

substantial patient morbidity, but studies on the intersection of social disparity and SSI are limited. We sought to evaluate the association between SSI and the Center for Disease Control and Prevention’s social vulnerability index (SVI). **Methods:** Patients with National Health Safety Network (NHSN) procedure codes for colon, abdominal hysterectomy, hip prosthesis, knee prosthesis and spinal fusion surgeries were retrieved from the electronic medical records of 20 hospitals across 4 geographic markets. SSIs were identified by trained infection preventionists using NHSN definitions. Descriptive statistics were used for baseline demographic and clinical characteristics. Univariate logistic regression was performed to assess the association of demographic, clinical, and procedural factors with the outcome of SSI. Further univariate subgroup analysis was completed by procedure. To account for the nonlinear relationship between the social vulnerability index and SSIs, smoothing splines were used in a Bayesian

Figure 1: Odds of Surgical Site Infection by Social Vulnerability Index Adjusted for Patient Age, Gender, Health System Market, Procedure Type and Procedure Duration

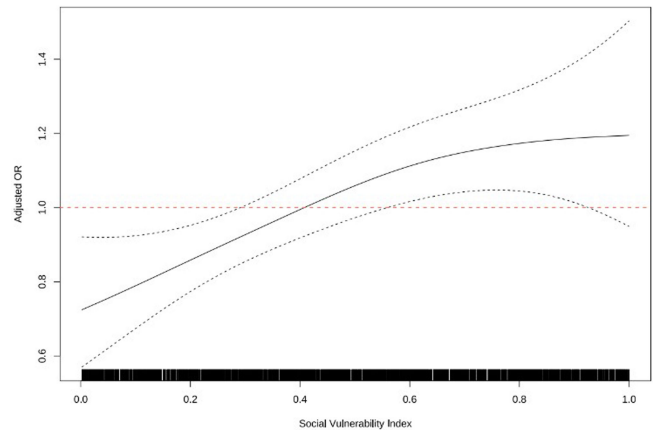


Table 1: Demographics of Patients Undergoing Colon, Abdominal Hysterectomy, Hip prosthesis, Knee Prosthesis and Spinal Fusion Surgery Between August 2022 and August 2023

Patients (N =23,864)	
Health System Market	
1	14,512 (61%)
2	1217 (5.1%)
3	2831 (12%)
4	5304 (22%)
Patient Clinical Characteristics, n (%)	
Median Age in years (IQR)	64 (52-73)
Gender	
Male	8455 (35%)
Female	15,403 (65%)
Other or missing	6 (<0.1)
Race	
Non-Hispanic White	17740 (74%)
Non-Hispanic Black	4548 (19%)
Hispanic	748 (3%)
Other	739 (3%)
Unknown	89 (0.4%)
Diabetes	4750 (20%)
Median BMI in kg/m ² (IQR)	30 (26-35)
Trauma	703 (3%)
Procedure Information, n (%)	
Type of Surgical Procedure	
Knee Prosthesis	6824 (29%)
Hip Prosthesis	5390 (23%)
Colon Surgery	3100 (13%)
Abdominal Hysterectomy	4643 (19%)
Spinal Fusion	3907 (16%)
Number of Procedures	
1	20902 (88%)
2	2618 (11%)
3 or more	344 (1%)
Median procedure duration in minutes (IQR)	104 (80-147)
Surgical Site Infections	
All	536 (2%)
Superficial	144 (1%)
Deep or organ space	296 (1%)
Present at the time of surgery	96 (0.4%)

IQR Interquartile Range, BMI Body Mass Index

hierarchical logistic regression model, with random effects to account for the different market practices. Nonlinear effects of procedure duration were also investigated while adjusting for the patient age, procedure type, and health system market. **Results:** 23,864 surgical procedures among 22,319 unique patients identified between 1 August 2022 and 31 August 2023. 96 patients with infection present at time of surgery were excluded. The study population was mostly white (74%) and female (65%) (Table 1). Less than 13% of the patients had more than one procedure during this time. In a univariate analysis, we found evidence of market and procedure effects, with colon surgery being associated with the highest odds of SSI. Procedure duration was significantly associated with SSI in both univariate and multivariable models, with a drastic increase in the odds of SSI for procedures > 150 mins. In the multivariable model we found that SVIs lower than 0.4 (95% CI 0.28 to 0.55) are associated with an adjusted odds ratio (aOR) < 1. (Figure 1) **Conclusions:** Our study shows that the relationship of social vulnerability and adverse outcomes is highly complex with nonlinear dynamics at play. After adjusting for procedure type, duration, patient age, gender and health system market the odds of SSIs increase sharply in patients with higher SVI until leveling off at an elevated risk.

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Table 2: Unadjusted Odds of Surgical Site Infection by Procedure

	All Surgeries N = 23,768		Colon Surgery N = 3017		Abdominal Hysterectomy N = 4641		Hip and Knee Prosthesis N=12204		Spinal Fusion N=9906	
	OR SSI (95% CI)	p- value	OR SSI (95% CI)	p- value	OR SSI (95% CI)	p- value	OR SSI (95% CI)	p- value	OR SSI (95% CI)	p- value
Health System Market										
1	--	0.02	--	0.04	--	0.05	--	0.8	--	0.08
2	1.1 (0.7-1.8)		2.2 (0.5-2.4)		1.2 (0.5-3.0)		1.3 (0.7-2.6)		--	
3	1.1 (0.8-1.3)		1.4 (0.8-2.3)		1.9 (1.1-3.6)		0.9 (0.4-1.8)		0.5 (0.3-1.1)	
4	1.4 (1.1-1.7)		1.6 (1.2-2.3)		1.9 (1.1-3.1)		1.0 (0.7-1.6)		n/a	
Patient Clinical Characteristics, n (%)										
Median Age (years)	0.99 (0.98-0.99)	<0.001	1.0 (0.99-1.01)	0.3	0.99 (0.97-1.01)	0.3	0.99 (0.98-1.01)	0.2	1.0 (0.98-1.01)	0.2
Gender										
Male	--	0.03	--	0.4	n/a		--	0.08	--	0.2
Female	0.8 (0.7-1.0)		0.9 (0.6-1.2)				0.7 (0.5-1.0)		1.4 (0.9-2.4)	
Race										
Non-Hispanic White	--	0.3	--	0.2	--	0.4	--	0.3	--	1.0
Non-Hispanic Black	1.1 (1.0-1.5)		1.3 (0.9-1.8)		1.4 (0.9-2.2)		0.5 (0.3-1.0)		1.0 (0.5-2.0)	
Hispanic	1.1 (0.6-1.8)		0.4 (0.1-1.2)		1.1 (0.5-2.6)		1.3 (0.4-4.2)		1.6 (0.4-6.7)	
Other	0.8 (0.3-1.3)		0.7 (0.3-1.7)		0.3 (0.2-0.7)		0.3 (0.1-2.4)		1.1 (0.3-4.8)	
Unknown	0.6 (0.1-1.5)		1.4 (0.2-11)		n/a		n/a		n/a	
Diabetes (yes)	1.5 (1.2-1.8)	<0.001	1.3 (0.9-1.8)	0.2	3.3 (2.0-5.3)	<0.001	1.2 (0.8-1.9)	0.3	1.4 (0.8-2.4)	0.2
BMI in kg/m ²	1.0 (0.99-1.0)	0.9	1.0 (0.99-1.0)	0.9	1.05 (1.0-1.1)	<0.001	1.0 (0.99-1.01)	0.3	1.0 (0.97-1.0)	1.0
Trauma	2.5 (1.7-3.6)	<0.001	2.0 (1.2-3.5)	0.01	n/a		1.8 (0.9-3.8)	0.1	5.4 (2.3-13)	<0.001
Procedure Information										
Type of Surgical Procedure		<0.001	n/a	n/a						
Knee Prosthesis	Reference						Reference			
Hip Prosthesis	1.7 (1.2-2.5)						1.7 (1.2-2.5)			
Colon Surgery	8.2 (6.0-11)						n/a			
Hysterectomy	2.5 (1.7-3.5)						n/a			
Spinal Fusion	2.0 (1.4-3.0)						n/a			
Procedure duration > 150 minutes	3.2 (2.7-3.9)	<0.001	1.3 (1.0-1.8)	0.10	3.3 (2.1-5.2)	<0.001	3.9 (2.5-6.0)	<0.001	2.9 (1.6-5.2)	<0.001

OR Odds Ratio, SSI Surgical Site Infection (all depths), 95% CI 95% Confidence Interval, p-value considered significant at p<0.05, BMI Body Mass Index.

Presentation Type:

Poster Presentation - Top Poster Abstract

Subject Category: Antibiotic Stewardship

Multifaceted Implementation Strategy to Improve the Comprehensive Assessment of Penicillin Allergies in Perioperative Patient

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Background: The CDC recommends that nurses improve the evaluation of penicillin allergies as part of antimicrobial stewardship programs. We evaluated the feasibility of a multifaceted implementation strategy to improve nurses’ documentation of penicillin allergy histories and to encourage nurses to notify prescribers of patients with low-risk symptoms of reported penicillin allergy. The implementation strategy was guided by the COM-B model of behavior change and addressed nurses’ capability, opportunity, and motivation to implement practices (Figure 1). The implementation strategy included education on the STORY mnemonic that details the questions of a penicillin allergy history, education on low-risk symptoms of penicillin allergy, dot phrases in EPIC to facilitate nurses’ documentation of STORY and communication of patients with low-risk

penicillin allergy symptoms, and educational pocket cards and flyers. We define feasibility as the implementation and acceptability of practices. **Methods:** This was a six-month feasibility study conducted in an outpatient perioperative area. We compared penicillin allergy documentation pre- and post- implementation strategy and report on nurses' notification of prescribers regarding patients with low-risk penicillin allergies in the post-implementation period. We engaged nurses in a focus group to assess factors that facilitated or hindered practice adoption. **Results:** A total of

426 unique patients with 482 penicillin allergy records were included in our study (n= 207 records pre-implementation, n = 275 records post-implementation). We found little to no change in the percentage of records that included symptom information post vs. pre-implementation (88.36% vs 88.41%). A greater percentage of allergy records in the post vs. pre-implementation periods included information on: timing/years since reaction (25.6% vs. 8.2%), onset of reaction (20.7% vs. 0%), resolution of symptoms (20.4% vs. 0%), and penicillin re-exposure (21.1% vs. 2.4%). There

Figure 1. Multifaceted Implementation Strategy Components According to COM-B Framework

CAPABILITY

Facilitators: 1) Nurses are proficient in reviewing and updating patient allergy information in the electronic medical record; 2) Nurses routinely assess and document the symptoms of reported allergies among their patients i.e., by asking, "What happens?"

Barriers: 1) Lack of awareness of the additional questions to ask when conducting a penicillin allergy assessment; 3) Lack of awareness of symptoms of reported penicillin allergy that are considered low-risk for true penicillin allergy.

We addressed these in our implementation

strategy by: 1) Introducing nurses to the acronym "STORY," that species penicillin allergy assessment fields (S=symptoms of index reaction to penicillin; T=timing of index reaction; O=onset of index reaction in relation to first dose of penicillin; R=how reaction was resolved; Y= if patient has received penicillin yet again); 2) Hosting educational in-services on low-risk symptoms of penicillin allergy; 3) Providing "STORY" acronym pocket cards that are readily accessible to nurses containing penicillin allergy assessment fields and low-risk symptoms of penicillin allergy. **Figure 2.**

OPPORTUNITY

Facilitators: 1) Nurses believe the assessment of allergies is a core nursing responsibility; 2) Nurses perceive the alerting of providers regarding questionable penicillin allergies to be within the role and responsibilities of nurses.

Barriers: 1) Lack of prompts in electronic medical record to guide nurses in the questions to ask when conducting a penicillin allergy assessment; 2) Belief that the nurses' role is to document patient-reported allergies--not be responsible for interpreting whether a reported allergy is a true allergy or drug intolerance.

We addressed these in our implementation

strategy by: 1) Strategically placing "STORY" acronym pocketcards that detail penicillin allergy assessment fields and low-risk symptoms of penicillin allergy by nurses' work stations; 2) Educating nurses on statements made by the CDC and ANA encouraging nurses to question and comprehensively evaluate reported penicillin allergies; 3) Including a structured communication message in the electronic medical record that nurses can send prescribers concerning patients with questionable penicillin allergies. **Figure 2.**

MOTIVATION

Facilitators: 1) Eagerness among nurses to do what is in the best interest for the patient; 2) Desire among nurses to know how their care of patients impacts the care patients receive and patient health; 3) Desire among nurses to advocate for their patients; 4) Desire among nurses to be recognized as a valuable member of the healthcare team.

Barriers: 1) Belief that reported penicillin allergies are harmless; 2) Belief that the documentation of penicillin allergies by nurses is inconsequential.

We addressed these in our implementation

strategy by: 1) Educating nurses on harms of reported penicillin allergies among surgical patientsf 2) Providing monthly updates to nurses with positive clinician feedback about nurses' implementation of practices.

were 24 documented instances of nurses' notifying prescribers of patients with a low-risk penicillin allergy. Focus group data revealed nurses perceived their comprehensive documentation of penicillin allergies highly acceptable and likely to improve patient care and outcomes. Whereas nurses' notification of prescribers concerning patients meeting low-risk penicillin allergy criteria had little appeal. Nurses described the STORY mnemonic, pocket cards describing the penicillin allergy assessment mnemonic, and the associated dot phrase in EPIC as particularly helpful. **Conclusions:** A multifaceted implementation strategy showed promise in improving the comprehensive documentation of penicillin allergy histories. Future studies are needed to determine the efficacy of the multifaceted implementation strategy on penicillin allergy documentation, the selection of antibiotic prophylactic treatment, and clinical outcomes among surgical patients.

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Presentation Type:

Poster Presentation - Top Poster Abstract

Subject Category: Antibiotic Stewardship

User-Centered Education for Patients/Caregivers about Urinary Tract Infections, Asymptomatic Bacteriuria, and Antibiotics

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Background: Older adults (aged ≥65) are at high risk of harm from over-diagnosis and overtreatment of urinary tract infections (UTIs) with antibiotics. Involving patients/caregivers in their antibiotic treatment decisions has potential to improve prescribing. To engage effectively, patients/caregivers must have sufficient knowledge about UTIs, asymptomatic bacteriuria (ASB: bacteria in the urine without signs of UTI), and antibiotics and opportunities to share their concerns and treatment preferences with healthcare staff. Patient education is one of the core elements of antibiotic stewardship recommended by the Centers for Disease Control and Prevention but, there are few resources for patients/caregivers about UTIs and antibiotics, leaving a knowledge gap as to what effective patient/caregiver antibiotic education for UTIs looks like. We sought to better understand the perspectives of patients/caregivers at high-risk of antibiotic overuse for UTIs and create an educational leaflet on UTIs, antibiotics, and ASB. **Method:** Between 11/2022 and 03/2023, we conducted virtual semi-structured interviews with patients ≥65yrs who had experienced UTI and caregivers about their needs, experiences, and preferences for educational support. Interviews lasted ~1 hour. Audio recordings were transcribed verbatim. NVivo software managed the data, which we analyzed using thematic analysis. **Results:** We conducted 9 interviews (5 patients, 4 caregivers). Interviewees expressed desire to be involved in their treatment decisions and learn more about antibiotics and alternative strategies (themes shown in Figure 1). Reported reasons for limited involvement in decisions included lacking the knowledge and confidence to ask questions, emotional factors (e.g., embarrassment/stress), deference to healthcare staff, and time constraints. Healthcare staff behaviors were described both as barriers (e.g., assertive treatment decisions) and facilitators (e.g., effective communication) of patient/caregiver engagement. Interviewees were eager for printed and digital educational support that

Figure 1. Themes with exemplar quotes.

Theme 1- Patient and caregiver needs		
<i>Greater involvement in treatment decisions</i>	<i>Improved knowledge of antibiotics</i>	<i>Discussion of alternatives to antibiotics</i>
“Before I would be like, yep, they gave me this medication and I’m going to take it but now, I’m a lot more asking those questions as to why am I taking this, why are they prescribed for me and how or what is the reason why you believe these are going to help?” – Patient	“[...]maybe something about how antibiotics work a little bit, kind of what they do, how they tackle infections[...]maybe why one is better than the other because that was the situation here, the basic antibiotics didn’t work and why they know this one works. So, explaining the purpose of antibiotics and maybe even some caution about what antibiotics should or shouldn’t do.” – Caregiver	“I mean none were suggested in our situation, but I think that would be helpful because, again, in terms of empowering and giving patients and families options because I think options in these particular cases are critical[...]if something could have been used that wasn’t used or not even considered; just giving patients options is very, very empowering.” – Caregiver
Theme 2- Patient/caregiver related reasons for limited involvement:		
<i>Deference to healthcare staff</i>	<i>Lack of knowledge/confidence to ask questions</i>	<i>Emotional factors</i>
“We just trusted the doctors because that’s their job to diagnose and treat the issue, we are, of course, going to take their – I trust their opinion because that’s their profession, I understand that’s what they go to school for, so I wasn’t going to question it.” – Caregiver	“[...]even when we were discharged to the hospital, they were just saying like we are going to continue with the antibiotics that the doctor had put her on, and we just moved forward from there. So I didn’t question anything because I didn’t know any better.” – Caregiver	“I didn’t believe that I could really ask a lot of questions because, when you go to the doctor you’re very sick, you’re not in your right mindset, you’re not in your right headspace to be advocating for yourself or asking questions at that point” – Patient
Theme 3- Perceptions of healthcare staff behaviors		
<i>Assertive treatment decisions limit patient/caregiver involvement</i>	<i>Effective communication fosters patient/caregiver involvement</i>	<i>Time constraints limit patient/caregiver involvement</i>
“They kind of approach you with, okay, this is our treatment plan. This is what we are going to do[...]But the why behind it wasn’t there. I think that would have been more helpful.” – Caregiver “Both times was just.. ‘Hey, we are going to give you antibiotics because we think you have an infection; sign this paper’. So, it really wasn’t a conversation.” – Patient	“These discussions really made me respect these doctors because I had never heard specialists or clinicians take that time to truly dig in to what’s going on and you can tell they cared about it and they truly cared about you getting better” – Patient	“Spend more time! Two to three minutes isn’t enough time. But I also want to acknowledge too, that I recognize that they’ve got many patients to see and that time constraint is a very big issue and challenge for clinicians.” – Caregiver
Theme 4- Educational tool preferences		
<i>Print and digital options</i>	<i>Content tailored to users’ specific situations and backgrounds</i>	<i>Help to prepare for conversations with healthcare staff</i>
“Myself... a pamphlet. Like material I could take with me because I don’t always have the time to sit and read right at that moment.” – Patient “Maybe something like just a general piece of paper, especially with these older folks. They were 90. I mean, they were not going to go online. I’m going to go online, and I can look stuff up and ask questions but I think that would have been more beneficial to have just a simple pamphlet or form.” – Caregiver “Two, three different ways of delivery: printed, an app, even a website I think is a good idea to have more than one way of delivering.” – Patient	“I feel like the tools will help people like myself and I do feel like it would help those minority groups which I can also relate and I feel like it would provide more comfort and ease when you are doing caregiving.” – Caregiver “Maybe having a lot of different options on there of different sections, pros and cons of antibiotics, facts and myths about them. Just kind of having different subcategories of if you’re looking for this you can click on this, if you’re looking for this, click on this and it will take you more into it.” – Patient	“[...]I think having that help of like here, you know what, are you concerned or do you struggle with bringing something up to your doctor? Here, let us help you because we all go through the same stuff, so here are ways to help you because you’re not alone in that aspect.” – Patient “I know a lot of people that don’t have an educational background and they don’t know how to ask questions. Some of them are fearful of it and I think it’s just common when you are coming from a minority group and so I think that question prompts would be really effective.” – Caregiver