The POSITIVE Program

Prolonged length **O**f **S**tay **I**n pa**T**ients with **IV** antimicrobials or **E**xtenuating infectious circumstances

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Disclosures

- Cory Hale: Nothing to disclose
- Emilie Muvundamina: Nothing to disclose

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Objective

- Describe the impact of an Infectious Diseases Pharmacist-led program designed to facilitate discharge of patients with complex infections on hospital length of stay, central line utilization, and discharge disposition.

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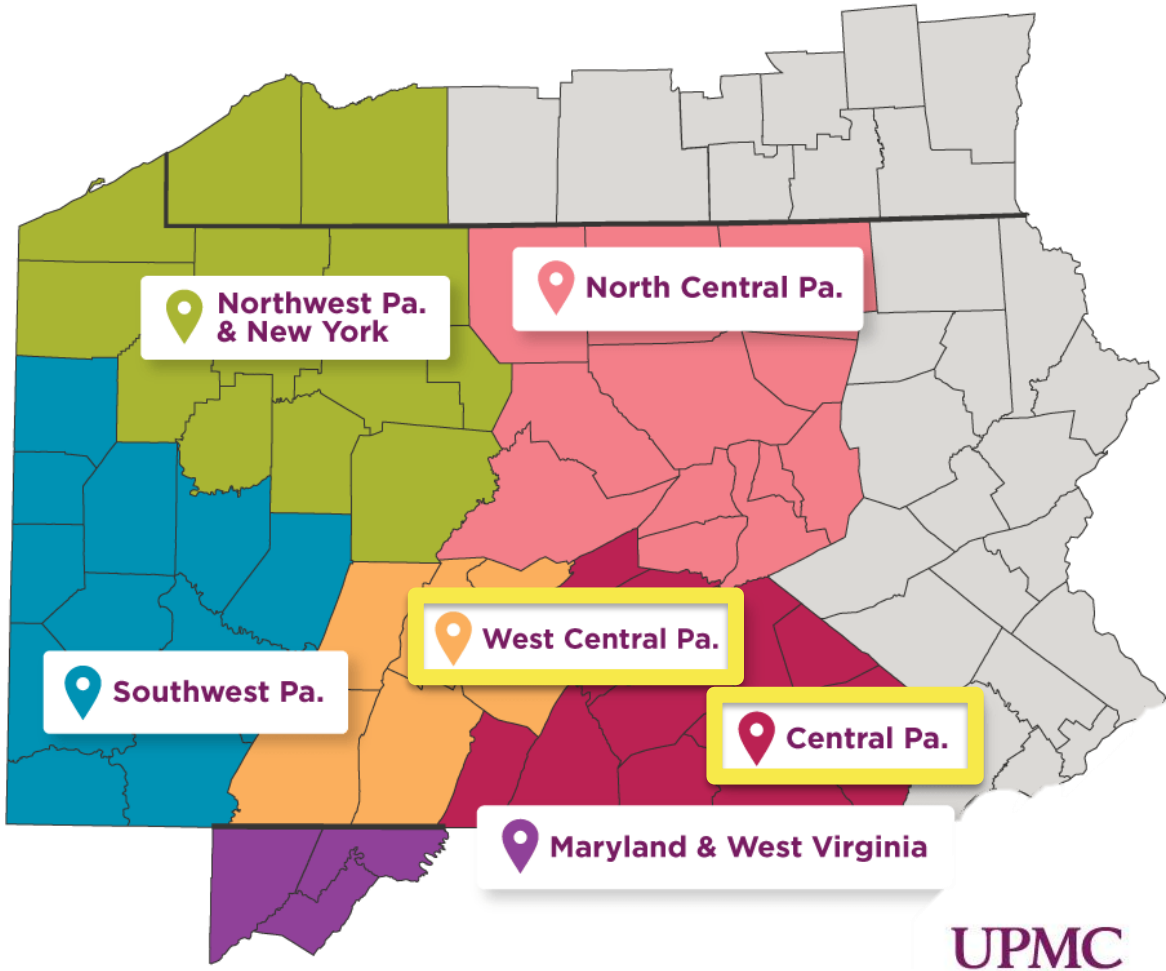
The UPMC Health System

- 37 US-based hospitals across multiple regions (and growing)
- 40+ antimicrobial stewards (and growing)
- 12 medical record systems → ONE



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Background

Complex Infections → Prolonged Hospital Stays

- Weeks of antibiotic therapy:
  - Endocarditis
  - Osteomyelitis
  - *Staphylococcus aureus* bacteremia (SAB)
- Historical practice:
  - Long inpatient stay
  - Intravenous (IV) antibiotics

Care is shifting outpatient

- Health systems face sustained pressure to reduce length of stay (LOS)
- Outpatient Parenteral Antimicrobial Therapy (OPAT) allows patients to continue IV antibiotics at home
  - First described in 1974

OPAT has its downsides

- Vascular access complications
- Line infections
- Antimicrobial adverse events
- Monitoring and logistical challenges
- Focus on **outpatient** rather than up-front management

Do all these patients actually need IV therapy?

Norris AH, et al. Clin Infect Dis. 2019;68(1):e1-e35.

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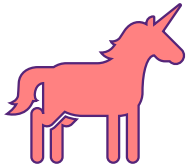
Following the evidence:

Traditional IV antibiotics is no longer the default



OVIVA
Bone & joint infection
n=1,054

13.2% vs 14.6%

Treatment failure at 1 year
(oral vs IV)

- Oral noninferior over first 6 weeks (margin 7.5%)
- Fewer IV catheter complications
- **Earlier discharge**; lower cost per patient

POET
Left-sided endocarditis
n=400

9.0% vs 12.1%

Composite outcome at 6 months
(oral vs IV)

- Oral step-down after ≥10 days IV once stable
- Oral group discharged to complete therapy at home
- Selected, stabilized patients only

SABATO
Low-risk S. aureus bacteremia
n=213

Noninferior

Early oral switch vs continued IV

- Switch after 5–7 days of IV therapy
- **Strict low-risk criteria**: no endocarditis, no prosthetic material
- Enrolled well under target — a narrow population

DOTS
Complicated S. aureus bacteremia
n=200

73% vs 72%

Clinical efficacy
(dalbavancin vs standard IV)

- Two IV doses, one week apart — no central line
- Alternative to 4–6 weeks of standard IV therapy
- Removes adherence and daily-infusion burden

The question is shifting: not **how do we get this patient home on IV antibiotics?** — but **does this patient need IV antibiotics at all?**

Li HK, et al. N Engl J Med. 2019;380(5):425-436. (OVIVA)
Iversen K, et al. N Engl J Med. 2019;380(5):415-424. (POET)
Kaasch AJ, et al. Lancet Infect Dis. 2024;24(5):523-534. (SABATO)\
Turner NA, et al. JAMA. 2025;334(10):866-877. (DOTS)

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Evidence alone hasn't closed the gap

Uptake is slow and inconsistent

Practice varies by preference, resources, and comfort with the evidence

CLINICAL BARRIERS

- Pending cultures and susceptibilities
- Patient acuity and overall likelihood of treatment success
- Supporting evidence hard to find — or hard to trust

SOCIAL BARRIERS

- Substance use disorder
- Unstable housing or no caregiver support
- Insurance and coverage limits or uncertain cost comparisons
- Health literacy and language barriers

LOGISTICAL BARRIERS

- Vascular access and line placement
- Home infusion and agency capacity
- Lab monitoring and follow-up access
- Transportation and pharmacy delivery

Patients stay in the hospital not because they need hospital-level care, but because of barriers to safely transitioning their treatment

This is the gap the POSITIVE Program was designed to close

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The UPMC POSITIVE Program

Prolonged length Of Stay In paTients with IV antimicrobials or Extenuating infectious circumstances

MISSION

To serve patients and support healthcare providers by advancing antimicrobial stewardship, optimizing treatment plans, and eliminating barriers to discharge-to-home for patients with complex infections.

VISION Patient-centered, evidence-based management that:

- Reduces hospital length of stay and unnecessary resource utilization
- Optimizes antimicrobial therapy through evidence-driven stewardship initiatives
- Enhances patient experience and satisfaction via shared decision-making
- Fosters multidisciplinary collaboration across the care team
- Drives continuous improvement and innovation in infectious disease management

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Key Focus Areas

- Implementing evidence-based, **shortest-possible effective durations** of antimicrobial therapy
- Facilitating **IV-to-oral** antimicrobial transitions, when appropriate
- Leveraging **long-acting IV antimicrobial agents** over daily IV therapy, when appropriate
- Supporting post-discharge **access** to therapies and **monitoring**
- Collaborating with care teams to recommend therapy adjustments and **support discharge planning**
- When daily IV therapy warranted at discharge, **prioritizing home infusion rather than SNF care**

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The POSITIVE Program Pilot

Methods	
Objective	To assess the early impact of the POSITIVE Program, a pharmacist-led infectious diseases transitions-of-care initiative, during its first 6 months of implementation
Study Design	Prospective enrollment + Retrospective chart review
Enrollment Dates	January 5, 2026 – July 5, 2026
Location	10 hospitals and associated clinics in the UPMC Health System
Primary Outcomes	• Hospital Days Avoided • Avoidance of peripherally inserted central catheter (PICC) or midline placement • Hospital Discharge Disposition and Route of Antimicrobial Therapy

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Definitions

Hospital days saved

Scenario for assessment	Days if reviewed Mon-Thurs	Days if review precedes weekend or holiday
IV to PO recommendation to avoid SNF placement	2	3
IV to PO recommendation to avoid home infusion	2	3
Completed Therapy prior to discharge with plan in place*	0	0
Discharging without antibiotics due to intervention (PO)*	0	0
Discharging without antibiotics due to intervention (IV)*	2	2
LAI with insurance approval	2	3
LAI in patients who would otherwise stay entire duration (unhoused, uninsured)	= DOT – days completed	DOT – days completed
LAI in through MyAbbVie assist with PO option available	2 – 3 days	3 – 4 days
Obtaining final ID plan early	1 day	3

Adjustments may be made for patient-specific considerations

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*Can adjust for recommendations of shortened therapy

DOT: Duration of Therapy

Patient flow through the POSITIVE Program

REFERRAL

- From any health care team member via:
  - Secure message
  - Electronic consult order
  - Email
- Proactive pharmacist case-finding

REVIEW

- Regional ID-trained pharmacist reviews the antimicrobial plan
- Recommendations and supporting evidence documented
- Oral and long-acting IV prioritized when appropriate

RESOLVE BARRIERS

- Clinical, social, and logistical barriers addressed
- Patient preference built into the plan when applicable
- ID physician partnership on complex cases

FOLLOW THROUGH

- Discharge plan: antibiotics, infusion scheduling (when applicable), access
- Patient follow-up calls
- Followed until therapy completion or follow-up with Infectious Diseases

DURING HOSPITALIZATION

AFTER DISCHARGE

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Results

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Program Referrals and Enrollment Totals

Characteristic	Value, n (%)
Inpatient Referrals, n	435
Inpatients Enrolled, n (%)	391 (90.1)
ID Consult	364 (93.1)
Referral source for enrolled patients	
Infectious Diseases	170 (39.2)
Care Coordination/ Discharge Planner	139 (32.0)
POSITIVE Program (Prospective review)	81 (18.7)
Hospitalist Physician	28 (6.5)
Other (OPAT clinic, pharmacist, IV team)	17 (3.9)

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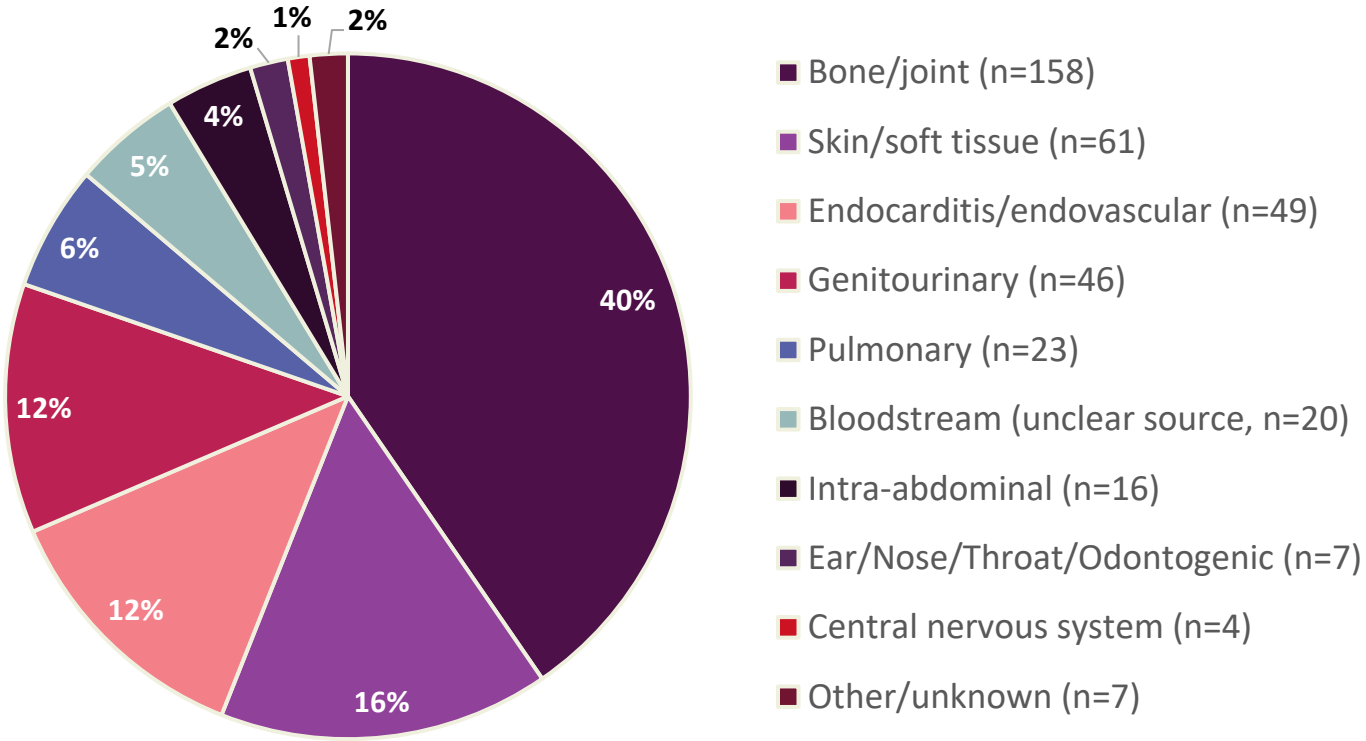
Primary Infection Source



Bacteremia or candidemia present	**178 (45.4)**

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POSITIVE Program Outcomes

1,288
Hospital Days Avoided

107
Central Lines Avoided

Median hospital length of stay* **7.0 days** (IQR 4.0-10.0)

52.9% of enrollments had at least 1 hospital day avoided

*LOS analysis (n=366) excludes hospice/CMO transitions, in-hospital mortality, and transfers.

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Key Patient Outcomes

Discharge Metrics (N=367*)	n (%)
Discharge to:	
Home/Community	275 (74.9)
SNF	56 (15.3)
Rehab Facility	34 (9.3)
LTACH	2 (0.5)
Antibiotic route at discharge:	
Oral only	175 (47.7)
IV (+/- PO)	101 (27.5)
at home	55 (54.5)
at SNF	22 (21.8)
at infusion center or dialysis	3 (3.0)
at Rehab or LTACH	15 (14.9)
Long-acting IV ** (+/- PO)	59 (16.1)
Intramuscular injection	1 (0.3)
No antibiotics	31 (8.4)

30-Day Readmissions

18.9%

69 of 367* patients

Mortality

In-hospital 7 of 376	**1.9%**
Within 30 days 16 of 391	**4.1%**
Within 90 days 19 of 391	**4.9%**

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*Excludes patients who were transferred, transitioned to CMO, in-hospital deaths, and those still admitted at the time of analysis

Patient Stories

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Patient Story: Making It Happen

49 YOM who is unhoused, with history of illicit drug use diagnosed with PJI after R tibial plateau fracture s/p ORIF. Admitted from substance rehabilitation. POSITIVE program consulted for dalbavancin evaluation

1. 6 weeks IV antibiotics for osteomyelitis
   - **BARRIER**: SNFs unwilling to accept patient due to social history
2. Discharge to shelter on dalbavancin
   - **BARRIER**: Medicaid denies dalbavancin twice
3. Request vial replacement (letter, denial letter + application)
   - **BARRIER**: Vial replacement denied

4. **OUTCOME**
   Denial is appealed and free drug is approved
   Administered inpatient; discharged 2 days after dose 2

LOS ↓ 26 days
Earlier discharge with follow-up

4-year problem resolution

PICC Avoidance
Through leveraging LAI use

Patient Story: Patient-centered Solutions

72 year-old man with a pacemaker and MSSA bacteremia, and an initial plan for PICC placement and 6 weeks of **three-times-daily** IV antibiotics at home.

Barriers and Patient Preferences

- During PICC counseling, the patient shared that he works at Harley-Davidson
  - Regularly lifts 30–40 lbs and travels frequently
- **PICC would limit function** and pose **line-related risks**
- Cefazolin infusions would be difficult during travel

Plan was not compatible with his daily life or work demands

POSITIVE Program Recommendation

- Recommended **dalbavancin** based on the latest evidence demonstrating its effectiveness for MSSA bacteremia
  - Eliminated the need for PICC placement
- Coordinated two outpatient infusion center visits that aligned with his work and travel schedule

Ensured therapy was clinically effective and patient-convenient

PICC Avoided

Reduced cost and complications
Preserved full arm function

↓ Hospital Stay

Day-of-discharge dosing with follow-up one week later

Supported his Lifestyle

Enabled full work function and travel flexibility

Conclusion

- The POSITIVE Program was associated with:
  - Reduced hospital length of stay
  - Reduced need for central venous access
  - Increased facilitation of discharge-to-home
- Expansion of this model may further enhance patient-centered care and support broader health system implementation

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Future Directions

- Health system expansion
- Electronic medical record enhancements
- Electronic, proactive identification of patients
  - Ideal state: any potentially eligible is reviewed by antimicrobial stewardship on day 3 of hospitalization to improve throughput
  - High impact infectious diagnoses: osteomyelitis, endocarditis, etc.

Which of the following outcomes was associated with the POSITIVE Program during its initial evaluation period?

A. Increased use of central venous access devices to facilitate discharge
B. Reduction in hospital length of stay, decreased central line placement, and increased discharge to home
C. Elimination of the need for infectious diseases consultation in most patients
D. Increased hospital length of stay due to additional pharmacist interventions

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