Leveraging the Stewardship Literature to Inform Your Practice & Design Your Next QI Project

Ashley Marx, PharmD, BCPS, BCIDP

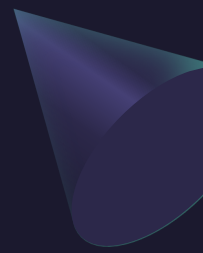
Clinical Specialist, Infectious Diseases

UNC Medical Center

Associate Professor of Clinical Education

UNC Eshelman School of Pharmacy

No disclosures.



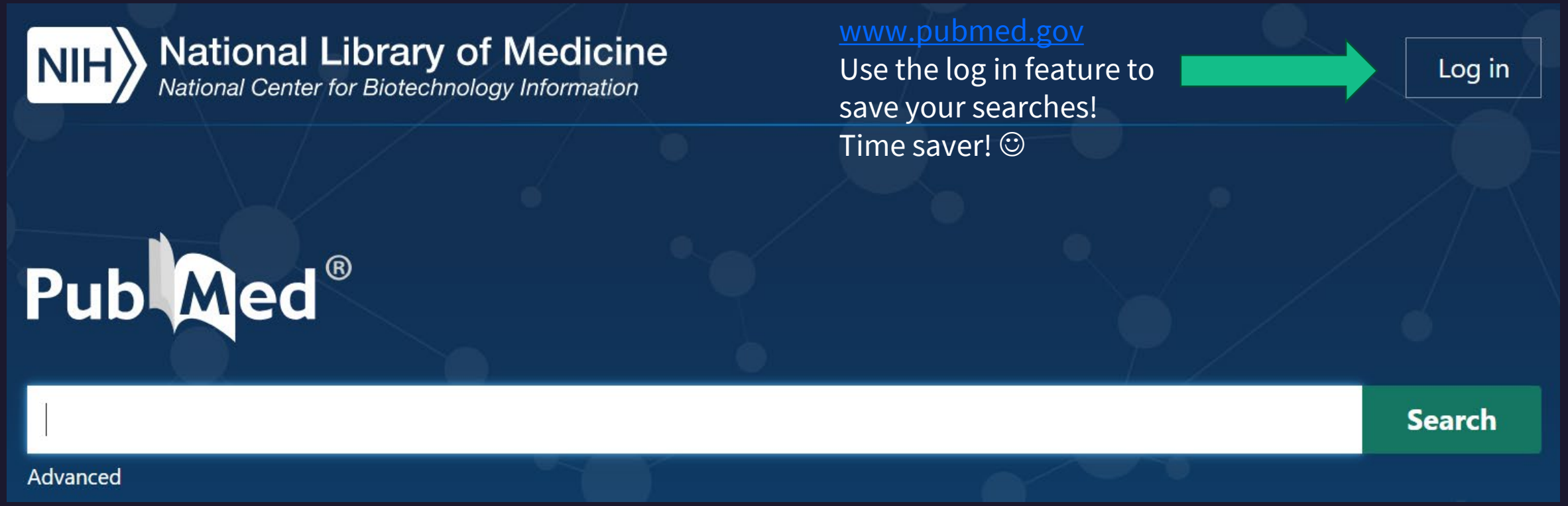
Learning Objectives:

1. Identify published resources to facilitate idea generation for antibiotic stewardship and quality improvement projects
2. Adapt, design, and implement local projects based on evidenced-based practices

Reasons to Pan for Gold in the Published Literature

- Increases awareness of literature and tested interventions
- Imitation *is* the sincerest form of flattery
- Focuses on reproducibility of links between intervention & outcome
- Avoids or mitigates known potential barriers

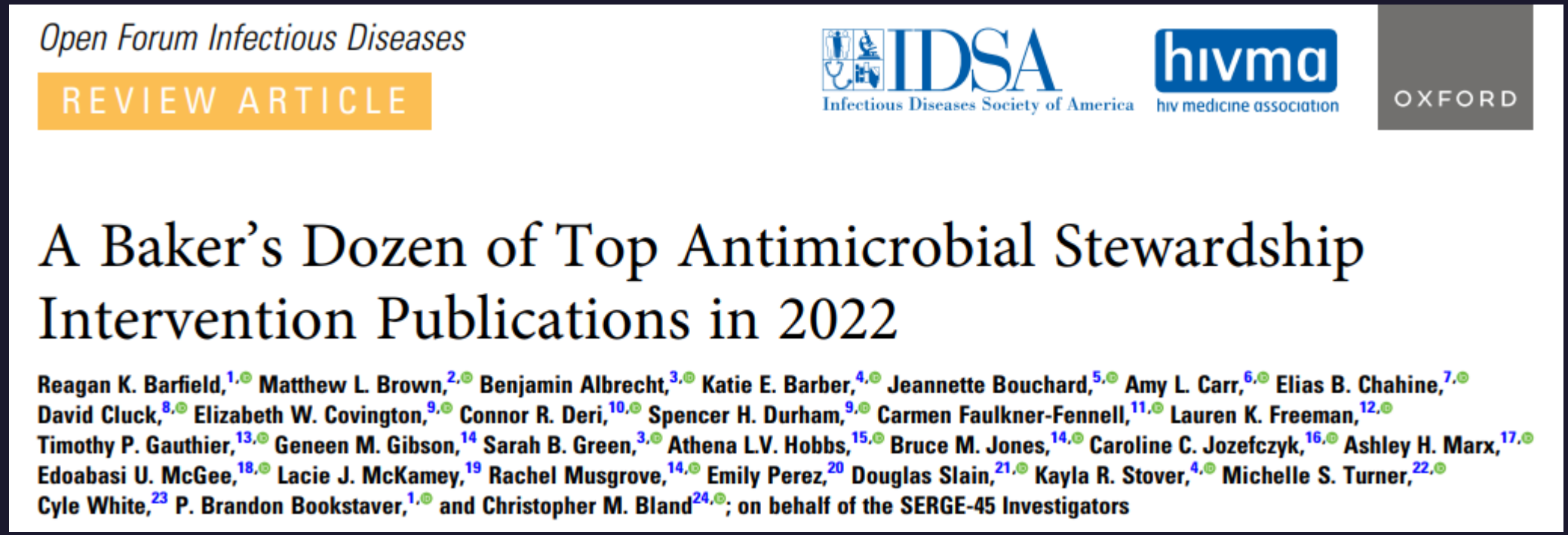
How to Start:
All Great Works Start with a Lit Search



- Take advantage of any school- or library-related portals you have
- Suggested search terms:

Antimicrobial stewardship +/- [intervention] + [your setting] + [target disease state]

Examples of Collated Published Resources



Open Forum Infectious Diseases

REVIEW ARTICLE

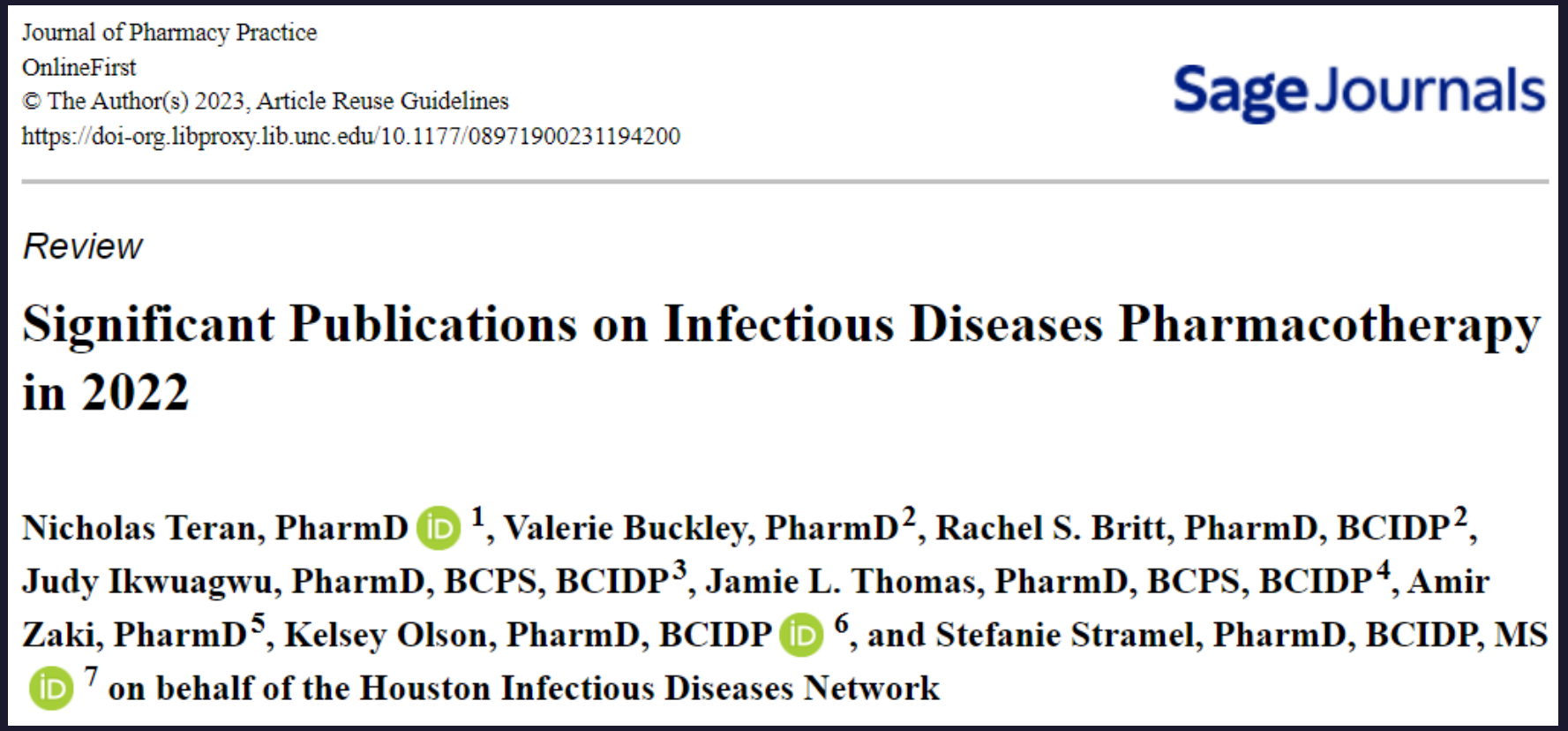
A Baker's Dozen of Top Antimicrobial Stewardship Intervention Publications in 2022

Reagan K. Barfield,[1] Matthew L. Brown,[2] Benjamin Albrecht,[3] Katie E. Barber,[4] Jeannette Bouchard,[5] Amy L. Carr,[6] Elias B. Chahine,[7] David Cluck,[8] Elizabeth W. Covington,[9] Connor R. Deri,[10] Spencer H. Durham,[9] Carmen Faulkner-Fennell,[11] Lauren K. Freeman,[12] Timothy P. Gauthier,[13] Geneen M. Gibson,[14] Sarah B. Green,[3] Athena L.V. Hobbs,[15] Bruce M. Jones,[14] Caroline C. Jozefczyk,[16] Ashley H. Marx,[17] Edoabasi U. McGee,[18] Lacie J. McKamey,[19] Rachel Musgrove,[14] Emily Perez,[20] Douglas Slain,[21] Kayla R. Stover,[4] Michelle S. Turner,[22] Cyle White,[23] P. Brandon Bookstaver,[1] and Christopher M. Bland[24]; on behalf of the SERGE-45 Investigators

- Included studies each describe a *completed* ASP intervention—so you could "shop" here for potential projects or outcomes of interest
- Interventions span acute care, ambulatory, and nursing home environments
- Scan the brief summaries or table, then refer to original citation for details
- Published annually, 2016-2022

https://doi.org/10.1093/ofid/ofad687

Examples of Collated Published Resources



Journal of Pharmacy Practice
OnlineFirst

https://doi-org.libproxy.lib.unc.edu/10.1177/08971900231194200

Sage Journals

Review

Significant Publications on Infectious Diseases Pharmacotherapy in 2022

Nicholas Teran, PharmD [1], Valerie Buckley, PharmD[2], Rachel S. Britt, PharmD, BCIDP[2], Judy Ikwuagwu, PharmD, BCPS, BCIDP[3], Jamie L. Thomas, PharmD, BCPS, BCIDP[4], Amir Zaki, PharmD[5], Kelsey Olson, PharmD, BCIDP [6], and Stefanie Stramel, PharmD, BCIDP, MS [7] on behalf of the Houston Infectious Diseases Network

- These studies provide the pharmacotherapy data *upon which* you could design an intervention
- Best suited for consideration in acute care and ambulatory environments
- Published annually, 2007-2022

https://doi-org.libproxy.lib.unc.edu/10.1177/089719002311942 00

Assembling Your A-Team: Be creative!

- Who could help you develop your project? Collect or analyze data?
  - Trainees, anyone working on an advanced degree, non-licensed personnel
- Are there potential collaborators or colleagues you have worked with before?
  - NC CLASP partners or academic partners
- Can you identify a few who are open to change and willing to provide feedback on the process?

Tips:

Data collection is typically the hardest; where you should be most thoughtful and parsimonious

- Make sure the planned metrics and data match the ability of those who can collect it

For initial projects, strive for simplicity and limit to small-to-moderate changes in workflows

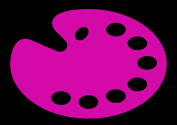
- Testing the team and process is part of any first collaboration!

Considerations for Selecting Your Project

Clinical or Regulatory Needs	• Review guidance & standards • Ask clinical staff for ideas & opportunities
Alignment with Leadership Priorities	• More likely to succeed with support from senior leaders • Look for local or national related goals
Project Team Fit & Interest	• Stakeholder meeting • Team/personal reflection
Potential Impact	• Direct impact of project • Opportunity cost (limited resources)

Adapting an Intervention to Your Setting

Feasibility checklist, link below p. 13-15

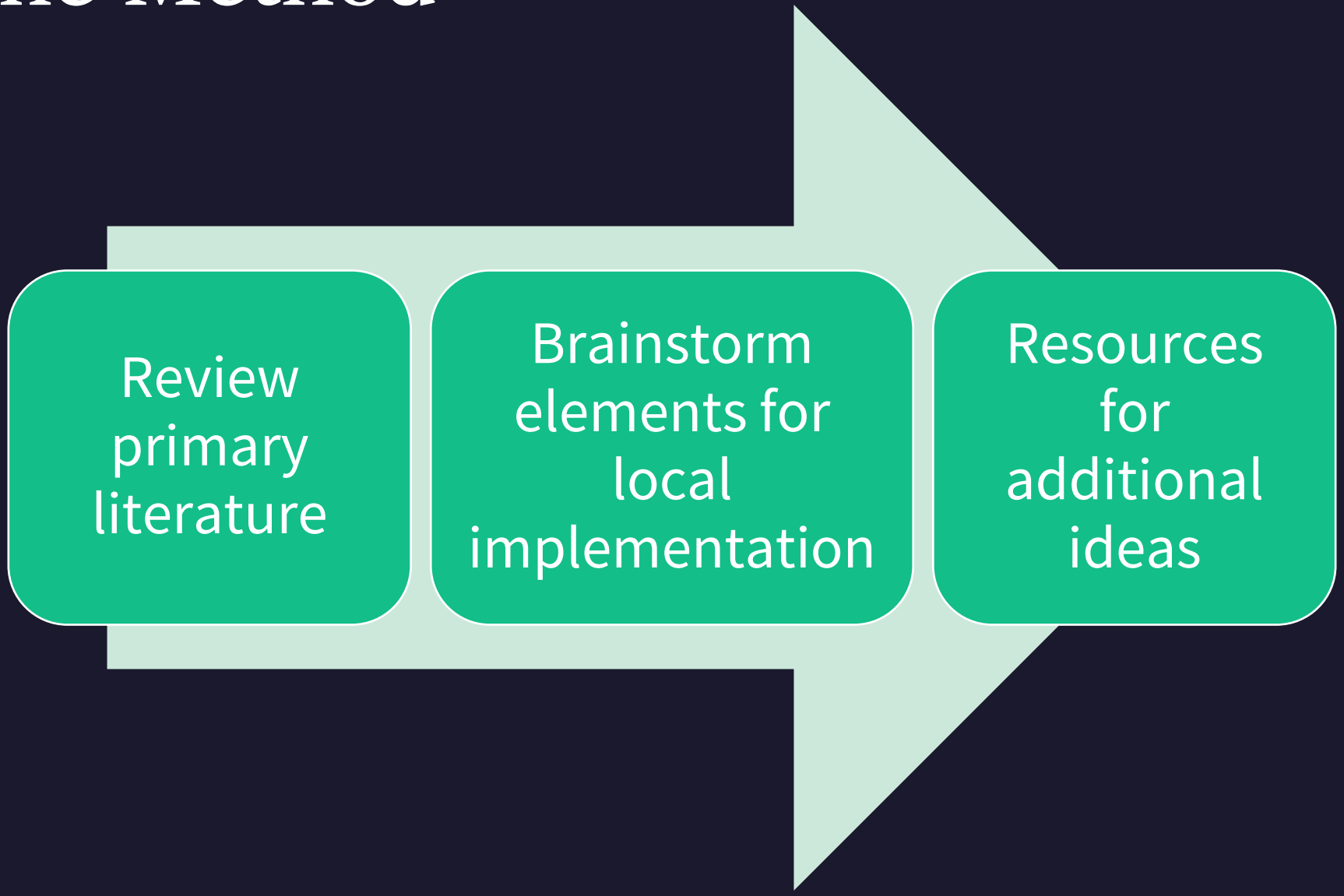


Blend ideas, and combine elements that have worked at your site before

Data & outcomes collected as part of a research study are often more than what is needed to assess a positive change in practice

https://kingsimprovementscience.org/cms-data/resources/KIS_Step_2_December_2018_revised.pdf

Test the Method



Nursing Home Setting: Staff Training & Communication to Improve Prescribing for UTI

- Open label, parallel-group, cluster randomized controlled trial to evaluate a tailored intervention on UTI in 22 nursing homes
- Intervention: 75-min educational session for staff; reflection tool; dialogue tool
  - Reflection tool: Includes observation (signs & symptom) checklist, decision-making algorithm, and questions to discuss with a colleague prior to contacting physician[1]
  - Dialogue tool: Identification-Situation-Background-Assessment-Request format, designed to standardize communication to physician
- Primary Outcome: Decrease in number of prescriptions for UTI per resident per day at risk during 4-month intervention period

1. Graphic file available in Supplementary Materials; Arnold SH et al. Lancet Infect Dis 2021;21:1549-56.

Effectiveness of a tailored intervention to reduce antibiotics for urinary tract infections in nursing home residents: a cluster, randomised controlled trial

	Intervention	Control	Adjusted RR, (95% CI)
Primary Outcome			
Number of prescriptions for UTI	134	228	0.42 (0.31 - 0.57)
Secondary Outcomes			
Number of appropriate prescriptions for UTI	22	24	0.65 (0.41 – 1.06)
Number of inappropriate prescriptions for UTI	32	62	0.33 (0.23 – 0.49)
All-cause hospitalizations	246	175	1.28 (0.95 – 1.74)
All-cause mortality	79	75	0.91 (0.62 – 1.33)

Staff education on UTI paired with use of reflection, assessment, and communication tools decreases inappropriate prescription for UTI by ~70%.

Brainstorming Ideas for Adapting to Another Site

- Is there a need for additional staff education on UTI at my site?
- Can we implement a questionnaire to collect objective information on signs and symptoms of UTI?
- Can we improve communication to prescribers at my site?
- What outcomes could we assess?
  - Point prevalence of patients on antibiotics for UTI
  - Number of UTIs treated per resident per month
  - Nursing staff and non-licensed staff self-assessed confidence using these tools

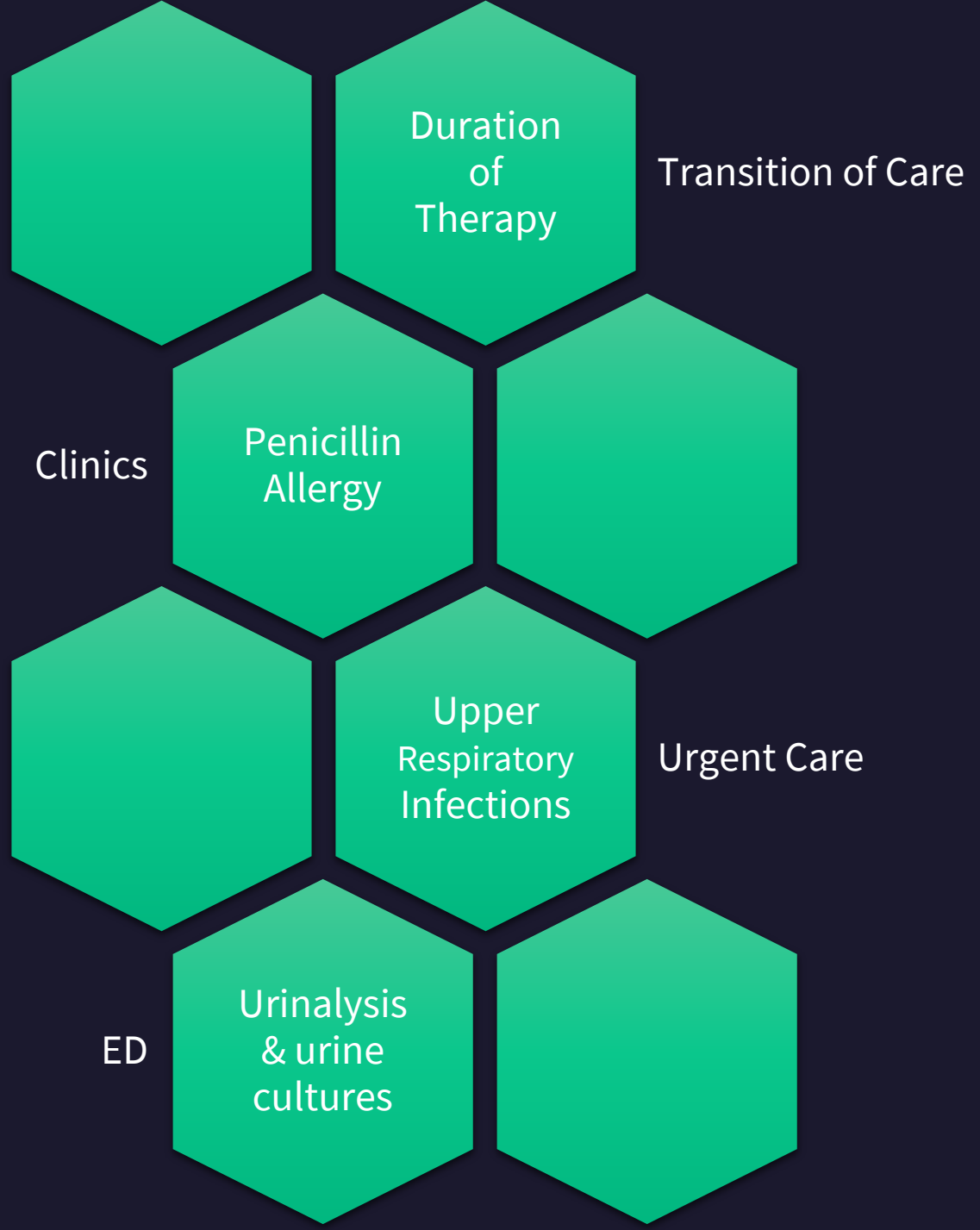
For more ideas, see recent similar work:

Hartman EAR et al. BMJ 2023;380:e072319.
König E, et al. Antimicrob Resist Infect Control. 2024; 13:43.

A Customized Proposal: Nursing Home

Proposal:	The problem we want to solve & how to do it: • **Implement a sign & symptom questionnaire to standardize evaluation for potential UTI.** • **Assess number of antibiotic courses for UTI therapies per month per resident for 3 months following: 1. in-person staff education sessions (45 min each, capturing each shift) and 2. implementation of standardized assessment questionnaire for potential UTI in residents.**
Project team:	Who will play a specific role on our team: • Nursing home clinical staff, support staff, contract pharmacist, medical director, administration.
Measurement:	What we will measure: • Number of prescriptions of antibiotics for UTI diagnosis per resident per month, collected monthly, for three months.
Analysis Plan:	What we will do with the measurements: • Look for trends in rate of UTI prescriptions. • Along the way, do we need to modify the questionnaire? Can staff readily access and use it?
Dissemination Plan:	How we will share our findings (with staff or others): • Report out at staff meeting and to hospital administration. Share with committee(s) to demonstrate progress toward ASP regulatory requirements.

Outpatient Setting Themes:



Outpatient Setting: ASP Intervention for Urgent Care Network Focused on Antibiotic Prescribing for Respiratory Conditions

- Quality improvement study conducted across network of 38 urgent care clinics and 1 telemedicine clinic. Antibiotic prescribing compared between 12 months pre- and 12 months post-intervention; a sustainability period (12 months after intervention) was added *post hoc*.
- Intervention:
  - Education for clinicians (peer-to-peer, guidelines) and patients (brochures and symptom checklist),
  - Medical record tools (azithro prescribing justification alert, note templates, pre-populated antibiotic orders, delayed antibiotic prescribing capability),
  - Clinician benchmarking dashboard,
  - Media blitz.
- Concurrently, but independently, an ASP metric with financial incentive was introduced as a quality measure. Prescribers incentivized to individually prescribe antibiotics for < 50% respiratory encounters (which was the median rate for the service line).
- Primary Outcome: percent of encounters with antibiotic prescription for respiratory condition.

Stenehjem E, et al. JAMA Network Open 2023; 6(5):e2313011.

Implementation of an Antibiotic Stewardship Initiative in a Large Urgent Care Network

Primary Outcome	Pre-Intervention	Post-Intervention	Sustainability
Antibiotic Prescribed for Respiratory Encounter	47.8%	33.3%	25.5%
Select Secondary Outcomes			
Antibiotic prescribing for Tier 3 diagnoses (Tier 3 = antibiotics not indicated)	18.7%	7.5%	6.2%
First-line antibiotic for sinusitis, OM, pharyngitis	70.7%	74.5%	72.5%
Delayed prescription	0	24.8%	24.6%

No change in ED visits and hospitalizations within 14 days of encounter.

- Complex intervention yielded **~15%** reduction in urgent care antibiotic prescribing for respiratory conditions
- Impossible to know what impact financial incentives had on performance!
- Impressive results, may not be generalizable to other sites…but many inspiring ideas to consider

Stenehjem E, et al. JAMA Network Open 2023; 6(5):e2313011.

A Customized Proposal: Ambulatory Care

Proposal:	**Develop and implement:** • **Education on CDC Adult and Pediatric Outpatient Treatment Recommendations;** • **Smart phrases or templates for clinician notes for common URIs to facilitate documentation of symptom-based therapy counseling & antibiotic prescribing;** • **Patient-facing symptomatic therapies checklist to guide counseling and prescribing.**
Project team:	ASP representative, urgent care clinic prescribers, urgent care staff (who would administer the patient-facing symptomatic therapies checklist), IT personnel to generate recurring report for specific ICD-10 and antibiotic prescriptions generated from that encounter.
Measurement:	*Many options! Below are the simplest:* Rate of antibiotic prescribing for conditions that do *not* require antibiotics (Tier 3, e.g, acute bronchitis). Rate of antibiotic prescriptions for conditions that *always* require antibiotics that are concordant with first-line or second-line selection and duration (Tier 1, e.g., bacterial pneumonia).
Analysis Plan:	Analyze team performance at clinic level; generate prescriber-specific reports as needed to identify opportunities for improvement.
Dissemination Plan:	Feedback at regular staff meetings & quality meetings; document for accreditation visits

CDC Outpatient Treatment Recommendations: https://www.cdc.gov/antibiotic-use/clinicians/adult-treatment-rec.html
and https://www.cdc.gov/antibiotic-use/clinicians/pediatric-treatment-rec.html
For information on Tier 1-3 diagnoses, please see: Fleming-Dutra KE, et al. JAMA 2016;315:1864 10.1001/jama.2016.4151

Acute Care Setting Themes:

Transitions of care discharge review

Duration of Therapy

Penicillin Allergy

Rapid Diagnostic Review

Diagnostic Stewardship

- Urinalysis and urine culture
- *C. difficile* testing

Acute Care Setting: Pharmacist-led Transitions of Care Prescription Review

- Non-randomized quality improvement study with stepped-wedge design of adults admitted to one of 17 specified units across 5 sites.
- Intervention: Pharmacists identified patients being discharged with oral antimicrobials for UTI, respiratory, SSTI or intraabdominal infections and provided discharge prescription review. Recommendations were reviewed on rounds or via phone; pharmacists entered orders for discharge for physician co-signature. Total of 800 patient records were analyzed, 400 pre- and 400 post-intervention.
- Primary Outcome: Optimal antibiotic prescription at discharge, pre- versus post-intervention. “Optimal” based on health system guidelines for selection, dose, and duration.

Mercuro NJ, et al. JAMA Network Open 2022;5(5):e2211331.

Pharmacist-Driven Transitions of Care Practice Model for Prescribing Oral Antimicrobials at Hospital Discharge

Primary Outcome	**Pre-Intervention**	**Post-Intervention**	**p-value**
Optimal antimicrobial prescription at discharge	36%	81.5%	$p < 0.001$
Select Secondary Outcomes			
Decrease in antimicrobial duration of therapy	-1.1 days (95% CI -1.7 to -0.6)		
No changes in clinical resolution or 30-, 60-, or 90-day mortality based on time-adjusted generalized estimating equations (GEE).			
Most frequent components of nonoptimal prescribing:			Time-adjusted GEE OR, (95% CI)
Prolonged duration, patients (%)	177/400 (44.2%)	37/400 (9.2%)	0.17 (0.11 to 0.26)
Non-guideline concordant selection	81/400 (20.2%)	24/400 (6%)	0.15 (0.03 to 0.86)
Treatment of asymptomatic bacteriuria	37/400 (9.2%)	10/400 (2.5%)	0.31 (0.11 to 0.86)

Mercuro NJ, et al. JAMA Network Open 2022;5(5):e2211331.

A Customized Proposal: Acute Care

Proposal:	**Targeted discharge prescription review of oral antibiotics by pharmacist (or ASP) for patients diagnosed with UTI or pneumonia on *specific* unit(s), using QI methods.**
Project team:	Pharmacist(s), ASP, Dept of Pharmacy, discharging providers. *Could be an excellent project for multidisciplinary trainees to support!*
Measurement:	Interventions as captured in the medical record (e.g., iVents), total length of therapy (sum of inpatient duration + days prescribed at discharge) per patient.
Analysis Plan:	Assess total length of therapy for a retrospective cohort (treated by same providers, same or similar units, same diagnoses per discharge summary). Compare this to length of therapy among intervention cohort.
Dissemination Plan:	Facility-wide quality conference, staff meeting, brief report in a published journal.

Also consider adjusting this project for transitions from ED or urgent care sites.

Last Note: Disseminating Your Findings

- Reasons to share your findings:
  - Demonstrates follow-through for the program & commitment to learning (whether results are positive or negative)
  - Helps the next team design work and mitigate potential implementation barriers
- Does not need to be time-consuming!
  - Short presentation at program or staff meeting
  - NC CLASP listserv
  - Local quality improvement conference
  - Local or regional newsletter
  - Short write-up for program portfolio (useful for accreditation visits!)
  - Brief communication in a published journal

Summary:

Using the published literature to identify or refine potential ASP projects can inspire and accelerate the work of your ASP team

Three ASP or quality improvement projects were proposed based on healthcare setting, but the opportunity is vast!

Pay it forward: disseminating your team's work allows us to assess reproducibility of intervention→outcomes & helps the next team identify challenges

Leveraging the Stewardship Literature to Inform Your Practice & Design Your Next QI Project

Ashley Marx, PharmD, BCPS, BCIDP

Clinical Specialist, Infectious Diseases

UNC Medical Center

Associate Professor of Clinical Education

UNC Eshelman School of Pharmacy