

Healthcare Informatics Lessons from the Pandemic
Deborah Cray and Prof. Keith F. Woeltje, Froedtert and the Medical College of Wisconsin
A Webber Training Teleclass

Healthcare Informatics Lessons from the Pandemic

Deborah Cray

Vice President, Chief Data and Analytics Officer
Froedtert and the Medical College of Wisconsin

Keith F. Woeltje, MD, PhD

Vice President, Chief Medical Informatics Officer
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Associate Dean of Clinical Informatics
Medical College of Wisconsin

Hosted by Martin Kiernan
martin@webbertraining.com

July 14, 2022

www.webbertraining.com



Learning Objectives

- Describe how to facilitate cross-organizational collaboration
- Describe the importance of clear data governance for collaborative efforts
- Discuss how to leverage existing infrastructure to address evolving information needs

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Conflicts of Interest

No conflicts to declare for either presenter

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About us

Deborah Cray



- Trained in Industrial Engineering at Northwestern
- At the onset of the pandemic was at University of Wisconsin Health in Madison as the Director of Enterprise Analytics

Keith Woeltje



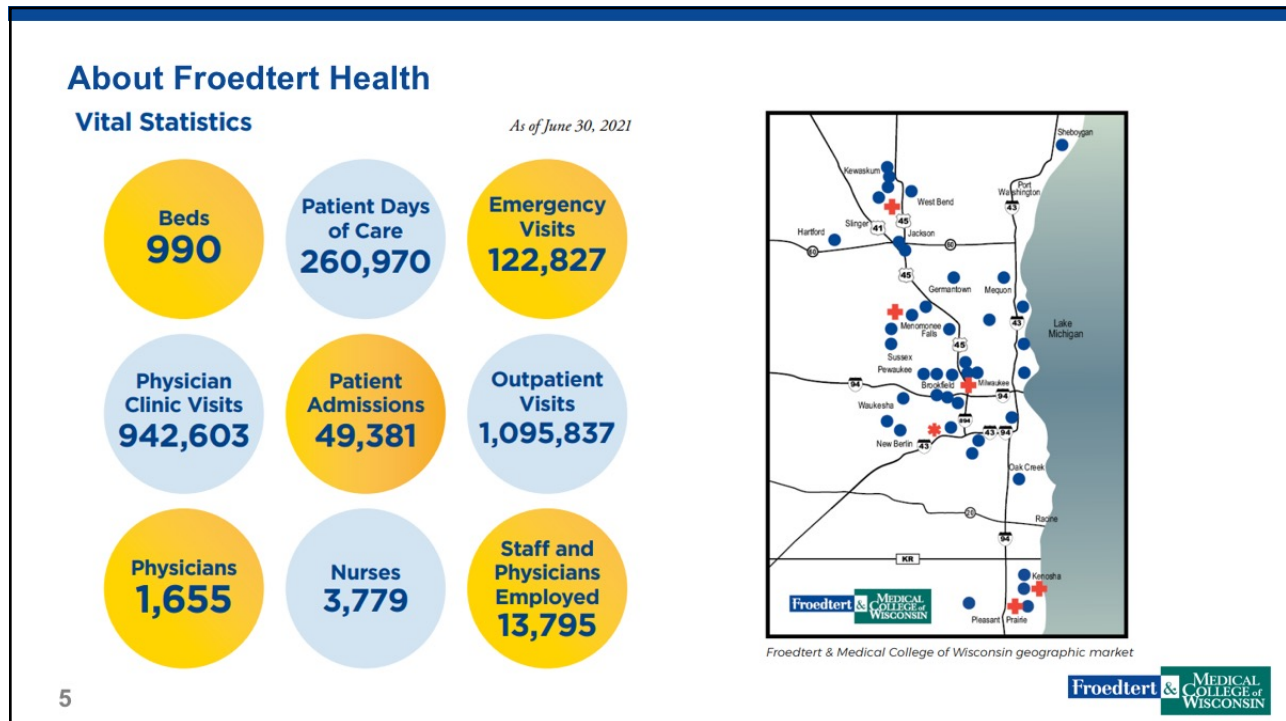
- Fellowship in Infectious Diseases and Epidemiology at Washington University School of Medicine
- At the onset of the pandemic was Chief Medical Information Officer for BJC HealthCare as well as Infectious Disease faculty at WUSM

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Lesson 1: Work Together, Mitigate Barriers, Fill Data Management Gaps

Froedtert & MEDICAL COLLEGE of WISCONSIN

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General Approach to Analytics

- Collaboration
 - Communicate frequently
 - Tap into each others' knowledge for insights
 - Utilize forum to learn from other systems about data/analytic issues related to COVID and beyond

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St. Louis Regional Healthcare System COVID-19 Analytics

Workgroup

BJC Healthcare

- Keith Woeltje
- Christine Hoehner
- Dajun Tian
- Lan Luong
- Ayesha Iqbal

Mercy Health

- Kerry Bommarito
- Byron Yount
- Brandon DeShon
- Chelsea West
- Benjamin Dummitt

SSM Health

- Mario Schootman
- Gokhan Metan
- Candace Crown
- Christopher Swenson
- Mohamed Elsaeti

St. Luke's

- Gretchen Blake
- Tami Strand

Washington University

- Elvin Geng
- Randi Foraker
- Abby Barker



Audiences

- St. Louis Metropolitan Pandemic Task Force
- Health System Leaders
- Public Health Leaders
- Elected Officials
- Education Leaders
- Local Press and Community

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Milwaukee Health Care Partnership

founded 2006



MEMBERS & PARTNERS

Working together for a healthier Milwaukee.

MEMBERS

Health System Members

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- [Advocate Aurora Health](#)
- [Children's Wisconsin](#)
- [Froedtert Health](#)

Academic Member

- [Medical College of Wisconsin](#)

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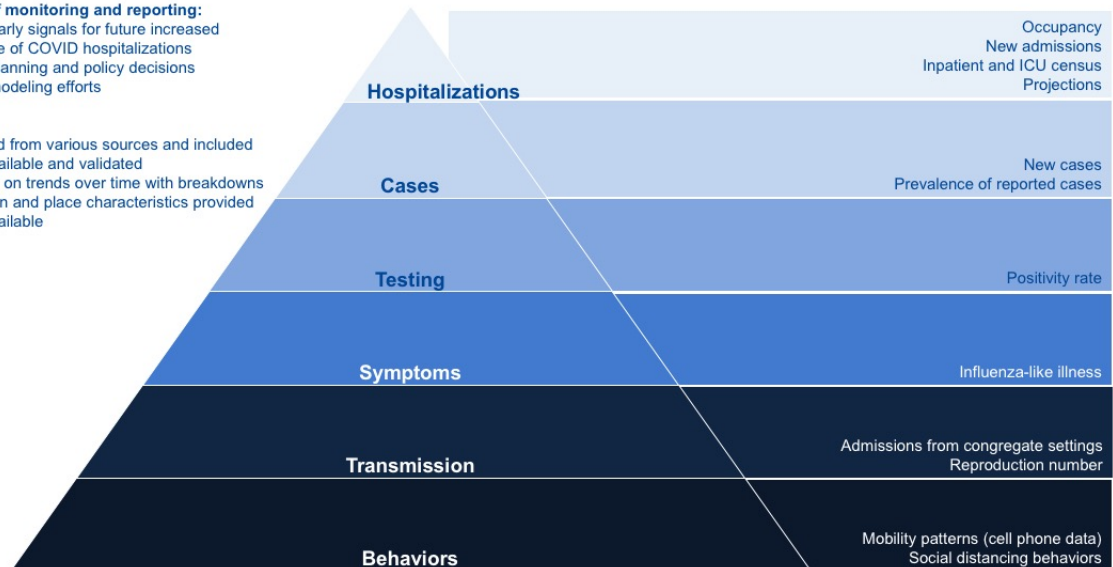
Organizational Framework for COVID Monitoring and Reporting – StL Task Force

Purposes of monitoring and reporting:

- Detect early signals for future increased incidence of COVID hospitalizations
- Inform planning and policy decisions
- Inform modeling efforts

Metrics:

- Compiled from various sources and included when available and validated
- Focused on trends over time with breakdowns by person and place characteristics provided when available



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Lesson 2: Develop Locally, Share Regionally and Nationally

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Focus on Local Needs First

- Initial focus was on health system reporting needs
 - Descriptive Analytics
 - Predictive Analytics - Projections for inpatient hospitalizations and ICU census
 - Critical for community planning
- Over time added regional analytics to assist public health and elected officials

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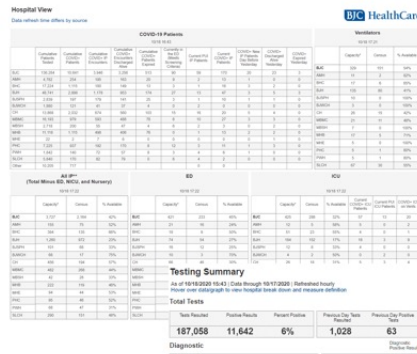
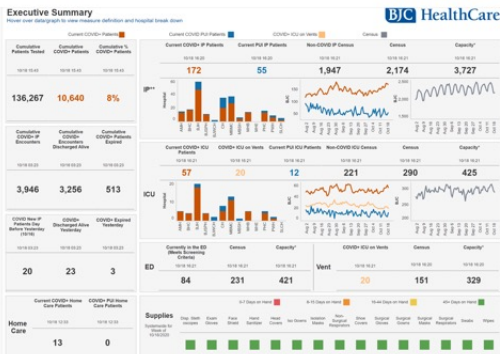
General Approach to Analytics

- **Modeling**
 - Initial approaches varied
 - Ultimately Utilized LEMMA (Local Epidemic Modeling for Management & Action), an SEIR-based tool
 - Developed by Dr. Elvin Geng from WUSTL and his colleagues and used by the State of Missouri
 - Designed to provide regional projections with uncertainty bounds
 - Allows for a range of user-specified parametrizations, including changes in Re based on interventions, and is fit using case series data of COVID-19 hospitalizations
- **Analytical insights**
 - Cater to decision-makers by keeping analytics simple and informative
 - Leverage existing resources from other regions and organizations for insights and guidance

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BJC COVID-19 Dashboards



Surge Planning
 HCU Color Status Indicators Refreshed Daily at 10:40 AM
 Equipment and Census Data Refreshed Hourly | Last Updated at 10/18/2020 05:22 PM

Unit	Total Hospital				ICU				Med / Surg*				Equipment					
	Current	Capacity	Utilization	Change	Current	Capacity	Utilization	Change	Current	Capacity	Utilization	Change	Current	Capacity	Utilization	Change		
RUC	2,164	2,171	-7	209	201	+8	3,727	913	288	70	405	1,678	168	3,382	151	309	20	54%
ICU	75	82	-7	18	15	+3	188	250	5	5	15	75	150	150	3	11	7	80%
ED	135	141	-6	19	18	+1	384	13	23	4	31	112	15	343	6	17	4	60%
ED*	372	384	-12	80	87	-7	2,096	174	150	21	164	620	30	3,076	80	100	0	81%
ED**	68	68	0	11	12	-1	101	25	6	4	12	60	7	89	0	10	0	100%
ED***	17	19	-2	3	3	0	68	0	1	2	24	1	0	24	0	3	0	100%
ED****	184	189	-5	28	28	0	450	105	18	6	24	178	28	433	13	26	4	42%
ED*****	288	279	+9	37	36	+1	482	78	39	15	40	235	24	442	11	21	3	38%
ED*****	28	28	0	5	5	0	42	4	1	1	4	27	4	30	0	7	0	100%
ED*****	119	119	0	14	16	-2	222	70	10	5	24	101	9	108	0	17	2	71%
ED*****	44	50	-6	0	0	0	84	2	3	0	4	41	0	89	0	0	0	100%
ED*****	40	50	-10	14	18	-4	95	8	0	2	11	41	9	20	1	5	1	80%
ED*****	47	49	-2	10	8	+2	69	3	0	2	4	42	0	62	1	0	0	80%
ED*****	151	145	+6	6	3	+3	200	0	10	0	48	138	6	242	30	67	0	55%

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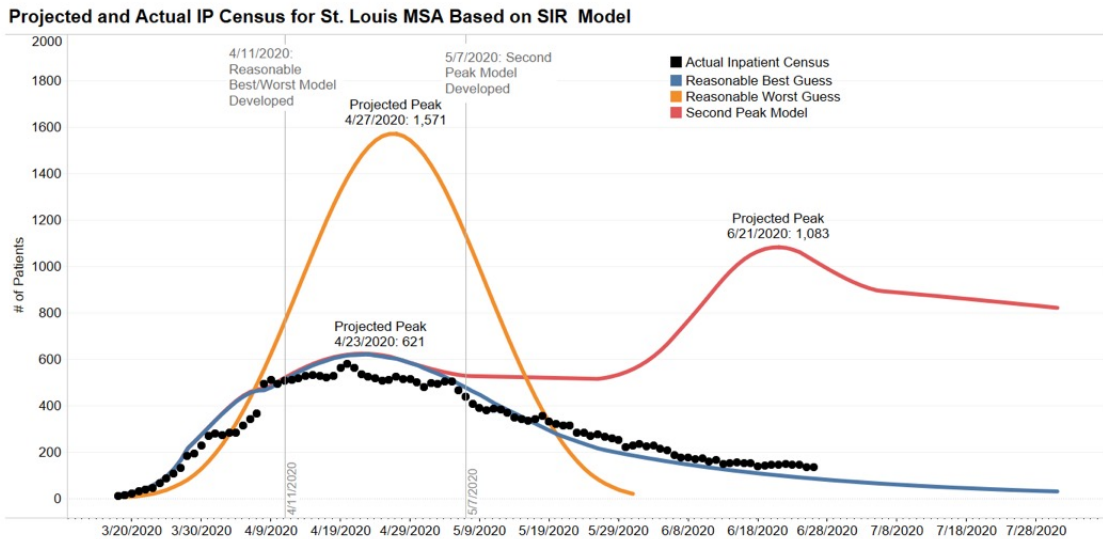
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Modeling Initial Peak and Post-Peak Scenarios



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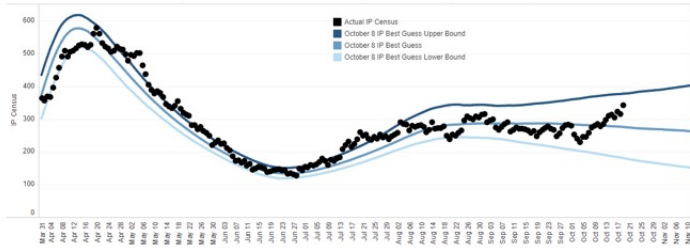
Monitoring COVID Hospitalizations and Cases



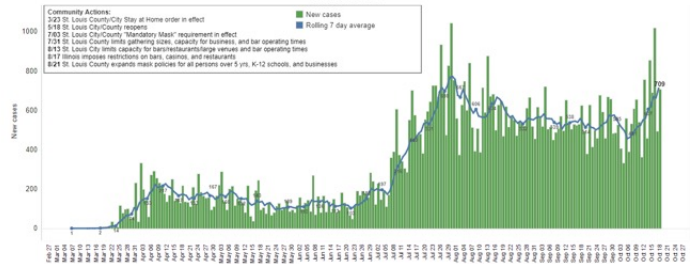
**ST. LOUIS METROPOLITAN
PANDEMIC TASK FORCE**



Projections vs. Actuals: COVID-19 Inpatient Census (St. Louis MSA)

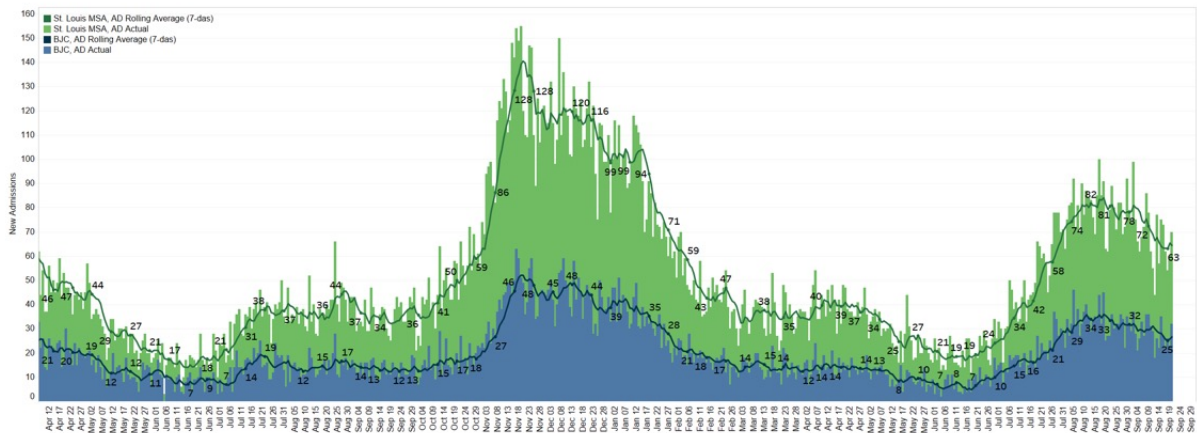


St. Louis MSA



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Daily New COVID-19 Admissions



SOURCE: St. Louis Metropolitan Pandemic Task Force | UPDATED: 9/22/21

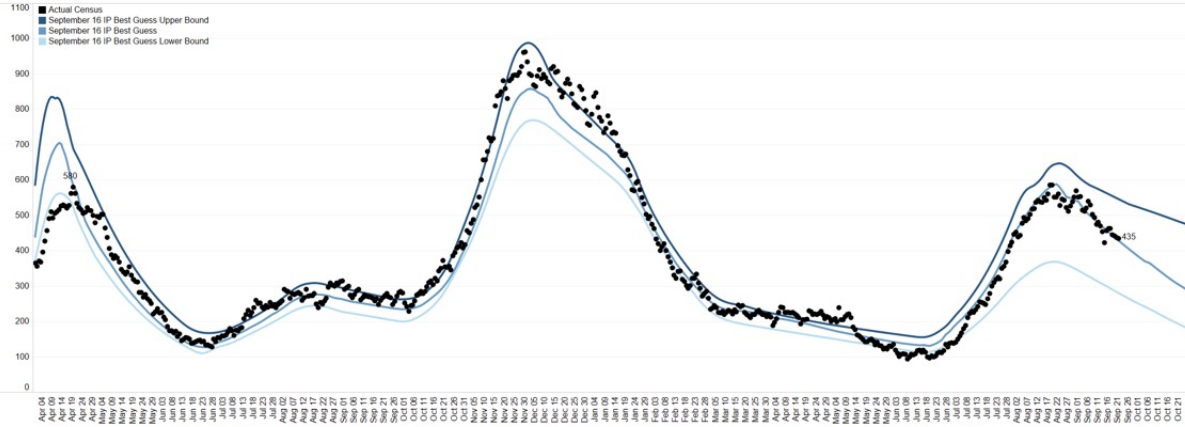
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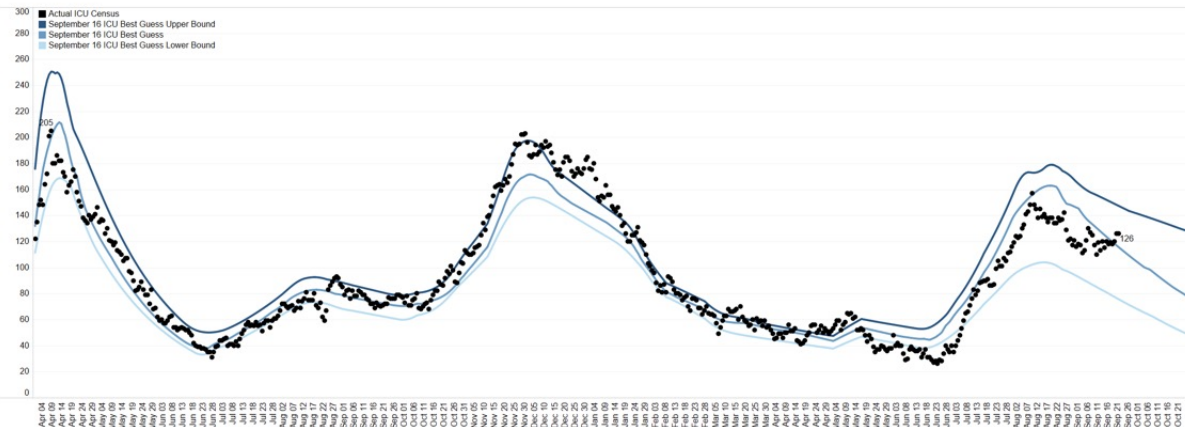
Projections vs. Actuals: COVID-19 Inpatient Census for St. Louis MSA Hospitals



SOURCE: St. Louis Metropolitan Pandemic Task Force | UPDATED: 9/22/21

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Projections vs. Actuals: COVID-19 ICU Census for St. Louis MSA Hospitals



SOURCE: St. Louis Metropolitan Pandemic Task Force | UPDATED: 9/22/21

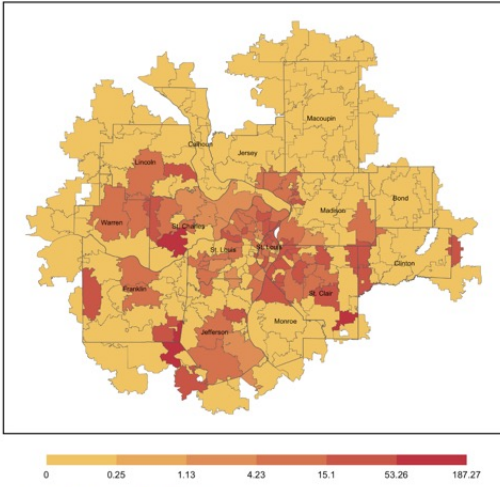
20

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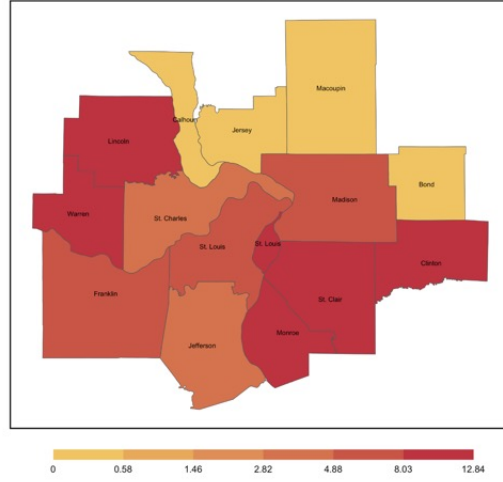
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COVID-19 Hospitalizations by Zip Code and by County from Past Two Weeks StL Metro Region

Hospitalizations of COVID-19+ Patients per 100k People



Hospitalizations of COVID-19+ Patients per 100k People



* / (Grey lines) :County Borders
* Admission date range: 05/30/2021 – 06/12/2021

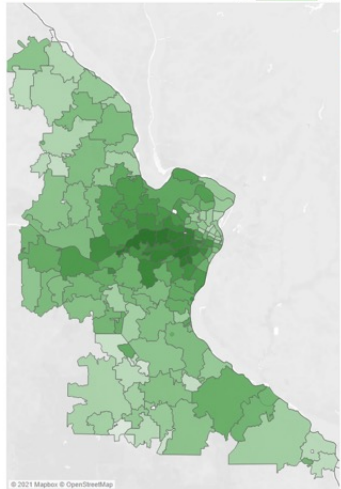
Note: Maps exclude COVID hospitalizations at St. Luke's, BJC Memorial Hospitals in IL, and non-Pandemic Task Force hospitals in IL, representing ~20% of COVID hospitalizations in the St. Louis MSA.

SOURCE: BJC Healthcare, SSM Health, and Mercy Health Data analyzed by Washington University's Institute for Informatics and the Institute for Public Health |
LAST UPDATED: 6/16/21

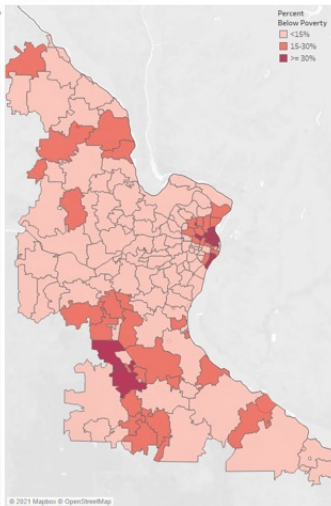
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Vaccination Uptake and Census-Based Percent Population Below Poverty and Percent Black/African by Zip Code StL Metro region

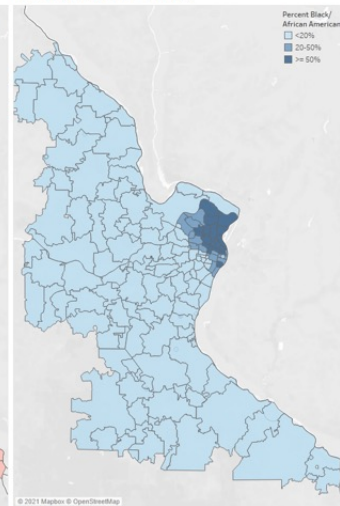
Percent 18+ Population Who Received At Least 1 Dose in Series



Percent Below Poverty



Percent Black/African American



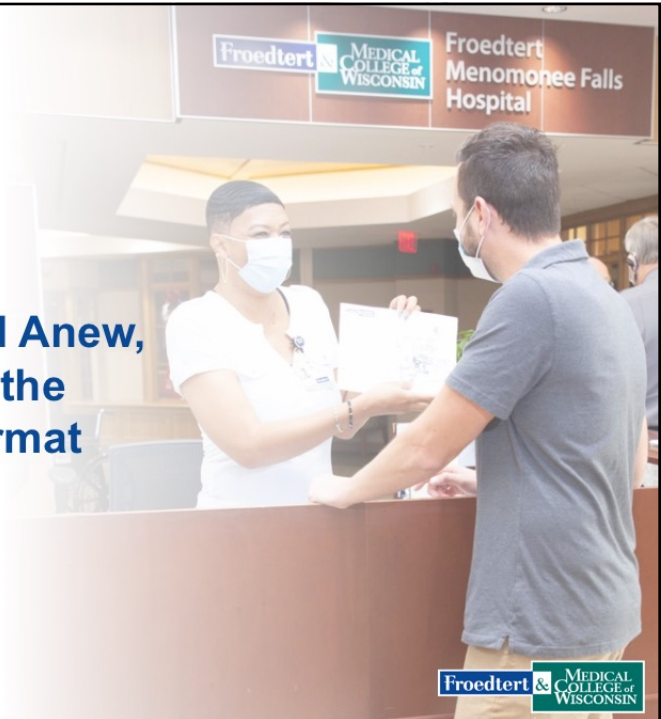
Note: Not all vaccine allocations are fully represented in ShowMeVax, thus actual vaccination levels are higher than shown.

SOURCE: Analysis of DHSS ShowMeVax Data and 2019 American Community Survey | UPDATED: Vaccine admin data through 6/15/21

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**Lesson 3: Adapt, not Build Anew,
and Deliver Knowledge at the
Right Time, Place, and Format**

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**“...it is important to rely on data
infrastructures that are currently
available, not those we wish we
had or what we may be able to
build in the future. “**

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General Approach to Analytics

- Case data
 - Leverage public data (e.g., USAFacts, New York Times, health department websites)
 - Hospitalization data
 - Employ simple, common reporting platform to collect aggregated data

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Data Governance

- Work with all stakeholders to ensure standard definitions
 - But don't get hung up if they're not perfect
- Be realistic about what data can be provided
- Collaborate with local/regional/state officials on data standards
 - When there is no existing standard, make one
- Clear documentation
 - Document, document, document!
 - Be explicit about changes over time



Build Transparency, Trust and Credibility at F&MCW

What data are you looking for?



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Lesson 4: Supporting an Evolving Research Enterprise

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Strong Ties to Medical Schools

- **St. Louis**
 - Washington University School of Medicine
 - Institute for Public Health
 - St. Louis University School of Medicine
- **Madison**
 - University of Wisconsin School of Medicine
- **Milwaukee**
 - Medical College of Wisconsin

- Leveraged existing relationships for use of clinical data for research

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Conclusions



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Accomplishments – St. Louis Task Force

- **Unified reporting** for the entire region for situational awareness and planning
- **Timely and frequent insights** based on real-time information and expert opinions to inform communications and decisions
- **Common indicators and thresholds** for hospital policy decisions
- **Early insights on COVID disparities**
- **Instrumental in spawning** the St. Louis Regional Comparative Modeling Network
- **Application of learnings and concepts** to markets outside St. Louis

Why Successful?

- Multi-disciplinary team with training in epidemiology, public health, statistics, infectious diseases, and informatics
- Health systems not bound by county lines
- “Small town” of St. Louis where many on the team had previously collaborated through school or work → fostered trust
- Engaged senior executives and regional leaders
- Engaged analysts because they saw how data was being used and shared
- Team members who genuinely care about their community

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Appendix

References:

- Kannampallil TG, Foraker RE, Lai AM, Woeltje KF, Payne PRO. When past is not a prologue: Adapting informatics practice during a pandemic. J Am Med Inform Assoc. 2020;27(7):1142-1146. doi:10.1093/jamia/ocaa073

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July 27, 2022	<p><i>(European Teleclass)</i> <u>RISK FACTORS FOR THE ENVIRONMENTAL SPREAD OF DIFFERENT MULTI DRUG-RESISTANT ORGANISMS</u> Speaker: Dr. Jean Ralph Zahar, Hôpitaux de Paris, France</p>
August 10, 2022	<p><i>(South Pacific Teleclass)</i> <u>HEALTHCARE ASSOCIATED PNEUMONIA – WHY SHOULD WE BOTHER AND WHAT CAN WE DO?</u> Speaker: Prof. Brett Mitchell, University of Newcastle, Australia</p>
August 23, 2022	<p><i>(European Teleclass)</i> <u>DATA QUALITY INDICATORS IN NATIONAL TB INFECTION CONTROL PROGRAMS: READING BETWEEN THE LINES</u> Speaker: Dr. Eltony Mugomeri, Africa University, Zimbabwe</p>
September 14, 2022	<p><i>(South Pacific Teleclass)</i> <u>THE COST-EFFECTIVENESS OF TEMPORARY SINGLE-PATIENT ROOMS TO REDUCE THE RISK OF HA</u></p>

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