

Mind the Gap: Using Administrative & Claims Data to Answer Your Research Question

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Poll #1: About you

- What is your role in research and level of experience?
 - Research investigator
 - New? Experienced?
 - Data manager/analyst
 - New? Experienced?
 - Project coordinator
 - New? Experienced?
 - Other – please describe via the Q&A function

Session Overview

- In this talk, I will:
 - Identify clinical, administrative, claims data that may be relevant for research
 - Describe strengths and limitations of data sources commonly used for research
 - Highlight data linkage methods
 - Illustrate experiences and methods for good data management practices

Errors in Medicine

Errors that expose more than one person are referred to as a **large-scale adverse event (LSAE)**.

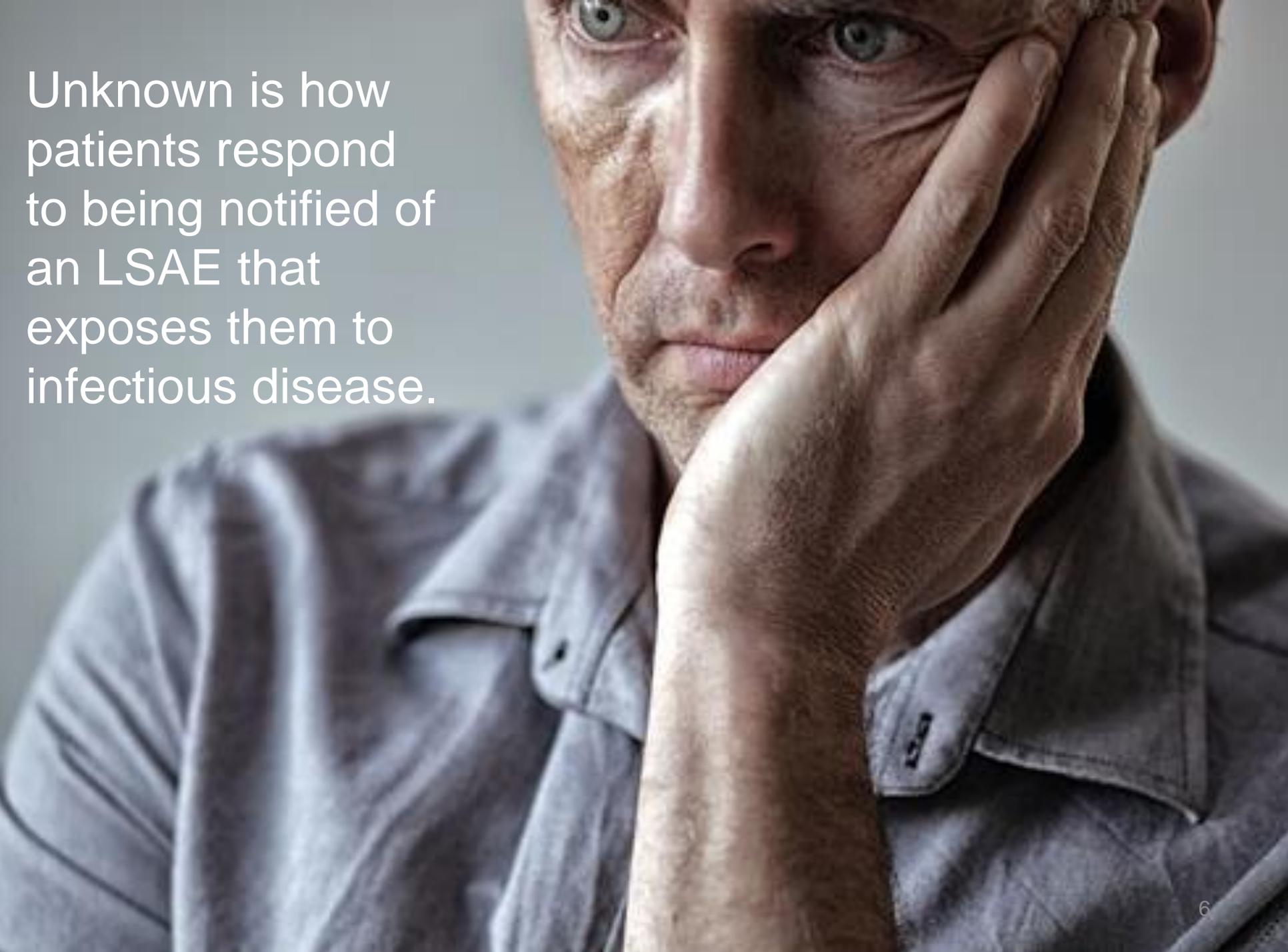
Example: Improper cleaning of medical equipment

Stainless Steel



- 304: medical trays, equipment
- 316: needles, syringes, catheters, otolaryngology scope nozzles, implants, piercings
- 440 / 420: surgical cutlery
- Cleaning protocols depend on type of stainless steel



A close-up photograph of a man's face, looking thoughtful and slightly distressed, with his hand resting against his cheek. The man has light-colored eyes and is wearing a blue button-down shirt. The background is a plain, light-colored wall.

Unknown is how patients respond to being notified of an LSAE that exposes them to infectious disease.

Communicating about Errors

A photograph of a doctor in a white coat and stethoscope looking at a patient's chart in a hospital setting. The doctor is on the right, and the patient's arm is visible on the left. The background shows a window with a grid pattern.

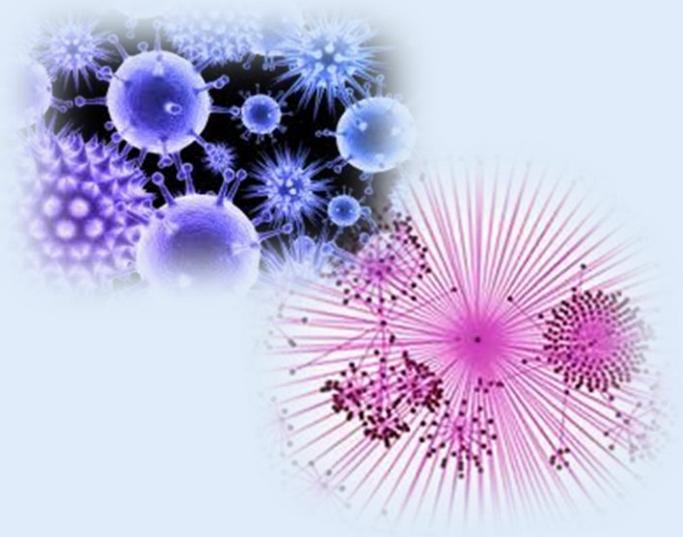
Communicating errors to patients in a way that engenders trust and guides them to appropriate action is one of the more difficult challenges in

Communicating with patients about LSAEs

- Challenges:
 - Risk of infectious disease from the exposure is not always well known
 - Absolute risks are often very small
 - Clinical risks and perceived risk may differ considerably
- VA health care system must provide timely and accurate information
- Most clinicians involved with disclosure have no prior relationship with the patients

Poor Communication

- Failure to communicate about LSAEs in a timely fashion raises the risk that:
 - Patients receive inaccurate information
 - Patients make decisions that could harm themselves
 - Patients question the quality of the care or organization



This risk has increased in recent years with efforts to have news “go viral”

Analyzing Patient Behavior

- We sought to improve the LSAE reporting system by
 - Identifying missed opportunities in intended effects
 - Identifying unintended effects

Analyzing Patient Behavior

- VA mandates reporting of LSAEs, so we can observe these events
- VA provides unique opportunity to analyze patient behavior using administrative databases from VA and Medicare.

Specific Aims

1. Infection disease testing: do exposed patients obtain follow-up testing for HIV, Hepatitis B and C?
2. Returning for same care in the future. When Veterans are notified about an exposure related to X, are they less likely to return to the same facility to receive?
3. Switching and Trust: when Medicare eligible Veterans are notified about an exposure, do they switch to a non-VA provider?

METHODS

Overview

- Cases: patients potentially exposed to LSAEs at 6 VA medical centers
- Controls:
 - patients who received the same services at the affected VA medical centers prior to the exposure
 - Patients who received the same services at control facilities
 - Control facilities based on similar sized clinic and geographic proximity (but outside of media market)

Overview

- Difference-in-Differences (DD) was used to identify the effect of notification

		Timing	
		Prior to exposure	Exposure period
Site	Exposure site	Control	Case
	Control site	Control	Control

Data Analysis Plan

We developed a 22 page data analysis plan:

- Study Overview and aims
- Data
- Variables 
- Precise Methods for developing analytical file
- Exposure sites
- Timing
- Control sites
- Analytical file

The Data Analysis Plan was a living document -- an HSR lab notebook

Variables	Event File (SE)
scrssn	x
sta3n	x
sta5a	x
sta6a	x
cl	x
cpt1-cpt20	x
dob	x
bornday	
dxlsf	x
dx2-dx10	x
ethnic	x
race1-race7	x
race1-race6	
marital	x
sex	x
zip	x
vizday	x
dsslarno	
clstop	
in_out	
svc_dte	

Case Identification

- We examined six LSAE; all were investigated by Office of Inspector General (OIG)
- To identify potentially exposed people, we used
 - exposure dates
 - exposure clinics
 - problematic procedures, represented by Current Procedural Terminology (CPT) codes
- This method **may not match exactly with the patients who received letters**, but it can be applied to identify controls



Cases Identification

- All six LSAEs were in ambulatory care
- Cases identified using Medical SAS (SE) data

Event (Clinic stop)	CPT codes
403 ENT Endoscopy	31231, 31233, 31235, 31237-40, 31267, 31276, 31287-88, 31290-94, 31505, 31510, 31515, 31520, 31525-31, 31535-6, 31540-1, 31545-6, 31560-1, 31570-71, 31575--9, 92511, S2342, S2344
321 Colonoscopy	44388-44394, 44397, 45300, 45303, 45305, 45307-9, 45315, 45317, 45320-1, 45327, 45330-5, 45337-42, 45345, 45355, 45378-87, 45391-2
180 Dental Clinic	D codes



Identifying Controls

- There are many possible **criteria for choosing controls**
 - Clinical similarities
 - Empirical similarities
- Clinical similarities
 - Geographical proximity
 - Similar patient volume
 - Minimized contamination by selecting control sites in other media markets

Tracking Timing of Events

	Pre-Exposure				Exposure				
Type of Site	Case selection		Outcomes (12 months)		Case selection		Notify Date	Outcomes (12 months)	
<i>Exposure</i>	<i>10/97</i>	<i>06/01</i>	<i>07/01</i>	<i>06/02</i>	<i>09/02</i>	<i>01/09</i>	<i>03/09</i>	<i>03/01/09</i>	<i>02/28/10</i>
Control	10/97	06/01	07/01	06/02	09/02	01/09		03/01/09	02/28/10
Control	10/97	06/01	*7/01	*6/02	09/02	01/09		03/01/09	02/28/10



Sites

	Exposure period	Sample Size		OIG Report
		Pre-Exposure	Exposure period	
Site 1: ENT endoscope exposure	1/2008-2/2009	561	675	1,069
Control sites		1,345	1,508	
Site 2: ENT endoscope exposure	9/2002-1/2009	138	378	NA
Control sites		637	1,089	
Site 3: colonoscope exposure	4/2003-12/2008	NA	6,226	6,387
Controls sites		NA	12,739	
Site 4: colonoscope exposure	5/2004-2/2009	2,012	6,189	3,260
Control sites		11,594	26,499	
Site 5: dental exposure	2/2009-3/2010	1,777	1,794	1,812
Control sites		4,051	5,083	
Site 6: dental exposure	1/1992-7/2010	NA	565	535
Control sites		NA	16,346	

*Site 4:
Excluded from analysis*

Final Analytical Sample (n=54,912)

	Sample Size: 5 LSAEs	
	Pre-exposure	Exposure period
Overall		
Exposure sites	2,476	9,638
Control sites	6,033	36,765

Aim 1 Outcomes:

Infectious Disease Testing

- Use of HCV, HIV, and HBV testing (based on CPT codes)
- Timing of HCV, HIV and HBV testing (days since notification)
- Dental Utilization: preventive, restorative, all other
- VA and Medicare utilization:
 - any outpatient medicine
 - ER visits
 - outpatient surgery
 - other outpatient care

Tracking Endpoints for Aim 1

- **HCV** : 86803-86804, 87520-87522, 87902
- **HIV** : 86689, 86701-86703, 87389-87391, 87500, 87901, 87906, 87534-87539
- **HBV** : 86704-86707, 87515-87517, 87340-87341, 87350, 87380
- **Acute hepatitis panel** : 80074
 - includes testing for Hepatitis A antibody [86709], Hepatitis B core antibody [86705], Hepatitis B surface antigen [87340], and Hepatitis C antibody [86803].

Aim 2 Outcomes:

Probability of returning for same type of care

- We created analytic cohort file for dental exposures with 18-month follow-up from SE file.
 - We used the SE to pull records for our pre and post cohorts' outcomes for visits at the dental clinic (CL=180), including all corresponding CPT codes (CPT=D****).
 - We summarize return visit data by *vizday*. (A single person could have several dental records per day; summarize to the *vizday*.)
- Type of Care
 - Any preventative care = D1000-D1999
 - Any restorative care = D2000-D2999
 - Any other care = D0100-D0999, D3000-D9999
- Medicare data were not used

Aim 3 Outcomes:

Switching Providers

- Outcomes for any use of care (0/1) and volume of care (count)
- Included patients over age 65 because they have a choice
- Used VA and Medicare Data

VA

- Outpatient care
 - Outpatient medicine
 - Outpatient prev. care
 - Emergency care
 - Urgent care
 - Outpatient surgery
 - Other outpatient care
- Inpatient care

Medicare

- Outpatient care
 - Outpatient medicine
 - Emergency care
 - Lab tests
 - Urgent care
 - Outpatient surgery
 - Other outpatient care
- Inpatient
 - Any inpatient
 - Short stay
 - Long stay
 - Skilled Nursing

Data Generating Process

- Understanding the data generating process is CRITICAL
- For VA care, you must understand how the data get into CPRS and coding incentives
- For Medicare, understanding the relationship between coding and billing is important
 - Providers are paid based on CPT codes, unless patients are in Medicare Advantage



VA Types of Care

- Office E&M (evaluation and management) care, CPT codes 99201-99215 in internal medicine clinics, clinic stop 301
- Office E&M (evaluation and management) care, CPT codes 99201-99215 **not** in general internal medicine clinics, clinic stop 301
- Any visit to general medicine clinic, stop code 301
- Preventive services, CPT codes 99381-99429
- ED visits, clinic stop 101 or 130
- Urgent care clinic stop 131
- Immunizations and vaccines clinic stop 710



Data Checks

- Most errors happen when reshaping data
 - Collapsing data
 - Merging data
 - Transposing data
- We built in data checks to confirm accuracy
- Total number of patients / volume of visits
 - Patients 65 and older (focus for aim 3)
 - Included patients under 65 (so the totals are maintained)



Data Sources Selected

VA outpatient utilization (SE)

VA Laboratory data

Fee Basis Data

Medicare

- Medpar (inpatient stays; facility claim)
- Carrier (inpatient and outpatient; provider claim)
- Outpatient file (outpatient; facility claim)



Data Linkage Method

Linking variables

- SCRSSN
- Dates of Service
- Location of care (station)

Analysis

- Unadjusted estimates of the difference in differences
- Multivariate logistic regression, controlling for gender, race, marital status, age, and LSAE
- Interactions: was the LSAE associated with a different effect for African Americans / Blacks

RESULTS

Patient Characteristics	Exposure period	
	Control sites	Exposure Sites
Male	93.5%	94.9%
Race / Ethnicity		
Non-Hispanic White	54.4%	64.8%
African American	22.3%	11.9%
Missing or unknown or other	23.3%	23.3%
Marital status		
Married	48.4%	60.7%
Divorced / Separated	28.4%	24.0%
Other	23.1%	15.3%
Age		
<45	8.8%	4.3%
45 to 64	53.7%	57.4%
65 to 74	18.7%	23.1%
75 and older	18.8%	15.2%

Unadjusted Notification Effect

	HCV			HIV			HBV		
	Pre.	Exp.	Diff.	Pre.	Exp.	Diff.	Pre.	Exp.	Diff.
Exposure sites	8.8%	83.2%	74.4	3.8%	82.8%	79.0	5.6%	82.9%	77.3
Control sites	6.8%	8.6%	1.8	2.3%	4.9%	2.6	4.5%	5.4%	1.0
Difference	2.0	74.6	72.6**	1.6	77.9	76.3**	1.1	77.4	76.3**

Note: *P<.001; **P<.0001

Adjusted Notification Effect

	HCV			HIV			HBV		
	Pre.	Exp.	Diff.	Pre.	Exp.	Diff.	Pre.	Exp.	Diff.
Overall AOR (95% CI)	49.7 (41.2 - 60.0)**			103.8 (78.1 - 137.9)**			88.4 (70.4 - 111.0)**		
African American AOR (95% CI)	0.74 (0.61 - 0.89)*			0.46 (0.37 - 0.56)**			0.66 (0.54 - 0.81)**		
Marginal effect for African Americans^a	-5			-14.1			-6.6		

Note: * $P < .001$; ** $P < .0001$

^aMarginal effects represent the predicted percentage point difference between African American and white Veterans at the means of the other covariates.

Returning for the Same Type of Services			
	Receipt of dental care		
	AOR^a	95% CI	P-Value
By six month period			
Preventative			
0-6 months	0.80	(0.68 - 0.93)	P<.01
7-12 months	0.65	(0.55 - 0.77)	P<.01
13-18 months	1.09	(0.92 - 1.28)	
Restorative			
0-6 months	0.89	(0.71 – 1.12)	
7-12 months	0.69	(0.54 - 0.90)	P<.01
13-18 months	1.14	(0.89 - 1.45)	
Other care			
0-6 months	1.12	(0.96 – 1.31)	
7-12 months	0.85	(0.73 - 1.00)	
13-18 months	1.12	(0.96 – 1.31)	

^aAdjusted odds ratios (AOR) are for the difference-in-differences for dental services at Site 5

Switching Providers

AOR for Use of Care

	Year	Qtr 1	Qtr 2	Qtr 3	Qtr 4
Over age 65 (n=20,210)					
<u>VA utilization</u>					
Outpatient medicine	0.88	2.21**	0.32**	0.42**	0.27**
Emergency care	1.73**	2.67**	1.34	1.18	1.39
Urgent care	3.54**	NE	7.68**	3.92*	1.75
Outpatient surgery	0.75*	0.59*	0.71	0.72	0.74
Other outpatient care	1.46*	1.00	1.25	1.11	0.97
<u>Medicare utilization</u>					
Outpatient medicine	1.37**	1.38**	1.44**	1.24	1.17
Emergency care	1.19	1.06	1.47*	1.33	1.02
Urgent care	0.49	NE	1.06	0.15	0.36
Outpatient surgery	2.05**	2.62	1.64	1.84	1.18
Other outpatient care	0.97	0.86	1.08	0.89	0.80

*P<.05, **P<.01; Robust 95% CI in parentheses

Note: These services exclude any visits that include HCV, HIV or HBV testing CPT codes

Summary

- Receipt of notification associated with a 72-76 percentage point increase in HCV, HIV and HBV testing.
 - Among those who sought testing, 56.8% were tested in the 30 days following the notification, and 74% were tested within 60 days.
 - The vast majority (>98%) of the testing was completed at VA facilities.
- Receipt of testing significantly lower for African Americans / Blacks
- Some evidence that a dental care LSAE notification associated with a decrease in dental care for 12 months following notification. Effects returned to baseline levels by 18 months
- Mixed evidence that patients switched providers. Evidence strongest with ambulatory surgery.



Limitations

- We did not have the exact list of patients who received notification letters.
- We excluded one site where our case algorithm overestimated the number of cases by a factor of 2.
- Race data are problematic in VA and are frequently missing; in this analysis, we compared African American/Blacks to whites. We excluded those with missing race

Conclusion

- The results suggest that existing communication strategies are successful in guiding many patients to remedial action after an LAE.
 - Additional follow-up communication may be needed for 60-day non-responders.
 - Additional efforts may be needed to support African Americans/ Blacks
- LSAE jeopardize patients' trust in the organization
 - Rates of dental care use fell during the first 12 months, although rates returned to baseline levels by 18 months
 - Ambulatory surgery was a strong measure of trust sensitive care.

Contact Information

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