique reduced but did not eliminate hand and wrist contamination.[1,4] Thus, improvements in PPE design to reduce the risk for contamination are needed.

We hypothesized that gowns and gloves designed to provide continuous coverage of the wrist and hand would reduce contamination during PPE removal. To test this hypothesis, we developed a seamless PPE prototype in which adhesive material on the outer sleeve of the gown at the wrist attaches to the inner cuff of the gloves, providing continuous coverage of the wrist and hand. This design prevents exposure of skin and requires that gloves be peeled off as the gown is removed. Here, we report the results of a pilot study to determine whether the seamless PPE design reduces hand and wrist self-contamination in comparison to standard gowns and gloves.

The Cleveland VA Medical Center's Institutional Review Board approved the study protocol. The prototype seamless PPE consisted of polyethylene contact isolation gowns (Safety Plus Polyethylene Gown, TIDI Products, Neenah, WI) and nitrile gloves (Denville Scientific, South Plainfield, NJ). Permanent contact bond adhesive (DAP Weldwood Contact Cement, DAP Products, Baltimore, MD) was applied circumferentially to the outer gown at the level of the wrist. Gloves were pressed to the gowns for 15 minutes and allowed to air dry for 24 hours.