SHSMD25 CONNECTIONS
Health Care Strategy & Market Development
October 12-14 ★ Dallas

Quantifying the Size of the Health System Capacity Problem and Evaluating the Use of AI Triage to Solve It

Justin Johnson, VP of Telemedicine, Baylor Scott & White Health,
justin.johnson@bswhealth.org

Bilal Naved, Ph.D, Chief Product Officer, Clearstep,
bilal@clearstep.health

AHA Events

Justin R. Johnson

Vice President, Telemedicine
Office of the CMO
Baylor Scott & White Health
justin.johnson@bswhealth.org

- Honor graduate of the United States Military Academy at West Point
- Served on active duty in the US Army as an Engineer Officer both stateside and abroad
- Employed with Baylor Scott & White for nearly 20 years, holding various roles in different departments
- Under the Office of the CMO, led efforts to develop and implement practice redesign initiatives to address provider burnout, to include efficiency of practice projects, leader development and provider engagement activities
- Currently reports to the Chief Medical Officer and leads system wide efforts around telemedicine
- Member of various BSWH Boards and Committees to include:
  - Executive Committee Member of the BSW Wellbeing in Medicine Institute
  - BSWH Military Advisory Committee
  - Veteran Services Executive Board

Bilal Naved, Ph.D

Chief Product Officer,
Clearstep
Schmidt Fellow, Early Career Faculty, Mount Sinai Health System
bilal@clearstep.health

clearstep

- Co-founded Clearstep while completing his MD/PhD at Northwestern University.
- Spent the majority of his PhD time on topics of using artificial intelligence to optimize the delivery of care resources.
- Led the development of the most prevalently implemented agentic AI for self-triage across US health systems as reported in a recent Nature Digital Medicine publication.[1]
- The Clearstep agentic AI has helped route patients in all 50 states and is powering routing capabilities for the largest health systems in the country (e.g. HCA, the Military Health System, Baylor Scott & White Health, Ochsner, Mount Sinai and many more).
- Clearstep was the first company to ever win three awards simultaneously at KLAS' emerging spotlight solutions awards and is the highest rated solution in its space by KLAS. He has been recognized in Forbes Next 1000.
- Currently is the Chief Product Officer of Clearstep and an early career faculty at Mount Sinai Health System in their Department of A.I. as a Schmidt Fellow (endowed by Eric Schmidt, former CEO of Google from 2011 – 2015).

SHSMD Society for Health Care Strategy & Market Development℠

1. Naved, Bilal A., and Yuan Luo. "Contrasting rule and machine learning based digital self triage systems in the USA." *NPJ digital medicine* 7.1 (2024): 381.

Outline/Agenda

Access and capacity are top of mind for health systems across the country. We quantified a year worth of outpatient visit data across all service lines of multiple health systems.

Many health systems aim to solve this, in part, by enabling online scheduling. However, without customer support and guidance, many systems experience tension from their medical groups due to loss of provider control over calendars or the wrong patients being booked.

How much revenue is being left on the table due to inappropriate patient bookings? How large of an effect may qualifying patient bookings have? Is there a way to do this without putting 10+ questions in front of every booking? How effectively can patient booking behavior be redirected?

Learning Objectives:

- 27% of all in-person appointment bookings across the health system indicated no physical exams nor diagnostic tests.
- 73% of all patient booking intents are clinically inappropriate, with 2/3 of them being too acute and 1/3 being too mild.
- Digital tools for qualifying booking intents are able to realize 34% re-directions.

Health System Perspective

Why is Navigation so Important: **Access and Capacity Management**

Access is top of mind for all Medical Groups and Capacity is limited

Mitigation Strategy: Right patient to right care setting the first time
Goal: Manage care at the lowest cost and most convenient setting clinically appropriate for patient conditions
Challenge: Patients don't know where that is
Nurse lines are busy, and Call Centers lack clinical training
Internet searching is risky business
Competing incentives across business lines

Solution: Help navigate patients and do what's best for them

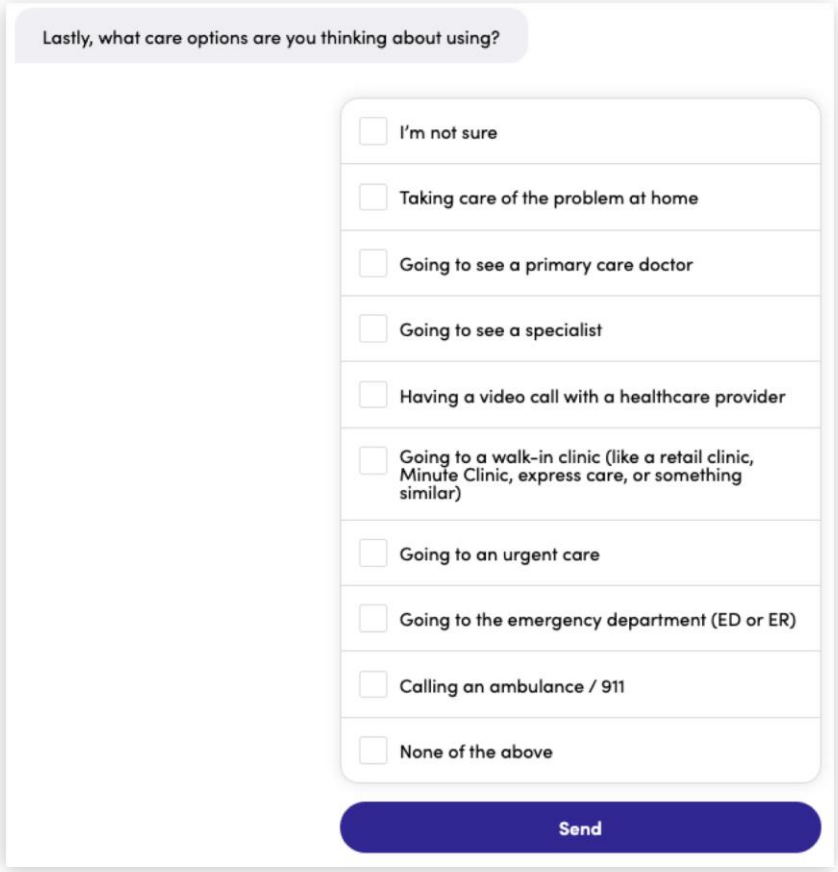
If each care setting worked top of license, and patients are intelligently directed, everyone wins

- Patient gets appropriate care more conveniently (think virtual first where possible)
- Less rescheduling and/or avoidable follow-ups (better for patient and Medical Group)
- Primary Care Clinics "declutter" and schedules open up (think what can be done elsewhere)
- Urgent Care and Emergency Departments shorten wait times (reduce avoidable visits)
- Specialists see only patients that need to be seen by them and their expertise (shrink backlogs)

With smart Navigation, patients win and Medical Groups load balance (also a win)

SHSMD Society for Health Care Strategy & Market Development™

How accurate are patients at self-directing to care?



BSWH Data Not Included

Methodology

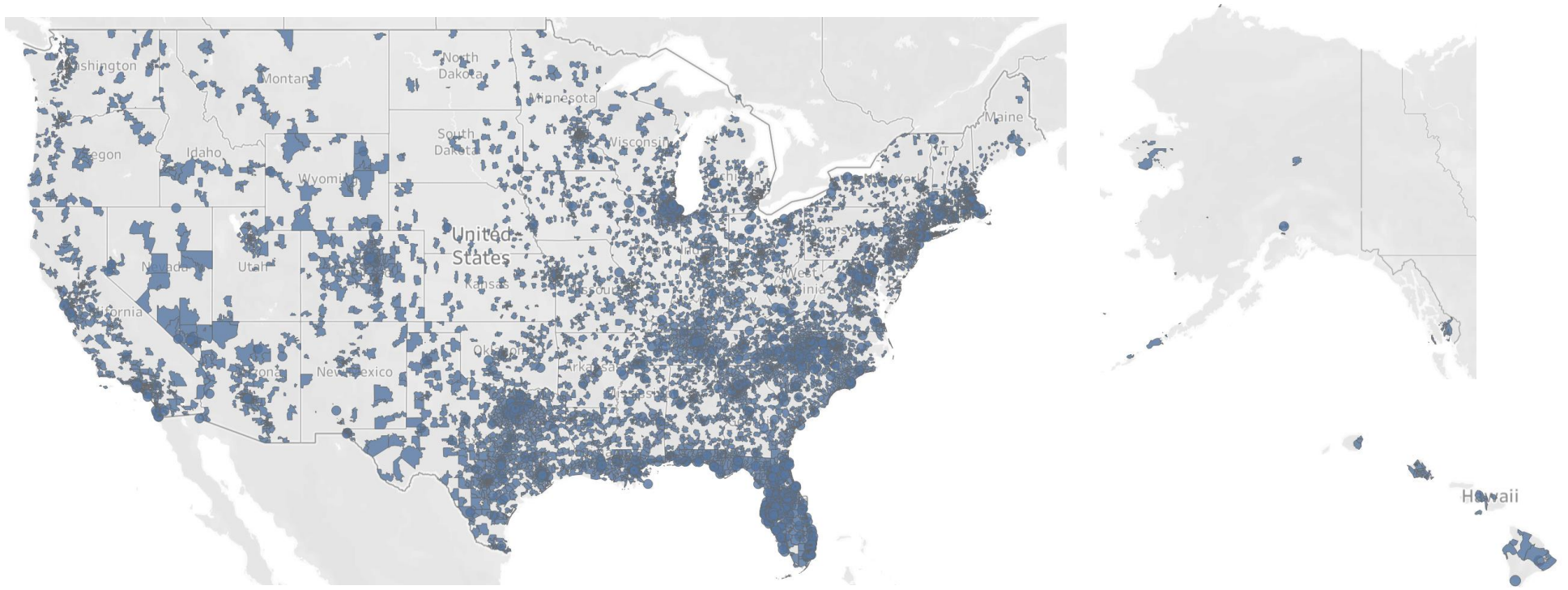
32,921 pieces of user pre-intent data were randomly collected

Note, the following were un-included:
- Users with an ER recommendation
- Users with a 911 recommendation

Also note: This analysis only looks at users that answered the pre-intent question with a clear intent or "unsure" remark, users that didn't answer the question or remarked "None of the above" are excluded

SHSMD Society for Health Care Strategy & Market Development℠

We randomly surveyed AI triage users from our national footprint of health system deployments in all 50 states



Naved, Bilal A., et al. "LLM enabled classification of patient self-reported symptoms and needs in health systems across the USA." *Nature Digital Medicine* 8.1 (2025): 390.

SHSMD Society for Health Care Strategy & Market Development℠

Analyzing users' "pre-intent" before seeing Clearstep care options

We wanted to understand what Clearstep users are already intending to do for care before showing them our recommended care options to observe any differences and understand whether we're driving behavior change.

Pre-Intent Response	# of Patients Selected	% of Patients Selected	% Engaged with CTAs
Unsure where to get care	4,728	14.4%	19.5%
Self-Care	10,164	30.9%	16.6%
PCP	8,196	24.9%	28.4%
Urgent Care	7,847	23.8%	41.3%
Retail Clinic	6,230	18.9%	38.4%
Specialist	4,589	13.9%	29.0%
Telemedicine	3,901	11.8%	41.8%
ED	3,618	11.0%	19.5%
911	77	0.2%	23.4%

26.4% of users engaged with CTAs if they indicated at least one form of pre-intent

These users are further analyzed later in the presentation.

Total: 32,921 unique conversations

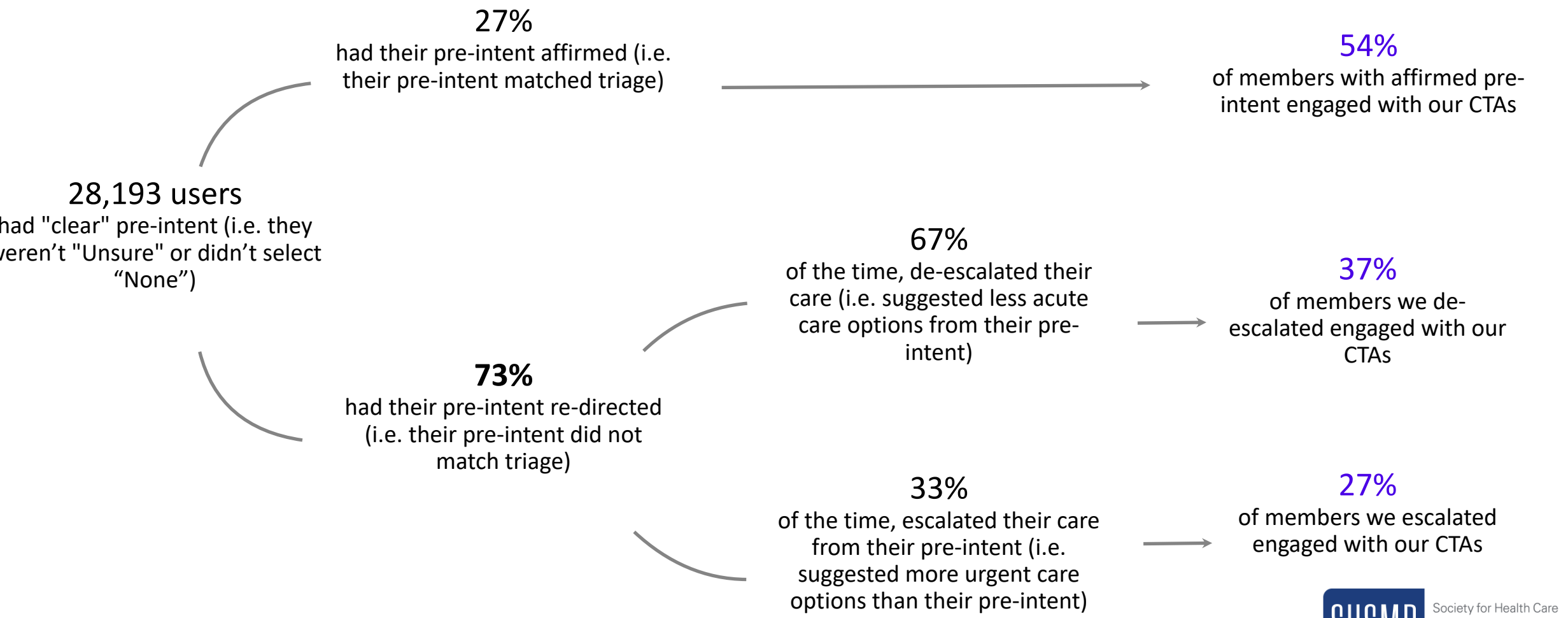
Patients can provide multiple responses, one patient may be represented several times above.
We analyze patients who provide multiple responses on the next slide.

***BSWH Data Not Included**

SHSMD Society for Health Care Strategy & Market Development℠

However, that intent is wrong >70% of the time.

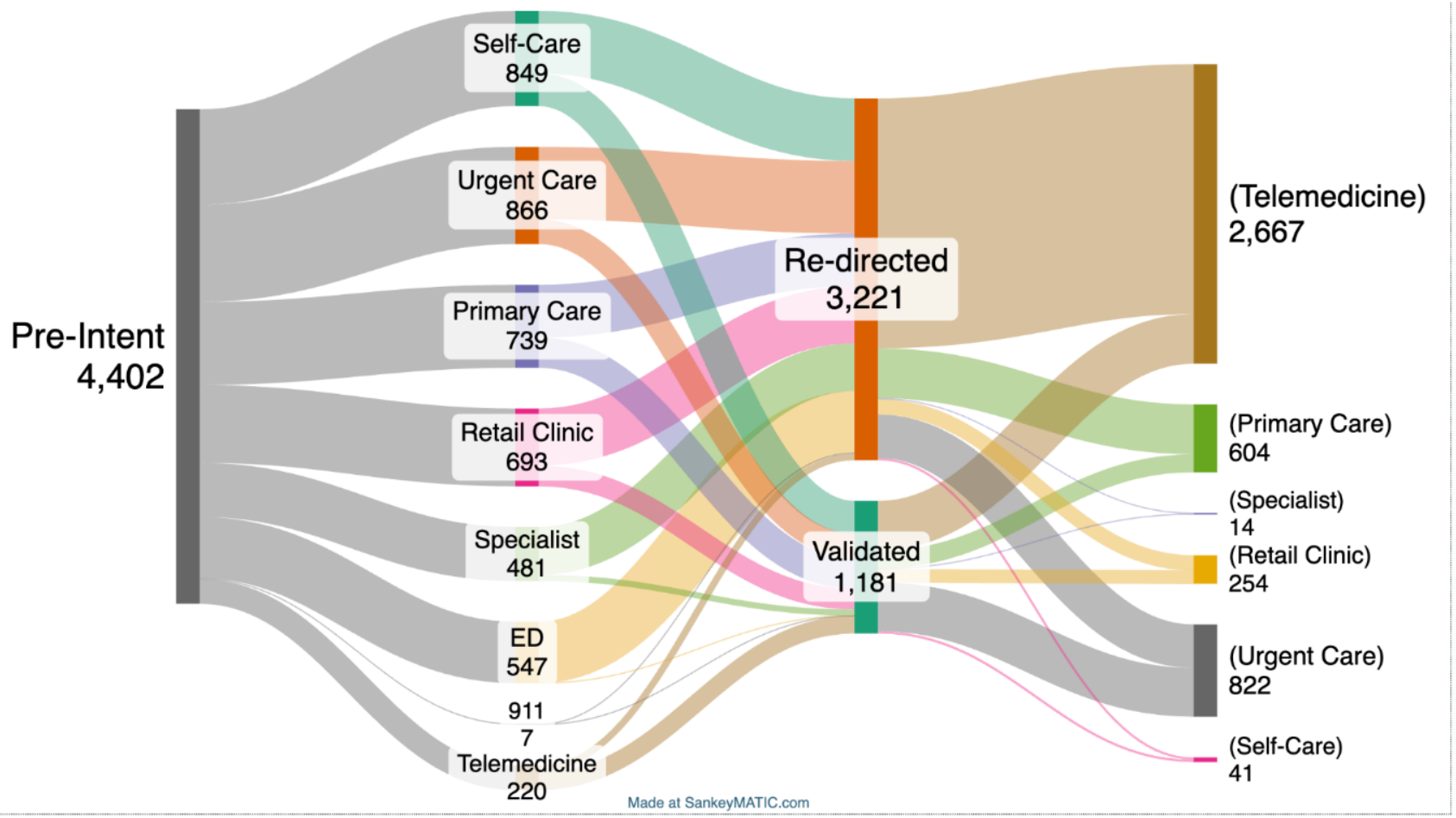
Validating patients led to 1.6x more engagement with resources than when re-directing them



BSWH Data Not Included

SHSMD Society for Health Care Strategy & Market Development℠

73% of intents were re-directed to more appropriate care. Only 27% of patients had a clinically accurate intent.



dynamic triage logic appropriately:

De-escalated 67% of patients who intended to use ED or UCC to lower-acuity sites of care.

with

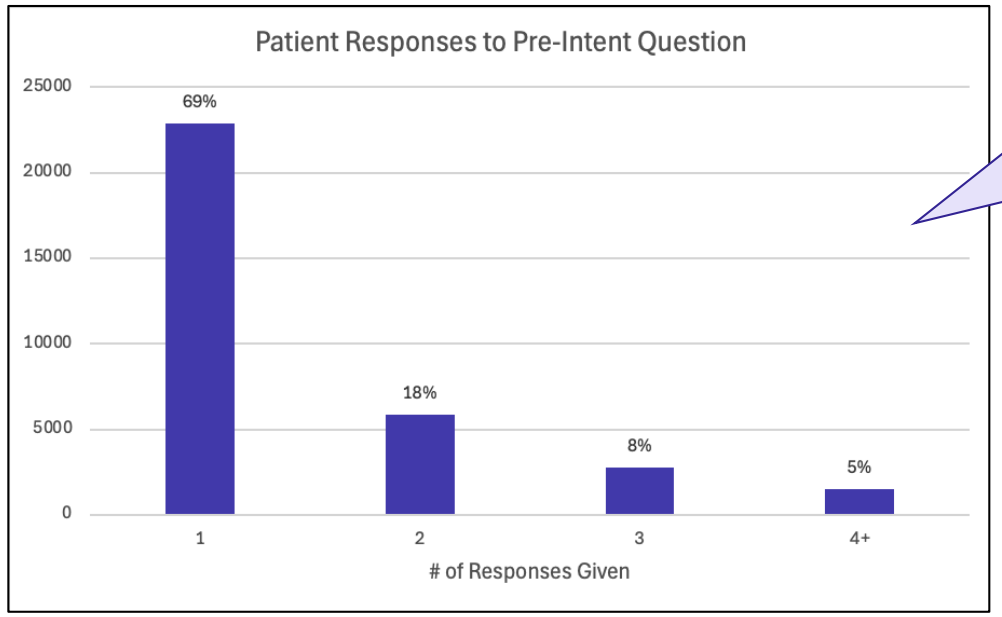
41% of de-escalated patients converted to lower acuity care recommendations.

When we validated intent, they engaged 54% of the time, whereas when we re-directed their original intent, they engaged 34% of the time.

***BSWH Data Not Included**

SHSMD Society for Health Care Strategy & Market Development℠

The vast majority of intenders have a single clear intent (~70%) with 20% picking between two options



31% of patients answer with more than one response

However, patients who choose more than one response have a higher likelihood of engaging with CTAs

32,921 unique patients
responded to the question

Patients gave only 1 response

22%
engaged with CTAs

Patients gave >1 response

34%
engaged with CTAs

Highest pairings of responses:

- Urgent Care & Retail Clinic
- Primary Care & Home
- Primary Care & Specialist
- ED & Urgent Care

We analyze these groupings in the next slides

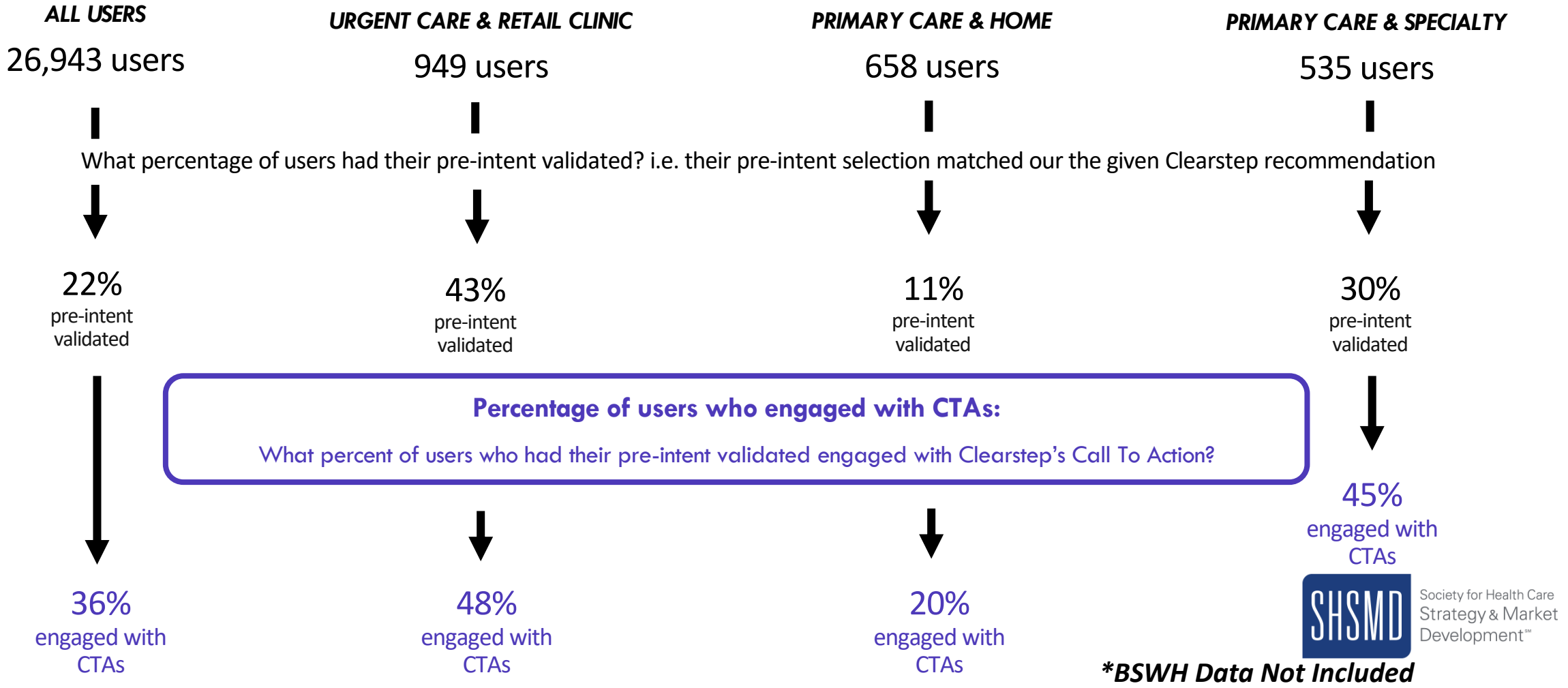
	Home	Specialist	Telemedicine	Primary Care	Retail Clinic	Urgent Care	ED	911	Unsure
Home		105	395	658	328	283	92	1	233
Specialist	105		105	535	41	89	78	1	36
Telemedicine	395	105		203	143	127	41	0	25
Primary Care	658	535	203		249	352	75	3	50
Retail Clinic	28	41	143	249		949	42	1	33
Urgent Care	283	89	127	352	949		462	2	37
ED	92	78	41	75	42	462		23	34
911	1	1	0	3	1	2	23		3
Unsure	233	36	25	50	33	37	34	3	

BSWH Data Not Included

SHSMD Society for Health Care Strategy & Market Development℠

Patients who are trying to choose between different types of care

We have pulled out patients who gave a clear pre-intent (removed patients who listed “unsure” or who chose >3 options to the original question) and are comparing the general user population to sub-groups of patients who are choosing between two different types of care



Society for Health Care Strategy & Market Development℠

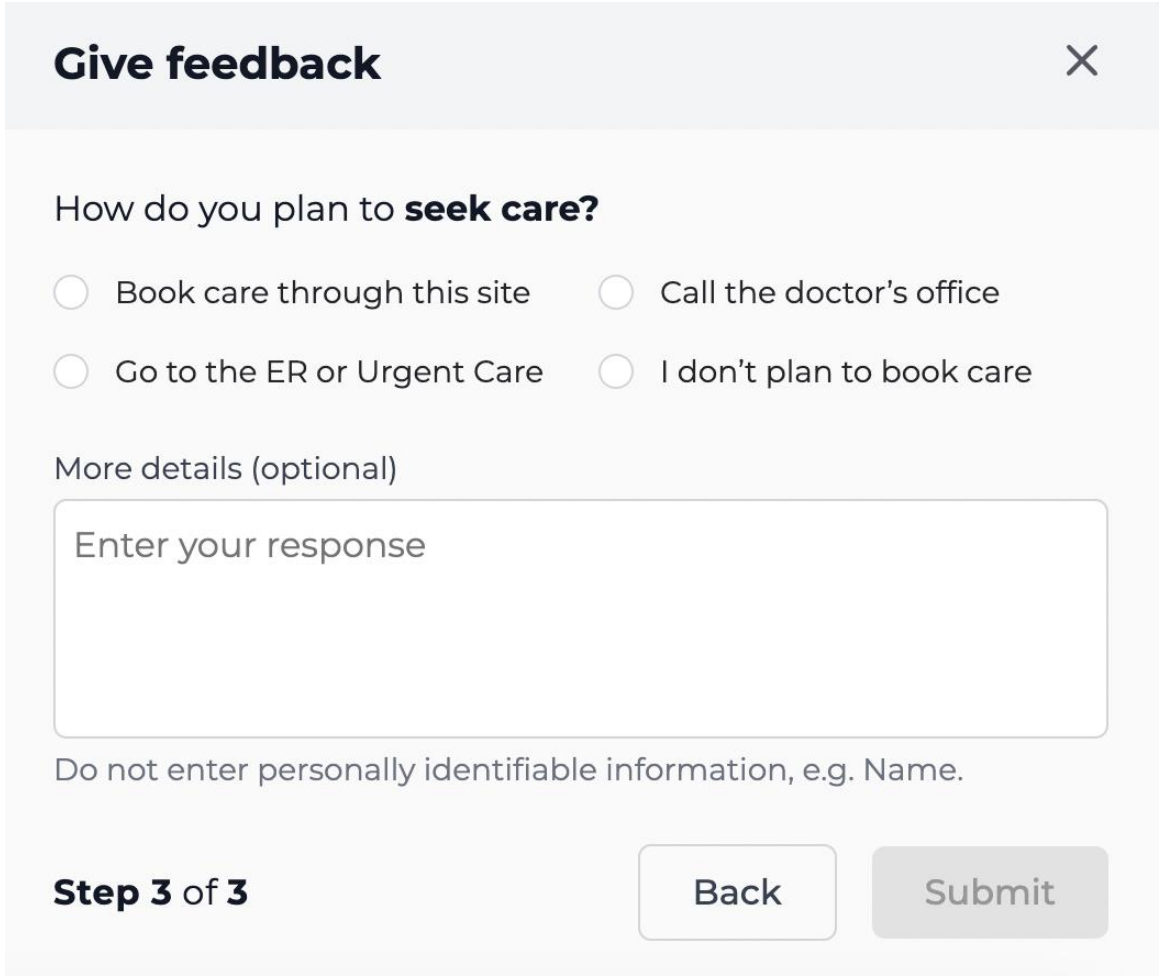
***BSWH Data Not Included**

100% of patients with incorrect Emergent intent were re-directed to less urgent care options by AI triage

BSWH Data Not Included

SHSMD Society for Health Care Strategy & Market Development℠

When 636 patients who did not engage with CTAs were asked how they planned to seek care 100% planned to take some next step



Breakdown of submissions

- Book Care: 49%
- Go to ER/Urgent Care: 31%
- Call the doctor's office: 20%

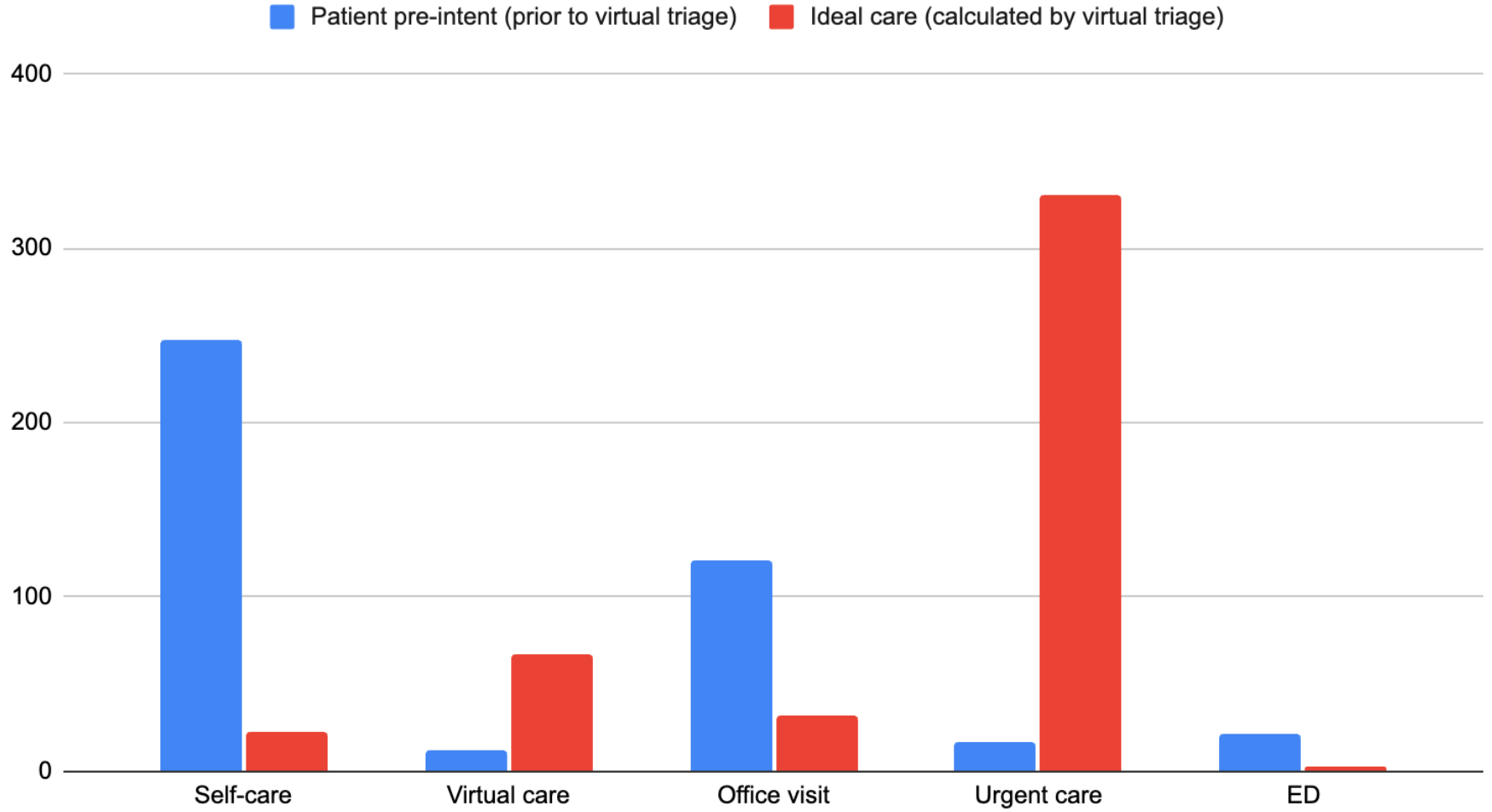
Of those that received an ER rec 62% said they were going to book care/call a doctor over going to the ER.

Of those that received a PCP rec, 72% said they were going to call a doctor/book care

BSWH Data Not Included

SHSMD Society for Health Care Strategy & Market Development℠

Unauthenticated care seekers most often intend self-care, which is frequently inappropriate



89% of self-care intenders were re-directed—predominantly up-triaged to urgent or more emergent care—indicating substantial miscalibration among public-site visitors.

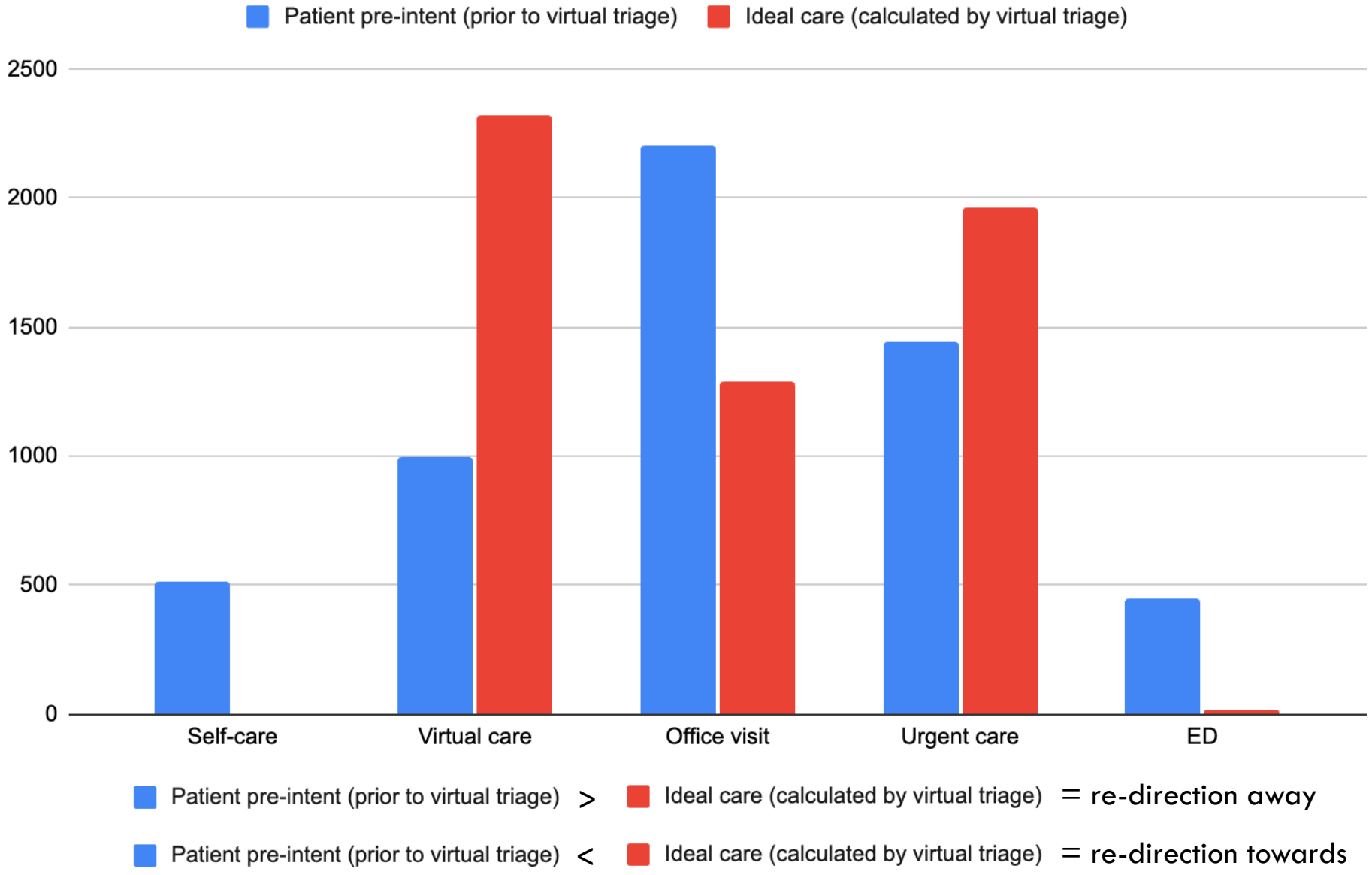
BSWH Data Not Included

Patient pre-intent (prior to virtual triage) > Ideal care (calculated by virtual triage) = re-direction away

Patient pre-intent (prior to virtual triage) < Ideal care (calculated by virtual triage) = re-direction towards

SHSMD Society for Health Care Strategy & Market Development℠

Authenticated care seekers most often intend office visits, with substantial re-direction



Among authenticated users, office visit was the most common pre-intent, followed by urgent care and virtual care; 42% of office-visit intenders were re-directed (escalated to urgent care or de-escalated to virtual care).

BSWH Data Not Included

SHSMD Society for Health Care Strategy & Market Development℠

System admin facing tools

Capacity Optimization

Patient Channels into Health System

Patient facing UX

Provider, admin, & agent facing tools

Patient facing UX

How big of a problem is inaccurate routing?

We asked -

At the system level, how effectively are health systems using their provider capacity across service lines?

***Baylor Scott & White Health**
Data Not included

There were 1.65M E&M visits across new and existing patients

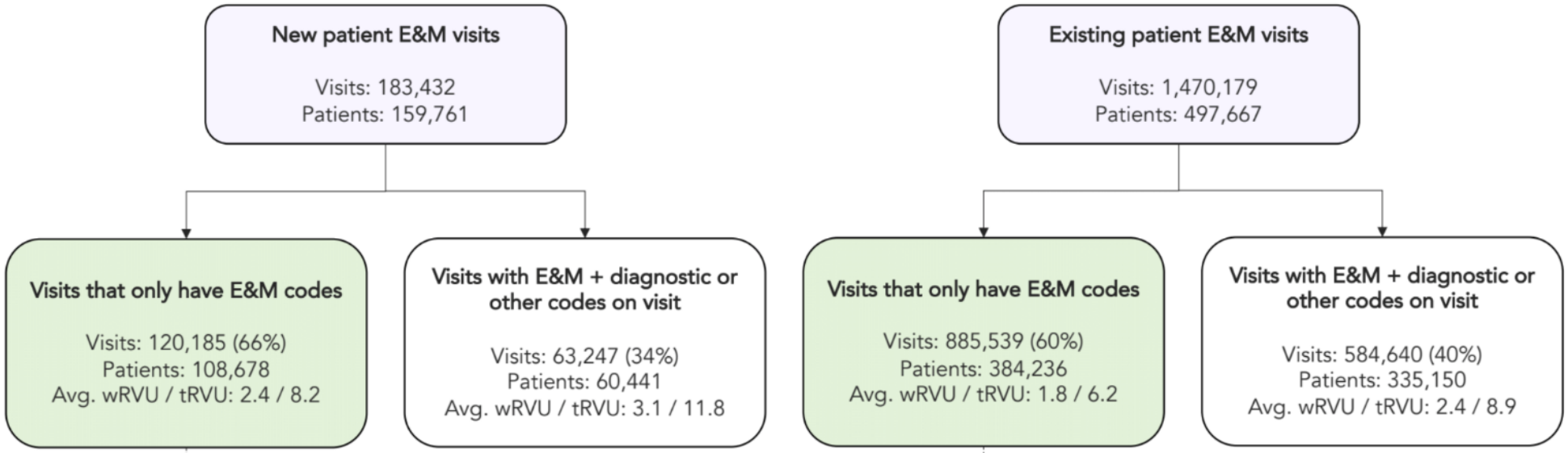
New patient E&M visits

Visits: 183,432
Patients: 159,761

Existing patient E&M visits

Visits: 1,470,179
Patients: 497,667

Over 60% of initial E&M visits (1M total) do not have diagnostics, physical exams, or other codes that would indicate the need for in-person care on the visit record. Many of these E&M visits could be done virtually, particularly those for primary care.



Naved, B., et al. " Sizing the health system outpatient capacity problem and simulating the value of self-triage." Manuscript in review at *Implementation Science.*

>700k visits visits without E&M codes for any diagnostic, referral, or other follow-on

Section Summary: There are 479,538 primary care and 240,869 specialty care visits that appear inefficient and could be shifted to virtual care settings (or avoided altogether).

Visit Description	Reference Slide	New Patient Visits	Existing Patient Visits
PCP E&M visits that have no other codes (e.g., radiology, labs, etc.) on the visit	10	20,118 (primary care)	383,443 (primary care)
Any E&M visits with no other codes on the visit **and** that don't lead to an episode of care	12	4,820 (primary care) 42,320 (specialty care)	71,157 (primary care) 182,807 (specialty care)
PCP E&M visits with no other codes on the visit **and** that are followed by just 1 specialty visit	13	795 (specialty care)	14,947 (specialty care)

BSWH Data Not Included

SHSMD Society for Health Care Strategy & Market Development℠

Opening up 720k appointment slots and filling them with the average RVU generating visit is a 7.9% revenue opportunity

Final revenue opportunity	
Total available visit capacity	720,407
Number of visits in each episode of care (EOC)	2.6
Total episodes of care capacity available	277,080
Total RVUs per EOC	28.3
Net new "replacement" revenue	**$421,786,970**
Cost of shifting visits to virtual	**($103,991,477)**
Gross revenue from better capacity management	**$317,795,493**

That being said, to realize all of the opportunity requires successful re-direction of all inappropriate care intents at both the call center and digitally

SHSMD Society for Health Care Strategy & Market Development™

BSWH Data Not Included

Naved, B., et al. " Sizing the health system outpatient capacity problem and simulating the value of self-triage." Manuscript in review at *Implementation Science.*

From these results we can simulate a number of helpful metrics

28,193 users
had "clear" pre-intent (i.e. they weren't "Unsure" or didn't select "None")

27%
had their pre-intent affirmed (i.e. their pre-intent matched triage)

54%
of members with affirmed pre-intent engaged with our CTAs

73%
had their pre-intent re-directed (i.e. their pre-intent did not match triage)

67%
of the time, de-escalated their care (i.e. suggested less acute care options from their pre-intent)

37%
of members we de-escalated engaged with our CTAs

33%
of the time, escalated their care from their pre-intent (i.e. suggested more urgent care options than their pre-intent)

27%
of members we escalated engaged with our CTAs

% of bookings that should've been escalated	33%
% of bookings that should've been de-escalated	67%
% of attempted escalations that patients engage with	27%
% of attempted de-escalations that patients engage with	37%
Overall attempted re-directions likely to be engaged with	34%

***BSWH Data Not Included**

SHSMD Society for Health Care Strategy & Market Development℠

Opening up 720k appointment slots and filling them with the average RVU generating visit is a 7.9% revenue opportunity

Simulating the impact of AI self-triage on the total revenue opportunity	
Total available visit capacity	720,407
Overall attempted re-directions likely to be engaged with	34%
Total re-directions via digital self-triage	251,445
Value of filling all available visit capacity with the average RVU generating visit	$317,795,413 +/- $133,967,462
Simulated value of re-directions if all bookings were qualified via digital self-triage	$67,523,011 (+/- $8,681,143)
Assuming only 20% of bookings come in via digital channels	**$13,504,602 (+/- 1,736,229)**

Note: this assumes a simple average wRVU across all service lines. For further precision would require more sophisticated statistical modeling of expected replacement wRVU at a per service line level.

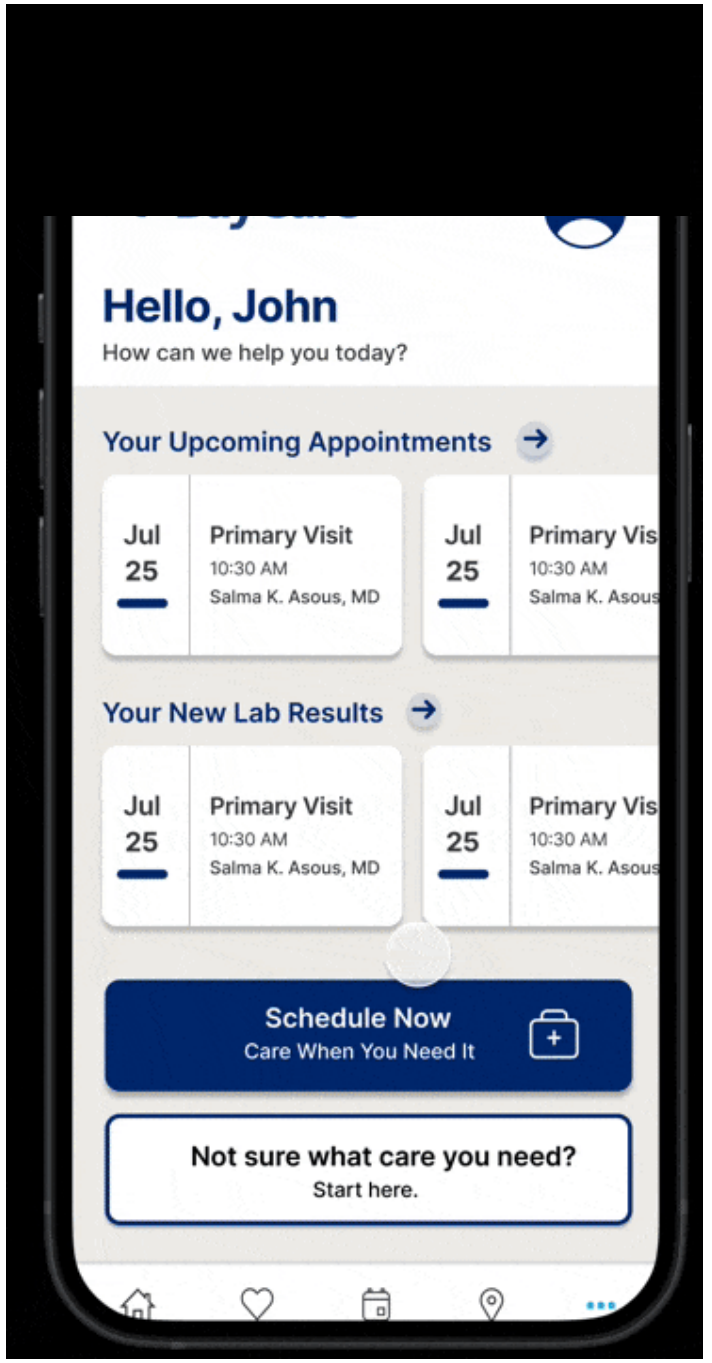
SHSMD Society for Health Care Strategy & Market Development™

BSWH Data Not Included

Naved, B., et al. " Sizing the health system outpatient capacity problem and simulating the value of self-triage." Manuscript in review at *Implementation Science.*

How might we realize this benefit of qualifying appointments without putting 10-15 questions in front of a booking?

For example, by positioning qualification as intake after an appointment booking is made



SHSMD Society for Health Care Strategy & Market Development℠

Three Key Take-Aways

Clinically intelligent qualification + navigation to care is an important component in optimizing access and use of capacity

1. 27% of all in-person bookings across ambulatory service lines had no physical exams nor diagnostic tests
   - **Action Step:** do this analysis at your system (in-house or contract with a group that will do it for you) it may reveal opportunities for improving practice of care, coding, and/or navigation.
2. 73% of all patient booking intents are clinically inappropriate
   - **Action Step:** implement an engine that allows patients to **self-service** and qualify their care seeking intents to further optimize bookings. Look for a **self-service** solution that uses clinical best practice protocols that your call center trusts **and** also offers a solution that can support call center agent decision making to synergize both access channels. **Self-schedule appts have the lowest likelihood of no-show.**
3. Digital tools for qualifying care are able to re-direct patient behavior 34% of the time (and climbing)
   - **Action Step:** consider implementing this re-direction technology for all booking intents. The way to do this could include positioning the qualification as “intake” after an appointment is made. In this way booked appointments can be “re-balanced” on calendars to further optimize the use of your service line capacity.

SHSMD Society for Health Care Strategy & Market Development™

SHSMD25 CONNECTIONS
Health Care Strategy & Market Development
October 12-14 ★ Dallas

Questions?

Please be sure to complete the session evaluation on the mobile app!

AHA Events

Bibliography/References

- Naved, Bilal A., and Yuan Luo. "Contrasting rule and machine learning based digital self triage systems in the USA." *Nature Digital Medicine* 7.1 (2024): 381.
- Naved, B. A., Ravishankar, S., Colbert, G. E., Johnston, A., Slott, Q. M., & Luo, Y. (2025). LLM enabled classification of patient self-reported symptoms and needs in health systems across the USA. *Nature Digital Medicine*, 8(1), 390.
- Naved, B. A., Malik, A., Slott, Q. M., & Luo, Y. (2025). Quantifying the size of the health system capacity problem and simulating the value of AI triage. *Implementation Science*, *in review*.
- Naved, B. A., Slott, Q.M., Hmaidi, M., & Luo, Y. (2025). Authentication impacts AI triage value for care seekers. *Lancet Digital Health, in review*.
- Naved, B.A., Luo, Y., Gavin, N. (2025). Implementing “Check Symptoms & Get Care”: Mount Sinai’s AI Triage Solution. *NEJM Catalyst, in review.*

SHSMD Society for Health Care Strategy & Market Development™