VERMONT
DEPARTMENT OF HEALTH

Antibiotic Stewardship in Emergency Departments

Structured interviews with emergency department personnel in 12 Vermont hospitals and Dartmouth Hitchcock Medical Center

VMS Education & Research Foundation
helping physicians help patients & communities

Executive Summary

Emergency room practitioners in 12 of Vermont's 14 hospitals and Dartmouth Hitchcock Medical Center (DHMC) were interviewed about their use of antibiotics for respiratory tract infections. The goal of the qualitative research effort is to identify opportunities to assist advancing antibiotic stewardship in the region.

Antibiotics are prescribed appropriately and judiciously in the ED setting
The predominant opinion among Vermont's emergency department (ED) providers is that antibiotics are being prescribed appropriately and judiciously in the ED setting. Broad spectrum antibiotics are rarely prescribed, and when they are used, it is typically for ease of compliance with the treatment regimen or uncertainty about the diagnosis. The members of each medical community are generally knowledgeable about each other's prescribing patterns; individuals who are more frequent prescribers of broad spectrum antibiotics are typically known to other community practitioners.

Nearly everyone opined that appropriate narrow spectrum targeted antibiotics are prescribed more frequently in EDs than would be predicted by an external review of clinical indications. This would be the case if the external review utilized billing claims and to a lesser extent if the review was based on a clinical record review. The reason for the variation between what would be categorized as appropriate by the external reviews and the actual prescribing behavior is the inadequacy of documentation processes to capture the nuances and all the details pertinent to the clinical decision making process.

Several interviewees mentioned that cellulitis including wound prophylaxis; urinary tract infections (UTIs); and the treatment of Lyme disease are more common indications for prescribing antibiotics than are respiratory tract infections. Interviewees also cautioned that the use of antibiotics for respiratory tract infections was significantly higher during the past year due to the prevalence of pertussis in many Vermont communities and clinical and public health recommendations to be aggressive in treating suggestive cases.

Clinical uncertainty, concern over the lack of follow up and patient expectations
The most common factors cited as influencing prescribing decisions not captured in a rigid interpretation of current best practice are:

- clinical uncertainty about the diagnosis;
- concern over the lack of follow up for the patient if their condition worsened; and
- patient expectations about the appropriateness of antibiotic treatment.

Concern about lack of follow up alludes to a variety of dimensions including homelessness, concomitant psychosocial challenges faced by the patient, lack of transportation or health insurance and no dependable site of ongoing care.

Patient expectation is a frequently cited factor. There is variation in respondent opinion of why patients expect to be treated with antibiotics. The principal cause seems to be patient perception that their symptoms are severe enough to warrant an antibiotic prescription; they tell the ED practitioner that they feel sicker than they typically do with a viral respiratory infection. ED practitioners include this patient perception in their diagnostic appraisal. Relatedly, practitioners are influenced by the ED setting; just the fact that a patient is feeling ill enough to expend the effort and expense to come to the

ED is included in some practitioner's assessment of illness. Patient expectation by itself is not an independent factor that influences practitioner decisions about whether to prescribe an antibiotic. That being said, many of the interviewed practitioners mentioned that patient expectation does influence them, particularly when they are under time pressure because of a heavy patient volume or when the patient is exceptionally insistent. It takes longer to talk to a patient about why they do not need an antibiotic than to write a prescription; and patients rarely complain to the hospital about not getting an antibiotic, but it is not uncommon for patients to complain about not getting antibiotics. There is no consistent response about whether parents are more or less insistent about their child's needs than adults are about their own. Respondents gave both answers.

Other factors mentioned more than once included:

- time pressures on busy days to move patients through the department, "it's always faster to prescribe a pill than educate a patient";
- "Last case bias" causing increased clinical anxiety (a practitioner or a peer having just missed a diagnosis and having the affected patient suffer untoward consequences);
- pressure and consequence from management to avoid patient complaints; and
- concern about pertussis which was so prevalent in many communities in the past year.

Public health campaign and consistency of practice across all care settings

A few responses suggest possible intervention or further investigation:

1. In one community patients seem to be of the opinion that "bronchitis" was an inevitable precursor to pneumonia, and antibiotics are to prevent progression of their illness;
2. Relatedly, many patients opine they need antibiotics because of the severity of their illness; many of the interviewees feel "they are pretty isolated" in trying to educate their communities about when antibiotics are appropriate. Both of these comments suggest a more effective community and statewide public health campaign might decrease patient demand for inappropriate antibiotic treatment;
3. A third comment heard in several communities is the role that inconsistency among community practitioners in their practice of prescribing antibiotics plays in patient expectations. Many patients present themselves to the emergency rooms thinking that antibiotics are appropriate because their usual physician inappropriately prescribed them for similar symptoms in the past. A possible intervention to address this aspect of overuse of antibiotics is community wide education of practitioners about the need for consistency of practice across all local practices; and
4. Two practitioners in one community mentioned "everyone in this community either has had MRSA or knows someone that has had it"; and it is more frequent for them to have to convince a patient antibiotics are needed than it is for them to have to persuade someone that antibiotics are not needed. Neither of the two practitioners knows if the prevalence of MRSA is higher in their community than elsewhere. This opinion was not expressed in any other community. The reason for this unique community perspective is not known.

Continuing medical education (CME)

The most frequent CME resource mentioned by interviewees was UpToDate

http://www.uptodate.com/home. UpToDate is available within all Vermont hospitals and DHMC. Several other modalities were mentioned as secondary resources including: web based professional resources, professional CME conferences, peer reviewed professional journals (both print and web based) and audio tapes that practitioners used in their cars.

CDC and ASTHO partner with professional organizations to promote Get Smart campaign

Interviewees suggested the Centers for Disease Control and Prevention (CDC) and the Association of State and Territorial Health Officials (ASTHO) work with professional societies to ensure current and consistent recommendations for professionals. One interviewee suggested CDC and/or ASTHO develop and host a web based CME curriculum.

Best practice reminders need to be pushed to providers and pushed out periodically; providers tend to regress to previous behavior without continual reinforcement.

Patient education and the Get Smart program

Only a few practitioners had seen the Get Smart materials or were aware of the program. Those that did happened to see the program did so on the CDC website, which they use as a professional resource for infectious disease issues, particularly sexually transmitted diseases. One practitioner found Get Smart materials distributed by VDH to all the hospitals, but had no knowledge of their origin. One director had found the materials in his work to develop a performance improvement initiative on appropriate prescribing in the department.

The most common response to the Get Smart materials was that they were redundant of the information that was already contained in the discharge instructions generated by their departmental electronic medical records (EMRs), and the materials didn't fit in to the busy work flow of the EDs and the cramped work space.

There were several interviewees who were adamant about not seeing any added value in the materials.

The remaining practitioners were somewhat or very enthusiastic about the materials. Those for whom the materials had appeal liked the high quality of the materials mentioning the quality paper material, colorful presentation and the direct clear content. A common comment from those enthusiastic about the materials was many patients did not pay much attention to the EMR generated discharge summaries because they tended to be too long and verbose. The colorful, targeted and unique Get Smart pamphlets might be treated differently and get more and wider attention among family members.

Practitioners were most enthusiastic about the pamphlets describing why antibiotics are not effective for viral infections. The posters were the second most popular. Only about half of the clinicians who saw a role for the Get Smart materials in their department were drawn to the other materials: the prescription describing non antibiotic measures, the listing of conditions whose etiology was viral and the how to take antibiotics handout. The reason for their lack of enthusiasm was redundancy with the information already contained in their EMR and current workflow.

CDC and ASTHO partner with EMR vendors to promote Get Smart campaign
Interviewees suggested CDC, ASTHO and the Vermont Department of Health (VDH) work with EMR vendors to have the Get Smart material incorporated into the EMR discharge instructions. Documentation of patient education is easier if materials are already contained in the EMR; practitioner salaries are affected by EMR documentation of patient education; and using materials outside of the EMR work flow isn't appealing in the often hectic ED setting.

Data collection and process improvement
No departments reported current tracking of the use of antibiotics for respiratory tract infections. Half of the institutions are tracking and reporting data on other infectious processes; UTIs being the most common. Nearly all institutions track data on pneumonia patients admitted to the hospital to comply with Centers for Medicare & Medicaid Services (CMS) Core Measures demands.

CDC and ASTHO partner with EMR vendors to facilitate performance audits
No interviewees were aware of the Healthcare Effectiveness Data and Information Set (HEDIS) claims based quality reporting measures. Most felt claims data are too removed from the nuances of the clinical setting and all the factors at play for determining who did and did not need antibiotics. Respondents did not discount the value of performance reporting and would welcome valid useful reports that could be reconciled with their clinical documentation. A few interviewees mentioned that if the departments themselves could easily generate performance reports from their EMRs, they would likely do so; but at present, the difficulties involved with extracting meaningful performance reports from their clinical records was too great to justify the necessary time and resources to do so.

The remainder of the document is structured to correspond to the 15 interview questions in the order they were asked. The executive summary represents a compilation of key findings and potential next steps. The remaining report provides more detail about the responses.

Quantitative information is included for most questions to give the reader a sense of the robustness and validity of the researcher's summary assessments contained in the executive summary. The reader should note that the numerical data in the following tables represent the times a comment was made by an interviewee. The total number of comments will rarely correspond to the number of 20 interviewees. For instance, some interviewees would only respond that pneumonia was the most common indication for prescribing an antibiotic; another interviewee would respond that pneumonia was the most common, but also mention otitis and strep pharyngitis as other frequent indications. The numerical data in the tables does however give the reader a sense of the frequency of a specific response across all 20 interviews.

Interviewee Background

Twenty emergency room clinicians were identified as key informants and interviewed by the Director of the Vermont Medical Society Education and Research Foundation. Sixteen of the interviewees were physicians, two were physician assistants (PA) and two were advanced practice registered nurses (APRN). All of the physicians were board certified, 19 of them in emergency medicine. All PA's and APRNs interviewed are certified and licensed by the State of Vermont. One of the APRNs had specific certification in emergency medicine. The majority of the physicians were the directors of their departments.

The median year of graduation from medical school or the year that the PAs and APRNs finished their degree was 1997. The range of graduation dates was 1983 to 2010.

Key Informant Interviews

Question	Category	Interviews	Hospitals not done	Interviews not done	Med	Max	Min
	Demographics						
	Hospital EDs	12					
	Tertiary care	2					
	Community	5					
	Critical access	5	2				
	Interviewees	20		6			
	MD/DO	16					
	APRN	2					
	PA	2					
1	Graduation year				1997	2010	1983
2	Speciality						
	Emergency medicine	19					
	Internal medicine	4					
	Family medicine	4					
	EM and IM	5					
	EM and FM	1					
3	Certification status	100%					

Methodology

The interviewer is an allopathically trained US physician who completed university based Family Practice and Pediatrics residencies; practiced community primary care for 15 years; subsequently received a master's degree in public health and worked in the fields of public health and clinical quality improvement for 20 years. The majority of the physician's training, clinical practice and public health career has been in the state of Vermont where he is well known by the clinical and public health professional communities.

All but one interview were done in person at the interviewees' emergency departments. The outlying interview was done at an off-sight convenient location. Seventeen separate interview sessions were conducted. A university undergraduate student accompanied the Director for two interviews. Thirteen of the interviews involved a single interviewee. Four of the interviews involved two clinicians from the same institution. Clinicians from 12 of the targeted 14 hospitals were interviewed. The two hospitals not represented in the research are both critical access hospitals. The emergency department directors at

these institutions did not respond to multiple requests for interviews both by the Foundation Director and leadership physicians at both the institutions. A single clinician was interviewed at three hospitals (one tertiary center, one community hospital and one critical access hospital). Two clinicians were interviewed at eight hospitals. Three clinicians were interviewed at one tertiary care center. There are no free standing emergency departments in Vermont.

The interviewees were all asked to respond to the same 15 questions. Interviews lasted from 30 to 45 minutes. Interviews were not audio recorded. A written summary of the interviews was sent back to each interviewee for review. The majority of the interviewees agreed with what was written without edits. A few interviewees made corrections or added clarifying comments. All edits were minor. Copies of the interview questions are included in appendix A. The shorter version was what was given to the interviewees. The longer version is what was used by the interviewer. The interviewer asked the secondary questions when the issue was not addressed spontaneously by the interviewee in their response to the leading question.

For what conditions do you most frequently prescribe antibiotics?

The interviewer prefaced this question explaining that the focus of the interview was respiratory tract infections including pneumonia, bronchitis, pharyngitis, sinusitis, otitis media and all other viral and bacterial respiratory syndromes.

Key findings

- Pneumonia was the most common condition mentioned. Nine respondents identified pneumonia as the most frequent indication; another six respondents mentioned pneumonia as being the second or third most common indication. Other frequent conditions included otitis media, acute exacerbations of chronic obstructive pulmonary disease (COPD), group A *Streptococcus* pharyngitis (strep throat, strep pharyngitis) and prolonged or atypical bronchitis meeting professional thresholds for antibiotic treatment.
- Nearly half of the interviewees (7) mentioned that respiratory tract infections were not the most common reason for prescribing antibiotics; cellulitis, urinary tract infections (UTIs) and Lyme disease being more common indications. Interviewees were not asked to rank respiratory tract infections against other conditions. A follow up effort should include this question for context.
- As mentioned in the Executive Summary, the reader should note that the numerical data in the following tables represent the times a comment was made by an interviewee. The total number of comments will typically not correspond to the number of 20 interviewees. For instance, some interviewees would only respond that pneumonia was the most common indication for prescribing an antibiotic; another interview would respond that pneumonia was among the most common, but also mention otitis and strep pharyngitis as being just as common an indication. The numerical data in the tables does however give the reader a sense of the frequency of a specific response across all 20 interviews.

	Current practice	Most common	Other	Combined
4	Clinical conditions			
	pneumonia	9	6	15
	otitis media	3	10	13
	COPD exacerbation	1	9	10
	Strep pharyngitis - culture, Centor score or Ag test positive	2	8	10
	Bronchitis typically prolonged and/or co morbidity/ ACEP guidelines	4	6	10
	sinusitis		3	3
	Tick borne disease		1	1
	Suspected Pertussis		1	1
	Cellulitis including Wound prophylaxis	2		2
	UTI		3	3
	Dental abcesses		2	2

4. What's your opinion of your own practice of using antibiotics for outpatient respiratory infections?

The interviewer prefaced this question explaining that the interviewee was to answer this question based on their own current knowledge of best practices and not against a specific recommendation promulgated by a specific entity, e.g. American College of Emergency Physicians (ACEP). The intent of this question was to get a sense of how often the clinician prescribed an antibiotic to a patient when, on review, the documented clinical record would not meet their own sense of a rigid interpretation of current professional recommendations. Additionally each interviewee was asked what non documented or nuanced aspects of the clinical situation were prominent in influencing their decision about whether to prescribe an antibiotic.

Key findings

The majority of respondents felt that they adhered to current best practices in the majority of their clinical interactions. No one felt that they were not knowledgeable of current best practices. Several respondents felt that they did overprescribe at times. Two respondents felt that they actually prescribed antibiotics less than the current recommendations. The reader is reminded to interpret these findings with a response bias in mind; as actively practicing practitioners, the respondents are unlikely to state that they are not knowledgeable about current best practices.

The term "over prescribing" is used in this document to refer to prescribing a targeted, narrow spectrum antibiotic for a patient with a convincing clinical presentation of a specific syndrome, but who may lack one or two key signs or symptoms if matched up against a strict interpretation of best practice. "Over prescribing" does not refer to the use of antibiotics with an excessive coverage spectrum for the condition being treated. Very few interviewees reported using "broad spectrum" antibiotics in any clinical case. The few reporting using an antibiotic spectrum broader than recommended for a specific clinical use did so either for ease of compliance (once or twice a day dosing versus three or four times a day for a more targeted antibiotic) or because of clinical uncertainty in the diagnosis - concern that there was something atypical about the clinical case and concern that they would under treat their patient.

The following table catalogues the frequency that an interviewee mentioned a factor that would cause them to over prescribe. In looking at the numbers recorded in the table, the

reader should be aware that the data in the table represent the frequency that a factor was mentioned in all the interviews. Some respondents would only mention one factor, others would mention several. Some respondents would cite a specific factor as the predominant factor; others would mention several factors together. The most informing data in the table is the combined number. This represents how frequently a factor was mentioned in all the interviews.

By far the most frequent reason cited for "over prescribing" was clinical uncertainty, followed by concern by the clinician about what access the patient had to follow up care if their problem worsened. This latter concern alluded to a variety of dimensions including homelessness, concomitant psychosocial challenges faced by the patient, lack of transportation or health insurance and no dependable site of ongoing care.

Patient expectation was also a frequently cited factor. There was variation in respondent opinion of why patients expected to be treated with antibiotics. The principal reason mentioned was patient opinion that they were more ill than was typical for a viral infection and they must have an illness that required antibiotics for them to get better. There was no consistent response about whether parents were more or less insistent about their child's needs than adults were about their own. Respondents gave both answers. Patient expectation was not an independent factor; rather it was one factor considered by practitioners in their process of deciding who to treat with antibiotics and who not to treat.

A few opinions mentioned suggest possible intervention. In one community patients seemed to be of the opinion that "bronchitis" was an inevitable precursor to pneumonia, and antibiotics were needed to prevent progression of their illness. Relatedly, many patients opine they need antibiotics because of the severity of their illness; many of the interviewees felt that "they are pretty isolated" in trying to educate their communities about when antibiotics are appropriate. Both of these comments suggest that a more effective community and statewide public health campaign might decrease patient demand for inappropriate antibiotic treatment.

A third comment that was heard in several communities was the role that inconsistency among community practitioners in their practice of prescribing antibiotics plays in patient expectations. Many patients present themselves to the emergency rooms thinking that antibiotics are appropriate because their usual physician inappropriately prescribed them for similar symptoms. A possible intervention that could address this aspect of overuse of antibiotics would be community wide education of practitioners about the need for consistency of practice across all local practices.

Other factors mentioned more than once included: time pressures on busy days to move patients through the department, "it's always faster to prescribe a pill than educate a patient"; last case bias causing increasing clinical anxiety; pressure and consequence from management to avoid patient complaints; and concern about pertussis which was so prevalent in many communities in the past year.

	Current practice	Frequently	Infrequently	
5	Practice of prescribing appropriate A/B			
	Strict adherence	11		
	More than best practice		7	
	Less than best practice		2	
	Factors influencing "over prescription"	Principal	Other	Combined
	Worrisome overall clinical gestalt/Clinical uncertainty/comorbidities	1	17	18
	Concern about no follow up/ ED population different/no transportation	3	8	11
	Patient expectations	6	3	9
	My doctor always prescribes/inconsistency across settings		4	4
	Fear they'll get worse		1	1
	Time pressure to move on	1	3	4
	Last bad experience		4	4
	Age as independent factor/difficult to separate comorbidity			0
	Corporate concern re: patient satisfaction		3	3
	Pertussis concerns		3	3
	Cost		2	2
	Continual change in recommendations		1	1

All interviewees said concern about antibiotic resistance is part of their everyday practice. Two practitioners in one community mentioned “everyone in this community either has had MRSA or knows someone that has had it”; and it was more frequent for them to have to convince a patient antibiotics were needed than it was for them to have to persuade someone that antibiotics were not needed. Neither of the two practitioners knew if the prevalence of MRSA is higher in their community than elsewhere. It might be worthwhile to understand more about the genesis of this public sentiment and whether there is something operant either in the community in general or in the practice of the clinicians in the community that seem to have successfully educated the patient population about the disadvantages of antibiotic over prescribing.

5. What about the practices of other ED practitioners in your hospital?

Respondents feel that their department colleagues prescribe similarly to themselves. A few respondents feel that their colleagues prescribed more than they do. No one thought their colleagues prescribed less. Two respondents mentioned that there is one physician in their department who prescribes more than others. There was a mix of opinion about whether physicians prescribed more or less than APRNs and PAs in those departments that employed these practitioners.

There was again mention of inconsistency across the care settings in some communities with varying opinions of whether the EDs prescribed more than other practices. The general sense from all the interviews was that the EDs prescribe less than the other practice settings. If there was a particular outlier either in the ED or in the community, it was generally known across the practitioners.

One respondent mentioned that at a former place of work, he led an improvement project that included chart review and performance feedback linked with an educational process; the effort resulted in less inappropriate prescribing and more consistent prescribing decision making among providers.

Not every respondent mentioned a reason why their peers might prescribe more than themselves. Those that did mentioned similar factors that caused their own over prescribing.

	ED Colleagues current practice	
6	Practice of prescribing appropriate A/B	
	Strict adherence	13
	More than best practice	5
	One notable exception	2
	Community practitioners overprescribe or mis-prescribe	3
	Community practitioners think ED overprescribes	2
	APRNs and PA's tend to prescribe more	3
	APRNs and PA's prescribe the same as physicians	5
	QI resulted in more consistency and lowered use	1
	Less than best practice	0
	Factors influencing "over prescription"	
	Concern about no follow up/ ED population different/no transportation	4
	Patient expectations	4
	My doctor always prescribes/inconsistency across settings	1
	Time pressure to move on	1
	Cost	2

6. Is there a standard treatment guideline for outpatient respiratory infection treatment for the ED?

Few departments had treatment recommendations specifically for respiratory tract infections. One department, part of a teaching institution, had guidelines for all inpatient and outpatient infectious disease conditions that are updated annually and embedded in their institution-wide EMR. A few institutions had recommendations specifically for pneumonia; most of these were limited to the treatment of pneumonia in patients that were to be admitted to the hospital in order to comply with the CMS Core Measures set.

Respondents from departments that did not have written guidelines mentioned that the treatment of respiratory tract infections was not a high priority for them; that they did have many treatment guidelines, but these addressed higher priority conditions, typically, life threatening situations. Several respondents mentioned that there was informal consensus on what was appropriate use of antibiotics for the treatment of respiratory infections, but no formal documentation of best practice.

	Standard Treatment Guidelines	
7	Yes	2
	Pneumonia - inpt and outpt	1
	Core measures for inpt pneumonia	2
	No	10
	Informal consensus	2
	Not a priority condition	4

7. How does the ED track and share data on antibiotic use?

No departments reported that they currently track the use of antibiotics for respiratory tract infections. Half of the institutions track and report data on other infectious processes; UTIs being the most common.

No interviewees were aware of the HEDIS claims based quality reporting measures. Two of the interviewees thought the information could be useful, particularly if it was specific to patients in the ED and comparative data from other EDs was included. Most felt that claims data were too removed from the nuances of the clinical setting and all the factors at play for determining who did and did not need antibiotics were not captured by the billing process.

The respondents did not discount the value of performance reporting and would welcome valid useful reports. A few interviewees mentioned that if the departments themselves could easily generate performance reports from their EMRs, they would likely do so; but at present, the difficulties involved with extracting meaningful performance reports from their clinical records was too great to justify the necessary time and resources to do so.

	ED Data Collection	
8	**Yes**	0
	No	12
	Yes for other conditions	6
	UTI	3
	HEDIS	
	Aware of	
	Yes	**0**
	No	**18**
	useful	2
	not useful	**16**

8. What, if any, are the biggest challenges when it comes to appropriately prescribing antibiotics for these infections in the ED setting?

The responses to this question were nearly identical to the response to the fourth question above in terms of factors influence over prescribing for respiratory tract infections. Principal factors mentioned again included patient expectations particularly when their usual source of care typically prescribes excessively; clinical uncertainty; and, concern about follow up for many patients with no usual source of care and compounding psychosocial issues.

Also repeated were corporate pressures to avoid dissatisfied patients and corporate pressure to not admit patients in communities with high per capita admission rates known through public reporting efforts by the state and private payer feedback. Concern over the prevalence of pertussis was mentioned again.

Two novel factors mentioned were the continual change in the prescribing recommendations from various professional organizations; and lack of evidence of actual practices due to inaccurate reporting methodologies like trying to extract clinical quality reports from medical billing data.

9	Biggess challenges to appropriate prescribing	Frequently	Infrequently	
	Factors influencing "over prescription"	Principal	Other	Combined
	Patient expectations	5	1	6
	My doctor always prescribes/inconsistency across settings		3	3
	Worrisome overall clinical gestalt/Clinical uncertainty/comorbidities	3		3
	Concern about no follow up/ ED population different/no transportation	2	1	3
	Corporate concern re: patient satisfaction and pressure not to admit		2	2
	Pertussis concerns	2		2
	Cost	1	1	2
	Time pressure to move on	1		1
	Last bad experience			0
	Age as independent factor/difficult to separate comorbidity			0
	Continual change in recommendations		1	1
	Definitional	1		
	Compliance requirements		1	
	Prescribing excessive spectrum A/B			
	Clinical uncertainty			
	Ease of compliance	1		

9. **What strategies or resources are you currently using to support appropriate prescribing of antibiotics? What other resources or tools would be helpful to you to ensure judicious antibiotic use?**

Regarding professional continuing medical education, the most common answers were professional guidelines, the American College of Emergency Medicine and UpToDate being the most frequently mentioned. UpToDate was a common response from those who worked in departments where the resource was easily accessible within or from their EMR. Listening to audio tapes in cars was mentioned by more than half of the respondents. CME conferences and peer reviewed journals were among other commonly mentioned strategies.

Regarding patient education the most common response was the use of the discharge summary generated by the departmental EMR.

One department is about to start a departmental quality improvement effort that will include performance reporting, educational sessions and new patient education materials.

Another department took advantage of the opportunity to refer patients who were cigarette smokers to their departmental smoking cessation service staffed by departmental nurses.

Professional Resources

10. **How do you stay up to date on best practices with regard to antibiotic prescribing? What would be better strategies or formats for delivering that information to busy clinicians like you?**

The most frequent resource mentioned by interviewees was UpToDate http://www.uptodate.com/home which is available within all Vermont hospitals and DHMC. Several other modalities were mentioned as secondary resources including: web based professional resources, professional CME conferences, peer reviewed professional journals (both print and web based) and audio tapes that practitioners used in their cars.

A suggestion made by more than one interviewee is for CDC and ASTHO to work with professional societies to ensure current and consistent recommendations for professionals. One interviewee suggested that if CDC and/or ASTHO were to develop and host a web based CME curriculum, it would be attractive to practitioners.

One responder made the suggestion that best practice reminders need to be pushed to providers and that they need to be pushed to them periodically, because providers tend to regress to previous behavior without continual reinforcement.

11	CME			
	Professional guidelines			
	ACEP	4		
	Infectious disease consults/institutional ID guidelines/Grand rounds	3		
	Up to Date	11		
	CDC	STD's	free on line cme	
	Peer reviewed literature	8		
	Conferences	7		
	Audio tapes	7		
	Web based resources/PDA's	7		
	Valid data and reporting	1		
	No A/B prescription			1
	Patient education pamphlets		1	
	Smoking cessation through nursing staff			
	Starting departmental QI effort on URI's	2		

Patient Education Resources

11. **How do you use patient education materials about antibiotic use? How could the materials or the process of using them be improved?**

12. **CDC's Get Smart: Know When Antibiotics Work initiative - Are you aware of the CDC Get Smart initiative?**

13. **Would you use the Get Smart resources for professionals? Could you suggest improvements to the content, format or mode of accessing them?**

14. **Would you use the Get Smart resources for patients? Could you suggest improvements to the content, format or mode of accessing them?**

Only a few practitioners had seen the Get Smart materials or were aware of the program. Those that happened to see the program did so on the CDC website which they use as a professional resource for infectious disease issues, particularly sexually transmitted diseases. One practitioner found the samples distributed by VDH to all the hospitals, but had no knowledge of their origin. One director had found the materials in his work to develop a performance improvement initiative on appropriate prescribing in the department.

The most common response to the Get Smart materials was that they were redundant with information that was already contained in the discharge instructions generated by their departmental EMRs, and that the materials didn't fit in to the busy work flow of the EDs and the cramped work space itself.

There were several interviewees who were adamant about not seeing any added value in the materials.

That being said, the remaining practitioners were somewhat or very enthusiastic about the materials. Those to whom the materials had the most appeal liked the high quality of the materials mentioning the high quality paper material, colorful presentation and the direct clear content. A common comment from those somewhat enthusiastic about the materials was many patients did not pay much attention to the EMR generated discharge summaries because they tended to be too long and verbose. The colorful, targeted and unique Get Smart pamphlets might be treated differently and get more and wider attention among family members.

Practitioners were most enthusiastic about the pamphlets describing why antibiotics are not effective for viral infections. The posters were the second most popular. Only about half of the clinicians who saw a role for the Get Smart materials in their department were drawn to the other materials: the prescription describing non antibiotic measures, the listing of conditions whose etiology was viral and how to take antibiotics. The most common reasons for their negative opinions were that the Get Smart documents were redundant of the information contained in their EMR discharge summaries.

There were interviewees of all three opinion groups that mentioned that CDC, ASTHO and VDH should consider working with both EMR vendors and their subcontractors who supply the patient education information to the EMR vendors to have the Get Smart material incorporated into the EMR discharge instructions.

Another comment made by a few interviewees was that documentation of patient education was easier if the materials already contained in the EMR were used; and that is some institutions practitioner salaries were affected by the rate at which patient education was documented in the clinical record. For these practitioners, using materials that were outside of the EMR work flow was not appealing.

Appendix A – Structured interview questions

1. Interview questionnaire given to interviewee

Antibiotic Stewardship in Vermont

Searching for Solutions to the Growing Problem of Antimicrobial Resistance

Key informant interview

The purpose of this interview is to collect information from you - an individual who has firsthand knowledge about the health care needs of your community - about the growing public health problem of antibiotic resistance and specifically the use of antibiotics for outpatient respiratory infections.

Your responses will be kept anonymous and confidential. A de-indentified aggregate summary will be written and distributed to all interviewees after study completion. The summary will be used to inform public health and health care delivery policy regarding antibiotic stewardship in the state.

We are planning on interviewing emergency department physicians caring for children and adults in all Vermont hospital service areas. The intent of the effort is to learn what challenges these physicians are facing in their community and what resources would be most helpful both for themselves and for their patients in order to more effectively prescribe antibiotics.

The VMS Foundation is a public-benefit corporation whose purpose is to advance the public good by supporting educational and research activities. This effort is being funded by the Vermont Department of Health with support from Vermont Blue Cross Blue Shield, the Association of State and Territorial Health Officials and the Centers for Disease Control and Prevention.

Thank you in advance for your generous contributions of time and thoughtful consideration.

The interview questions

As a reminder, all these questions pertain to child and adult patients with acute respiratory infections who present at the emergency department and are discharged home. When I say "respiratory infections," it's referring to acute otitis media, acute bronchitis, sinusitis, nonspecific URI, etc.

Interviewee Background

1. **In which year did you graduate from medical school?**
2. **What is your specialty?**
3. **Are you board eligible or board certified in your specialty?**

Current state and improvement opportunities

4. **For what conditions do you most frequently prescribe antibiotics?**
5. **What's your opinion of your own practice of using antibiotics for outpatient respiratory infections?**
6. **What about the practices of other ED physicians in your hospital?**
7. **Is there a standard treatment guideline for outpatient respiratory infection treatment for the ED? If so, is it routinely reviewed or referred to during in-services?**
8. **How does the ED track and share data on antibiotic use?**

9. **What, if any, are the biggest challenges when it comes to appropriately prescribing antibiotics for these infections in the ED setting?**

10. **What strategies or resources are you currently using to support appropriate prescribing of antibiotics? What other resources or tools would be helpful to you to ensure judicious antibiotic use?**

Professional Resources

11. **How do you stay up to date on best practices with regard to antibiotic prescribing? What would be better strategies or formats for delivering that information to busy clinicians like you?**

Patient Education Resources

12. **How do you use patient education materials about antibiotic use? How could the materials or the process of using them be improved?**

CDC's Get Smart: Know When Antibiotics Work initiative

13. **Are you aware of the CDC Get Smart initiative?**

14. **Would you use the Get Smart resources for professionals? Could you suggest improvements to the content, format or mode of accessing them?**

15. **Would you use the Get Smart resources for patients? Could you suggest improvements to the content, format or mode of accessing them?**

2. Questionnaire with secondary questions used by interviewer

The interview questions

As a reminder, all these questions pertain to child and adult patients with acute respiratory infections who present at the emergency department and are discharged home. When I say "respiratory infections," it's referring to acute otitis media, acute bronchitis, sinusitis, nonspecific URI, etc.

Interviewee Background

1. **In which year did you graduate from medical school?**

2. **What is your specialty?**

3. **Are you board eligible or board certified in your specialty?**

Current state and improvement opportunities

4. **For what conditions do you most frequently prescribe antibiotics?**

5. **What's your opinion of your own practice of using antibiotics for outpatient respiratory infections?**

    a. How often do you follow current recommended guidelines?
    b. What are some of the reasons that lead you to prescribe an antibiotic when it's not indicated?
    c. What are some of the reasons you choose an antibiotic that covers more pathogens than indicated?
    d. How does concern about antibiotic resistance influence your decisions?
    e. How does the age of a patient influence your responses to the above questions?
    f. What else influences your decision-making when it comes to prescribing antibiotics?

6. **What about the practices of other ED physicians in your hospital?**

    a. How often do they follow current recommended guidelines?
    b. What about their practices are different from yours?
    c. What are some of the reasons that lead you to prescribe an antibiotic when it's not indicated?
    d. What are some of the reasons you choose an antibiotic that covers more pathogens than indicated?
    e. How does concern about antibiotic resistance influence their decisions?

7. **Is there a standard treatment guideline for outpatient respiratory infection treatment for the ED? If so, is it routinely reviewed or referred to during in-services?**

8. **How does the ED track and share data on antibiotic use?**

    a. How might health plan data on antibiotic use in your ED be useful (HEDIS - Healthcare Effectiveness Data and Information Set)?
    b. How would health plan data on your own prescribing patterns be useful (HEDIS)?

9. **What, if any, are the biggest challenges when it comes to appropriately prescribing antibiotics for these infections in the ED setting?**

    a. Challenges with regard to adult patients?
    b. Challenges with regard to pediatric patients?
    c. Pressure to prescribe from patients/parents?
    d. Staying up to date on prescribing guidelines?
    e. No chance to see patient again?
    f. Fewer patients with health insurance?

10. **What strategies or resources are you currently using to support appropriate prescribing of antibiotics? What other resources or tools would be helpful to you to ensure judicious antibiotic use?**

    a. Professional guidelines/apps/clinical decision support?
    b. Patient tools?
    c. Financial incentives from health plans?
    d. Policy and performance measures, like HEDIS or something internal to your health system?
    e. Process improvement data?
    f. How does the age of a patient influence your responses to the above questions?

Professional Resources

11. **How do you stay up to date on best practices with regard to antibiotic prescribing? What would be better strategies or formats for delivering that information to busy clinicians like you?**

    a. CMEs?
    b. Smartphone/tablet app?
    c. Web-based or print tools that summarize guidelines?
    d. Electronic communication from professional societies?
    e. Electronic health record support?

Patient Education Resources

12. **How do you use patient education materials about antibiotic use? How could the materials or the process of using them be improved?**

- Does your EHR print patient education materials?
- Does the age of a patient influence your responses to the above questions?

CDC's Get Smart: Know When Antibiotics Work initiative

13. Are you aware of the CDC Get Smart initiative?

a. Prescription pad?
b. Virus/bacteria chart?
c. Patient brochure?
d. Parent brochure?
e. Poster?
f. Academic detailing sheets?

14. Would you use the Get Smart resources for professionals? Could you suggest improvements to the content, format or mode of accessing them?

15. Would you use the Get Smart resources for patients? Could you suggest improvements to the content, format or mode of accessing them?

a. Does the age of a patient influence your responses to the above questions?