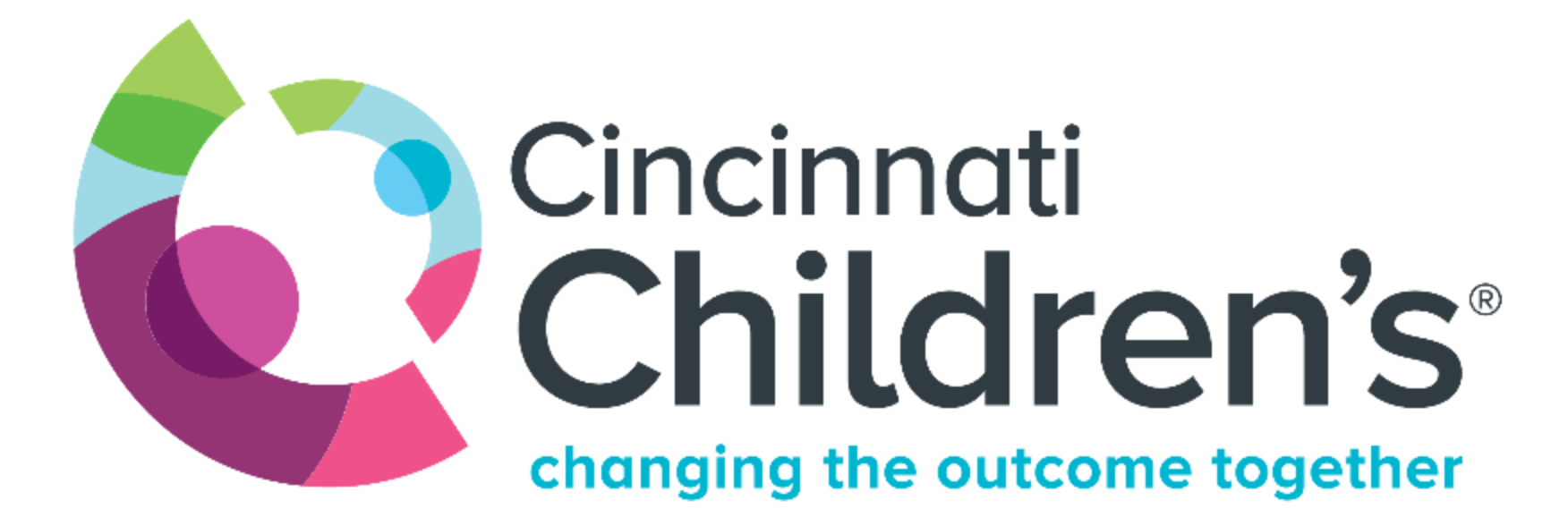


# Assessment of Antimicrobial Stewardship Education by Pediatric Infectious Diseases Program Directors

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## Background

- Antimicrobial stewardship (AS) is a crucial aspect of a pediatric infectious diseases (ID) fellow's training to address the public health crisis of antimicrobial resistance
- Around 30% of all antibiotics prescribed in hospitals in the United States are unnecessary or suboptimal and 20% of hospitalized patients have serious adverse effects from antibiotics
- Given regulatory requirements and standards for AS programs, it is important to have effective pediatric ID physician leadership and direction within this area
- In order to fulfill the core elements of an AS program one needs to have the ability to implement new interventions, track and report data, and the capability to educate others in this area
- Adult ID programs have noted an educational gap with only about half of programs reporting a formal AS curriculum and low satisfaction of program directors with their fellows' current training in this area
- There is minimal information known relating to the status of AS fellowship education as a whole within pediatric ID

## Methods

Cross section survey via Google Forms sent to pediatric ID fellowship program directors

Survey addresses: the presence of a curriculum, interest in AS as a career, satisfaction with fellows' current training, need for a standardized curriculum

If a formal curriculum is present, further questions were asked about:

- Learning objectives
- Methods of implementation
- Learning modules
- Fellow participation in AS interventions
- Timeframe of the curriculum
- Formal assessment tool
- Barriers

If a formal curriculum is not present, further questions were asked about:

- Existing educational opportunities/learning objectives
- Learning modules
- Fellow participation in AS interventions
- Areas where trainees would benefit from additional AS instruction
- Barriers to implementation of a curriculum

## Results

- 27 of 65 programs responded to the survey (41.5% response rate)
- 63% of programs had a formal AS curriculum
- 100% of programs thought a standardized pediatric ID AS curriculum would be useful
- At the start of fellowship, there was more perceived interest in AS, however job acquisition at the time of graduation did not match initial interest
- Concordance in satisfaction with current training and perceived fellows' ability to use AS in clinical practice
- Divergence in satisfaction of fellows' training and perceived fellows' ability to assume a future leadership role post fellowship
- In programs with a formal curriculum fellows had a higher likelihood of participation in a greater array of AS interventions

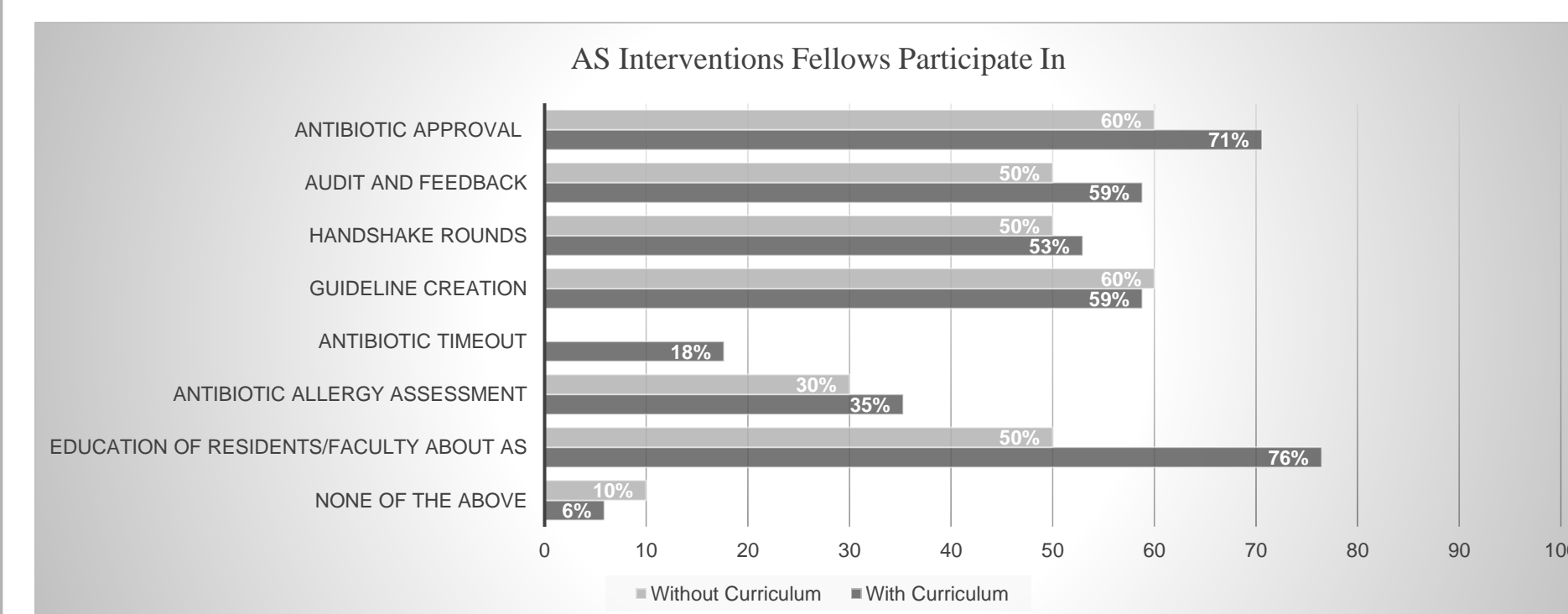


Figure 1: Percentage of fellows who participate in different AS interventions as a part of their training in programs with a formal curriculum versus programs without a formal curriculum.

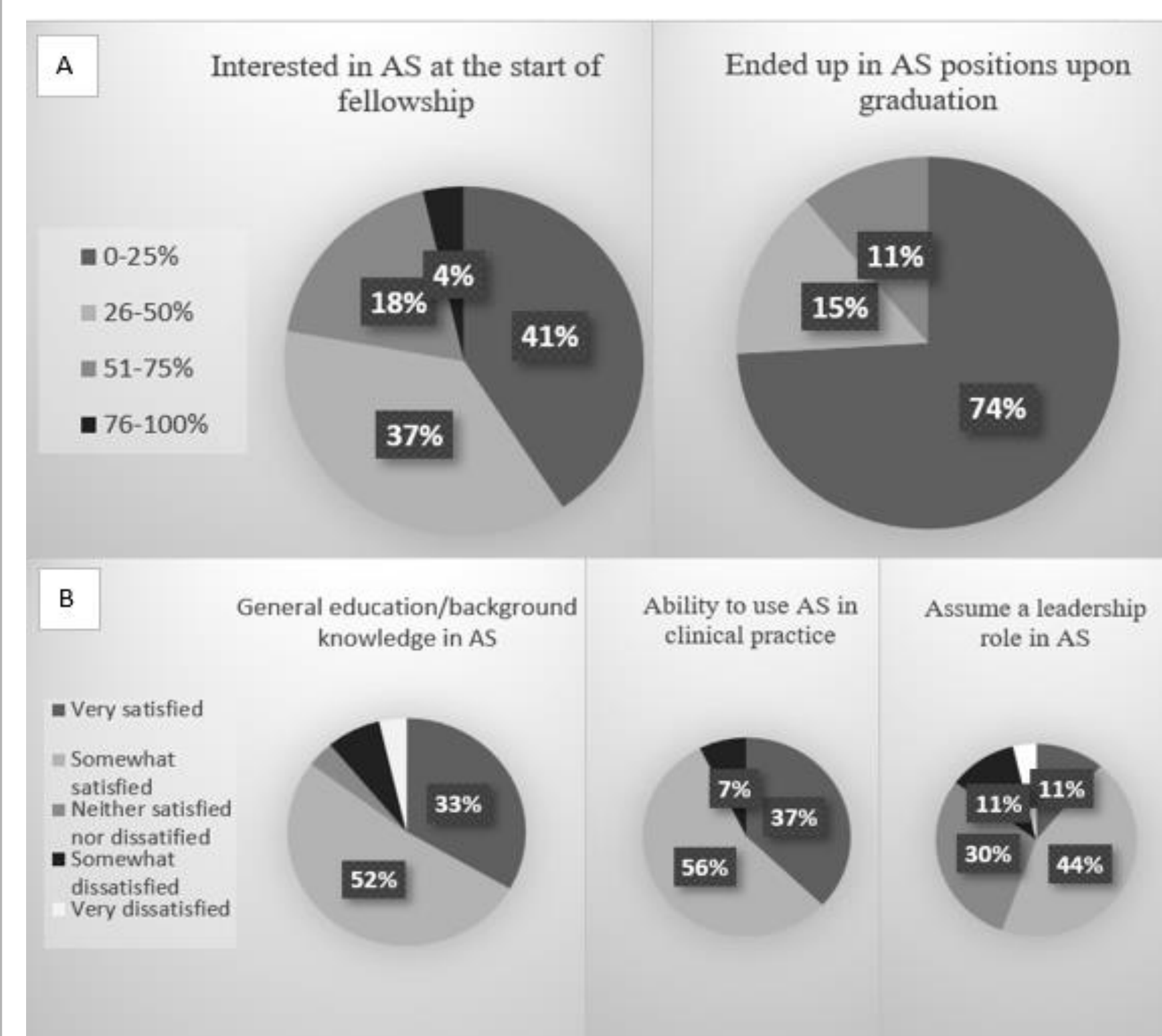


Figure 2: A - In the last 5 years, the approximate percentage of fellows interested in antimicrobial stewardship (AS) at the beginning of fellowship and the percentage who ended up in AS positions after graduation. B - Pediatric ID programs satisfaction with their fellows' current training in AS with respect to background knowledge, ability to use AS in clinical practice, and ability to assume a leadership role in AS.

## Results

- Most common methods of implementation: learning modules, lecture slides, reading materials, teaching during clinical service, requirements for an AS project
- Main online learning modules used: SHEA, IDSA
- Timeframe of the curriculum was highly variable (2 to 4 weeks, longitudinal over 3 years, combination)
- Majority of programs did not have a formal assessment tool
- Most common barriers: lack of time in the educators' schedule, lack of materials

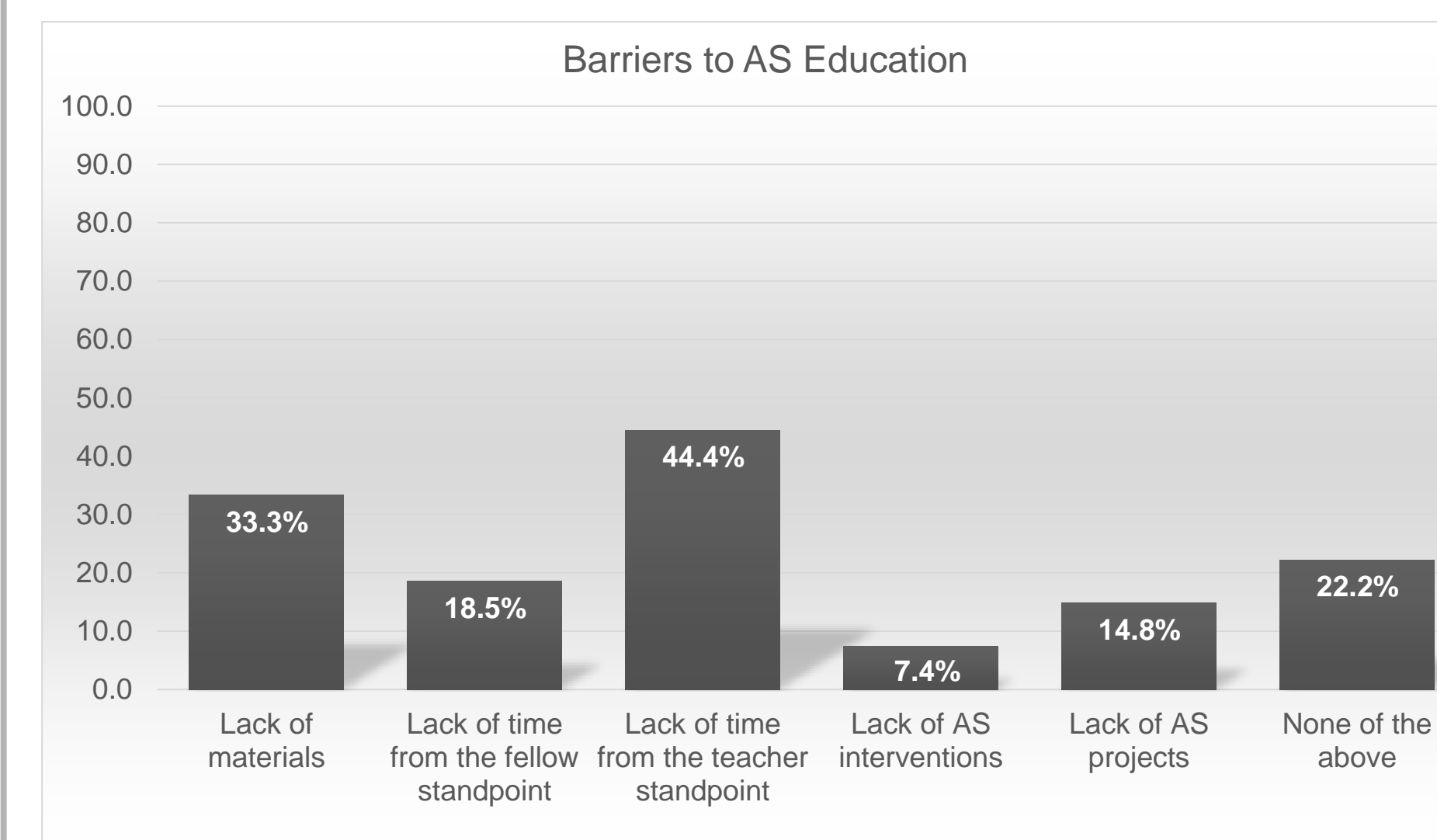


Figure 3: Barriers pediatric ID programs face both in terms of programs that have a curriculum and barriers programs face in terms of implementing a curriculum.

Table 1: Learning Objectives and Areas of Improvement

Curriculum: Learning Objectives Commonly Included	Curriculum: Learning Objectives Commonly Not Included	No Curriculum: Areas That Majority Thought Needed Additional Instruction
<b>Antimicrobial Education</b>		
Antibiotic spectrum of activity and adverse effects	Psychosocial factors that influence providers/families	When to intervene and how to escalate/de-escalate antibiotic regimens
Pharmacology	Techniques/skills used to influence antimicrobial prescribing	Psychosocial factors that influence providers/families
Antibiotic resistance		Techniques/skills used to influence antimicrobial prescribing
Microbiology and diagnostics		
Management and scenarios of antibiotic overuse/misuse		
When to intervene and how to escalate/de-escalate antibiotic regimens		
<b>Practicing Antimicrobial Stewardship</b>		
Roles/requirements of an ASP	Obtaining/calculating data pertaining to antibiotic use	Obtaining/calculating data pertaining to antibiotic use
ASP interventions and meetings	Strategizing when antibiotic shortages occur	ASP interventions and meetings
	Applying AS knowledge (QI, guideline creation, etc.)	Applying AS knowledge (QI, guideline creation, etc.)

(List of learning objectives that programs with a curriculum commonly include (> 80%) and commonly do not include (< 80%). List of learning objectives that majority (> 50%) of programs without a curriculum believed fellows needed additional instruction in.)

## Discussion and Conclusions

The survey identified several areas of strengths and opportunities for improvement in AS training. There was a strong consensus that a standardized training curriculum would be valuable.

Perceived strengths of existing AS training

- Satisfactory education in basics of AS and ability to use these skills as a clinician
- Majority of those with and without a curriculum addressed basics of antimicrobial education
- Education regarding roles and requirements of ASPs

Perceived areas for improvement in AS training

- Low percentage of satisfaction with fellows' ability to assume a leadership role in AS
- Perceived lack of understanding in psychosocial/behavioral factors
- Perceived lack of understanding in strategizing about antibiotic shortages, collecting and analyzing data, and applying AS knowledge for research
- AS interventions: lack of training in antibiotic allergy assessments and antibiotic timeouts

Formal leadership training and cross-collaboration between programs could help to establish an AS community among fellows and alleviate barriers.

## Future Directions

Multiple programs' curricula could be integrated to create a standardized curriculum for pediatric ID programs to prepare their fellows for a career in antimicrobial stewardship. Ideally, education would start at the beginning of fellowship so fellows can apply learnings throughout their training. A longitudinal elective over the course of fellowship could allow those interested in the field to develop the skills necessary to be successful in AS after graduation. Collaboration would allow programs of all sizes to provide this education, enabling fellows to learn all the core aspects of AS from leaders across the country.

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