Implementation Strategies for HCV Treatment that Distinguish Higher-Performing VA Facilities: An Applied Use of Configurational Comparative Methods

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March 7, 2018

Presentation Outline

1. Hepatic Innovation Team (HIT) collaborative background – Rachel Gonzalez
2. Implementation Strategies – Vera Yakovchenko
3. Introduction to Configurational Comparative Methods (CCMs) – Edward Miech
4. Solutions Revealed and Explained – Vera Yakovchenko
5. Q&A

Background

- **Hepatitis C virus (HCV):** Veterans Health Administration (VA) is the largest single provider of HCV care in the United States.

- **Evidence-Based Practice:** new >90% highly effective HCV treatment

- **Initiative:** VA developed the HCV Innovation Team (HIT) Collaborative in 2015 to support regions and medical centers to conduct quality improvement & systems redesign activities.

National Virtual Collaborative

Collaborative Leadership Team

- Program management and facilitation, including setting national goals
- Coaching Hepatic Innovation Teams (HITs) to improve processes
- Identifying low performers and pairing them with strong practices
- Advocating for patients and on behalf of the HITs
- Building community amongst the HIT members

Hepatic Innovation Teams

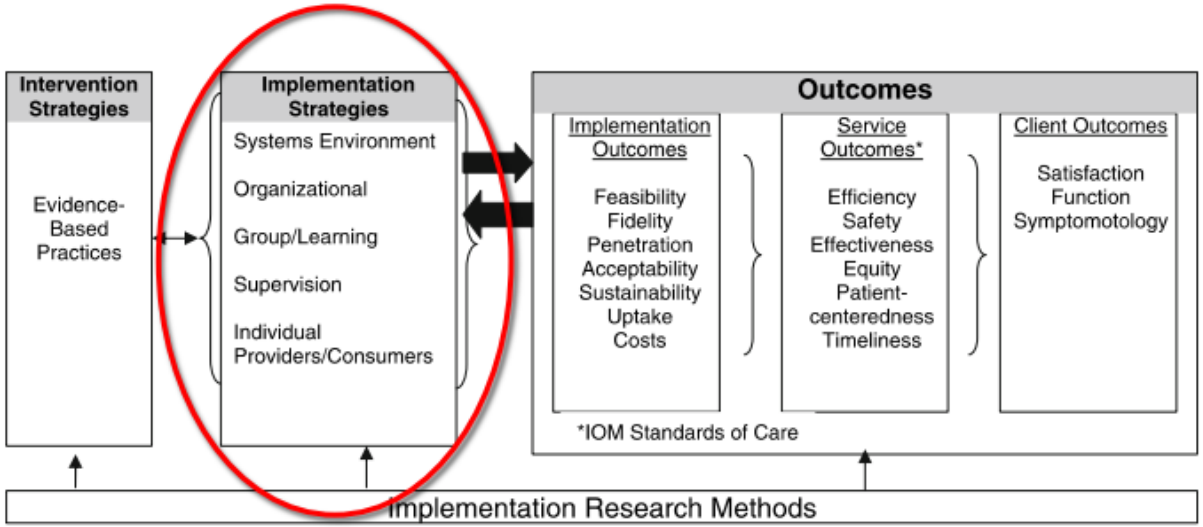
- Multidisciplinary, network-level teams led by a HIT Coordinator
- Work locally to contribute to national goals
- Participate in national calls and working groups
- Have monthly virtual meetings and annual face-to-face meetings

Evaluation Question

- Which implementation strategies are difference-makers for HCV treatment initiation at VA hospitals?

Implementation Strategies

"Methods or techniques used to enhance adoption, implementation, and sustainability of a clinical program or practice." (Proctor, Powell, & McMillen, 2013)



(Proctor et al., 2009)

http://www.hsrd.research.va.gov/for_researchers/cyber_seminars/archives/1060-notes.pdf

Barriers to Studying Implementation Strategies

- Lack of conceptual clarity leads to poor specification and reporting
- No discrete strategies, but also no broad categories of strategies

- Poor terminological consistency
  - Same term has multiple meanings
  - Different terms have the same meaning
  - Term meaning changes over time

(Powell, 2015, Waltz, 2015)

Evaluation Methods

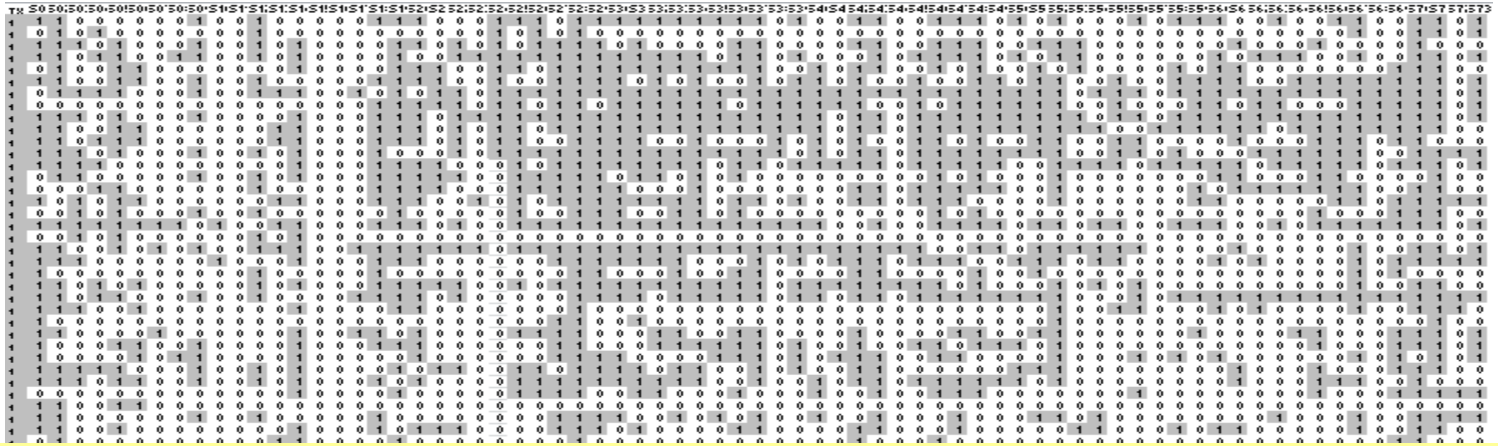
- **Sample**: HCV providers and staff at VA hospitals = 80 cases
- **Data Collection**: online survey examining use of 73 strategies across 9 clusters
  - Factors: absence of strategy = 0, presence of strategy = 1
- **Outcome**: number of HCV treatment starts per year per site
  - Calibrated to Low treatment = 0, High treatment = 1
- **Analysis**: CCMs approach with R Studio, R and R packages QCApro and cna (coincidence analysis)
  - Consistency level cutoff = 100% (% of cases covered by solution with outcome condition vs. all cases covered by solution)

Configurational Comparative Methods

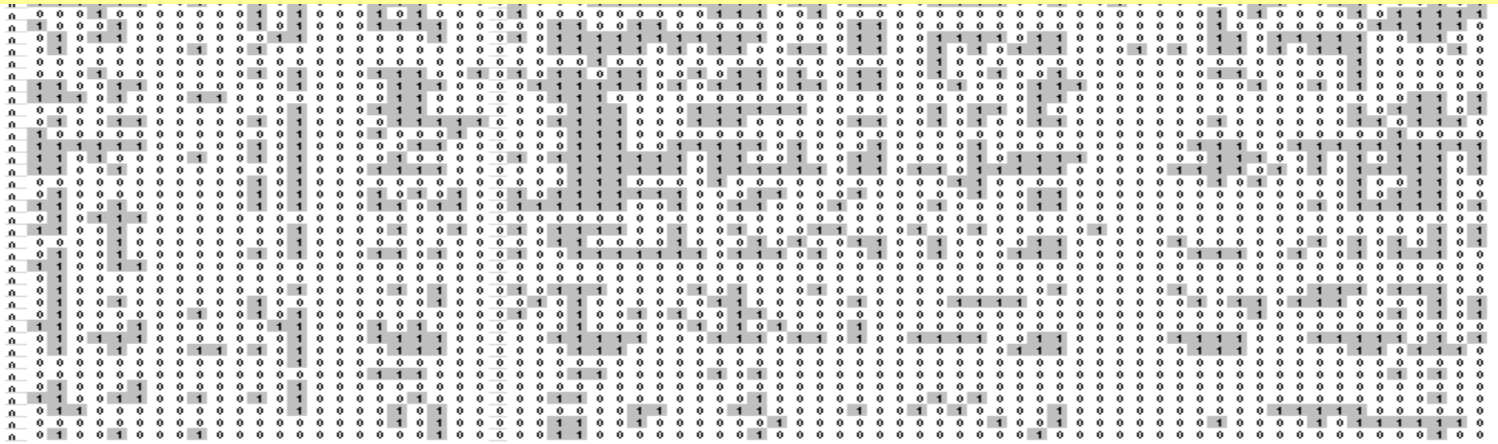
- Moving from variables to conditions
- Group of cases with an outcome condition
- Another group of cases without the outcome condition
- Additional information about each case expressed in the form of conditions
- What uniquely distinguishes Group A from Group B?

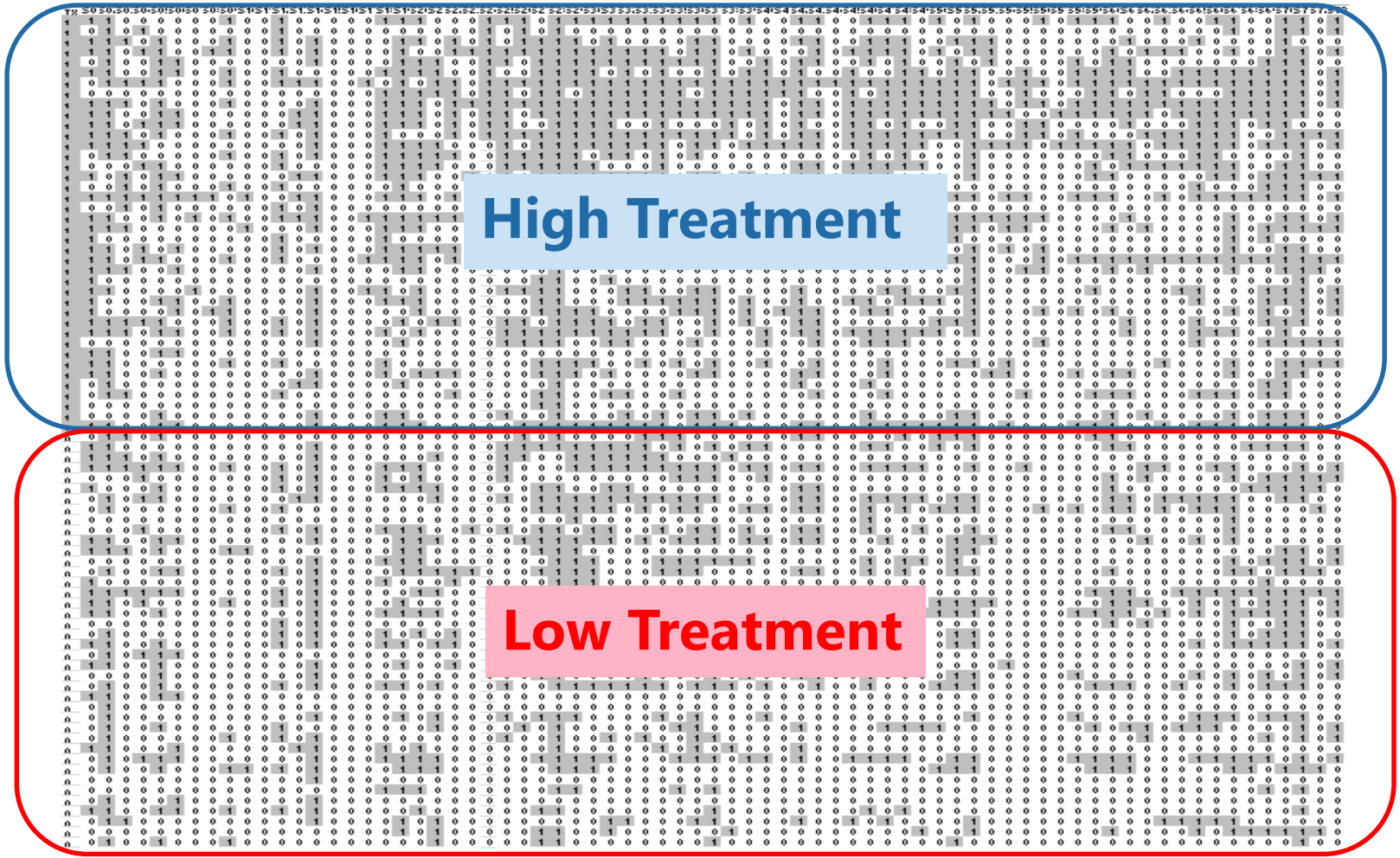
Configurational Comparative Methods

- Figure that follows below is a data matrix
- 80 cases (each row represents a different VA medical center)
- 73 implementation strategies
- 40 cases have outcome (higher-performing facilities in top two quartiles); 40 do not
- Columns in data matrix represent individual implementation strategies (“S01” “S02” ... “S73”)

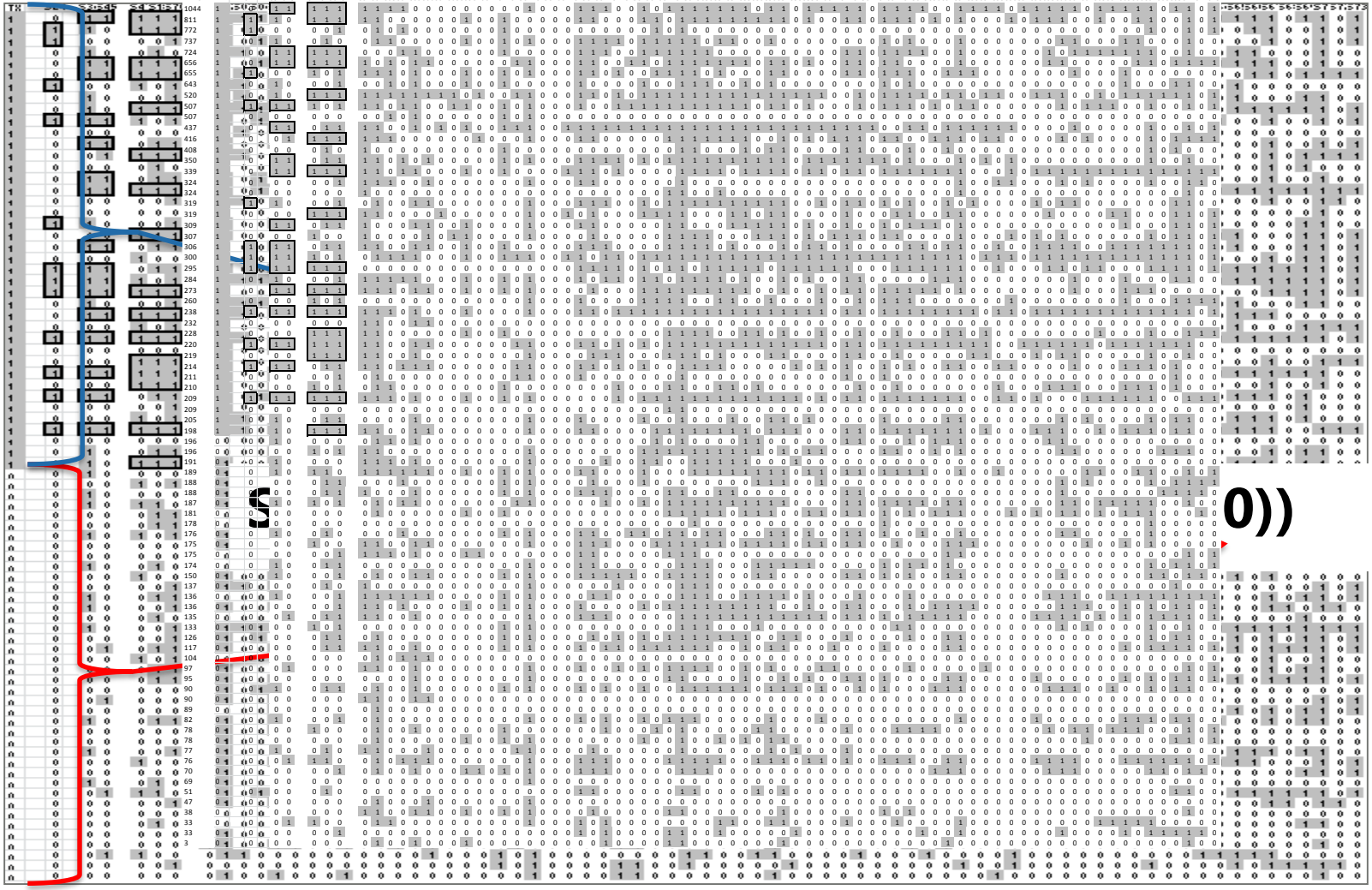


Respondents used 25±14 (range 1-59) strategies




High Treatment
Low Treatment


TXNUM TX S24 S34S45 S47S18S70
TX S24 S3 S45 S4 S1 S70
S01S02S03S04S05S06S07S08S09S10S11S12S13S14S15S16S17S19S20S21S22S23S25S26S27S28S29S30S31S32S33S35S36S37S38S39S40S41S42S43S44S46S47S48S49S50S51S52S53S54S55S56S57S58S59S60S61S62S63S64S65S66S67S68S69S71S72S73
S0 S0 S0 S0 S0 S0 S0 S0 S0 S0 S0 S1 S1 S1 S1 S1 S1 S1 S1 S1 S1 S2 S2 S2 S2 S2 S2 S2 S2 S2 S2 S2 S3 S3 S3 S3 S3 S3 S3 S3 S3 S3 S4 S4 S4 S4 S4 S4 S4 S4 S4 S4 S5 S5 S5 S5 S5 S5 S5 S5 S5 S5 S6 S6 S6 S6 S6 S6 S6 S6 S6 S6 S7 S7 S7


TXNUM
TX
S24
S34S45
S47S18S70
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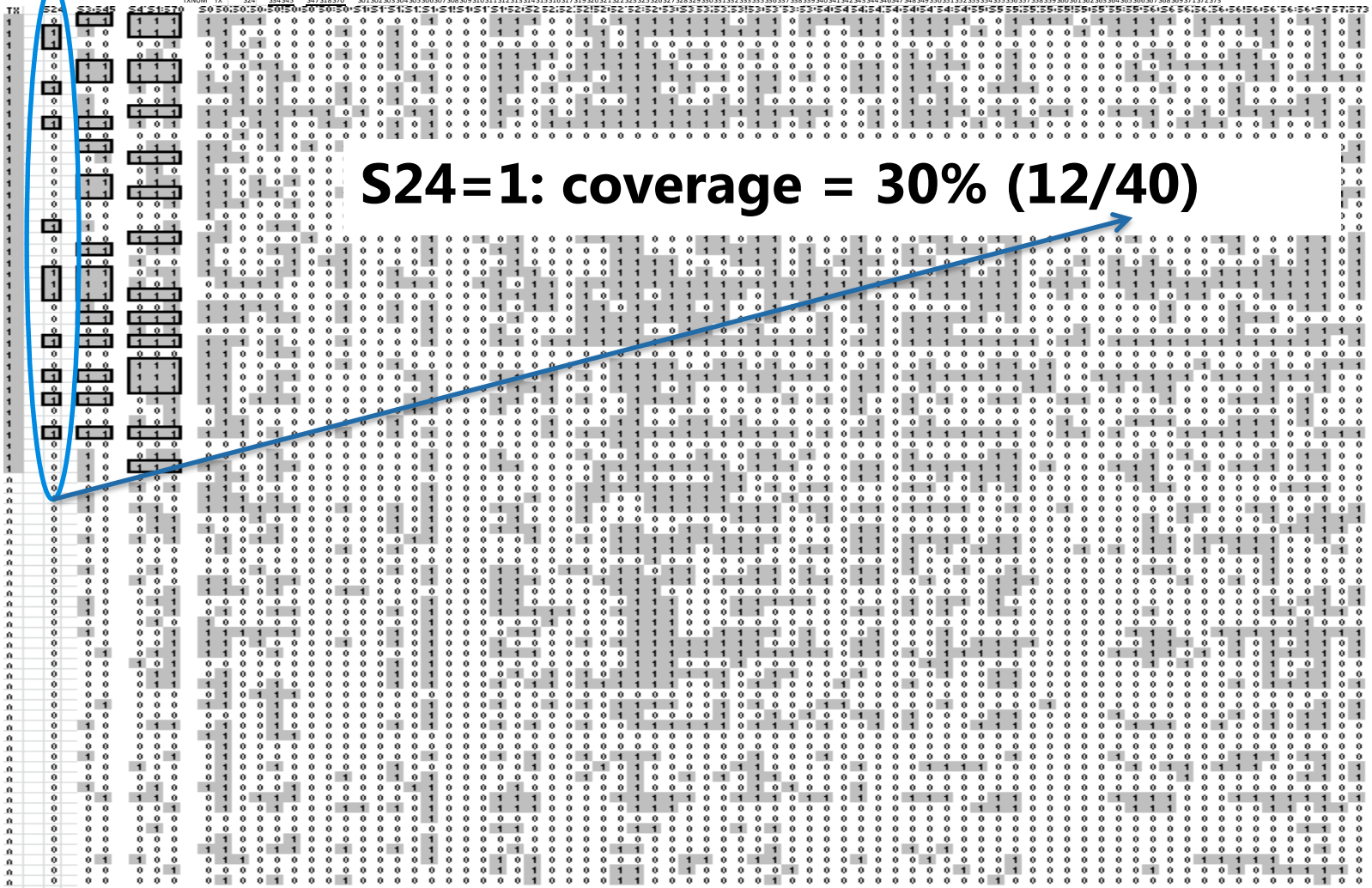

S24=1: coverage = 30% (12/40)

Final Model

```
M1: S24 + S34*S45 + S18*S47*S70 => OUT

                      incl   cov.r   cov.u
-------------------------------------------
1   S24               1.000  0.300   0.075
2   S34*S45           1.000  0.400   0.075
3   S18*S47*S70       1.000  0.400   0.150
-------------------------------------------
    M1                1.000  0.650
```

Final Model

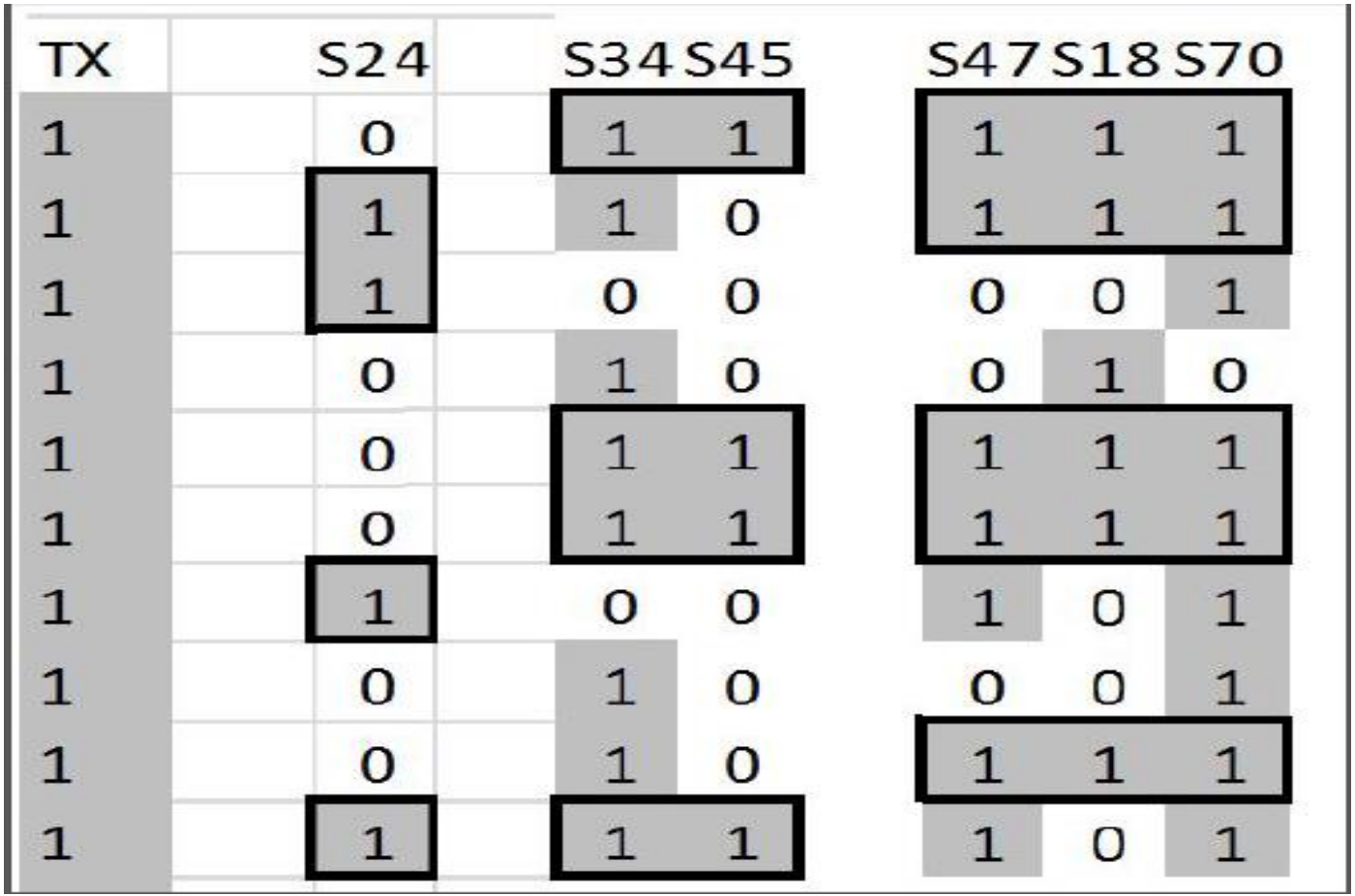
- CCMs identified **3 distinct "solution paths"** that **explained 65%** of higher HCV treatment starts
- Within the 3 paths there were **6 difference-making strategies**

Configurational Comparative Methods

- Transparent and Verifiable
- Straightforward to Interpret
- Allows for Equifinality
    - multiple paths to an outcome condition

Configurational Comparative Methods

- Assesses Combinations of Values



TX	S24	S34	S45	S47	S18	S70
1	0	1	1	1	1	1
1	1	1	0	1	1	1
1	1	0	0	0	0	1
1	0	1	0	0	1	0
1	0	1	1	1	1	1
1	0	1	1	1	1	1
1	1	0	0	1	0	1
1	0	1	0	0	0	1
1	0	1	0	1	1	1
1	1	1	1	1	0	1

INUS Conditions

- Necessary and Sufficient Conditions
  - only presence of S24 sufficient; no necessary conditions

- INUS conditions
  - all other conditions in solution
    - –insufficient by itself
    - –but necessary part of a combination of conditions
    - –that is sufficient for the outcome

Final Model

```
M1: S24 + S34*S45 + S18*S47*S70 => OUT

                        incl   cov.r   cov.u
-------------------------------------------
1   S24                 1.000  0.300   0.075
2   S34*S45             1.000  0.400   0.075
3   S18*S47*S70         1.000  0.400   0.150
-------------------------------------------
    M1                  1.000  0.650
```

= **INUS condition**

Coincidence Analysis

- Relatively new member of the Configurational Comparative Methods family – developed within last 5 years in Europe
- Freely available as R package “cna”

Coincidence Analysis

- Like Qualitative Comparative Analysis (QCA), Coincidence Analysis (CNA) uses Boolean algebra and set theory to develop solutions of "difference-making" configurations
- Unlike QCA, CNA uses a bottom-up strategy (instead of top-down)
  - first considers 1-object configurations
  - then 2-object configurations
  - then 3-object configurations....etc

CCM Factor Selection

- Using the “msc” (minimally sufficient condition) function within the R package “cna”
- Looked across all 73 implementation strategies and 80 cases at once to identify specific factors to use in model development
- We then used this output to narrow down the initial set of 73 strategies to a smaller subset of candidate factors to model
- Subset of candidate factors came from configurations that have “separation” in terms of connection to outcome

Results: Factor Selection

A	B	C	D	E
outcome	**condition**	**consistency**	**coverage**	**complexity**
OUTCOME=1	S24=1->OUTCOME=1	1	0.3	1
OUTCOME=1	S17=1->OUTCOME=1	1	0.1	1
OUTCOME=1	S07=1->OUTCOME=1	1	0.075	1
OUTCOME=1	S08=1->OUTCOME=1	1	0.075	1
OUTCOME=1	S44=1->OUTCOME=1	1	0.075	1
OUTCOME=1	S57=1->OUTCOME=1	1	0.05	1
OUTCOME=1	S34=1*S45=1->OUTCOME=1	1	0.4	2
OUTCOME=1	S28=1*S55=1->OUTCOME=1	1	0.3	2
OUTCOME=1	S55=1*S70=1->OUTCOME=1	1	0.3	2
OUTCOME=1	S18=1*S47=1*S70=1->OUTCOME=1	1	0.4	3
OUTCOME=1	S19=1*S47=1*S70=1->OUTCOME=1	1	0.375	3
OUTCOME=1	S20=1*S47=1*S70=1->OUTCOME=1	1	0.375	3
OUTCOME=1	S27=1*S45=1*S70=1->OUTCOME=1	1	0.375	3
OUTCOME=1	S27=1*S32=1*S45=1->OUTCOME=1	1	0.35	3
OUTCOME=1	S47=1*S70=1*S73=1->OUTCOME=1	1	0.35	3

How Does It Work?

- Fundamentally different kind of math
- Fundamentally different search target

Different Search Target

- CCMs search target = find configurations of conditions linked to “light bulb being on”
  - e.g., configurations of switches in on or off position
  - combination of conditions (present or absent)

- Correlation search target = find how “more/less of X” relates to “more/less of Y”
  - e.g., dimmer switch

Unpacking the High Treatment Solution

S24 OR (S34 AND S45) OR (S18 AND S47 AND S70)

Path 1	Path 2	Path 3
S24 OR	(S34 AND S45) OR	(S18 AND S47 AND S70)
Local technical assistance	Foster collaborative learning environment	Create new clinical teams
	AND	AND
	Recruit, designate, train leaders	Share the knowledge gained from quality improvement efforts with other sites
		AND
		Activate patients

Unpacking the High Treatment Solution – Path 1

Solution Path	Strategy	Cluster	Importance	Feasibility
1	**S24: Local technical assistance**	Provide interactive assistance	High	Low

- Active ingredients: building capacity, coaching, quality improvement expertise
- Causal mechanism: ? “processes or mediators by which strategies exert change”
- Mode of delivery: one-on-one, small group, large group, virtual meeting, web-based
- Intended target: available to all providers and staff, but also by request

(Colquhoun, 2014; Powell, 2015)

Unpacking the High Treatment Solution – Path 2

Solution Path	Strategy	Cluster	Importance	Feasibility
2	S45: Recruit, designate, and/or train leaders	Develop stakeholder relationships	High	Low
	S34: Facilitate the formation of groups of providers and fostered a collaborative learning environment	Train and educate stakeholders	Low	High

- Leadership involvement needed to precede regional team formation
- Guidance from HIT leadership: *Structure should include the following expertise: Identified HIT lead, project management, system redesign, interdisciplinary representation, representation across the VISN and including all collaborating medical facilities.*

Unpacking the High Treatment Solution – Path 3

Solution Path	Strategy	Cluster	Importance	Feasibility
3	S18: Create new clinical teams	Support clinicians	Low	Low
	S47: Share the knowledge gained from quality improvement efforts with other sites outside your medical center	Engage consumer	High	High
	S70: Engage in efforts to prepare patients to be active participants in HCV care	Develop stakeholder relationships	High	Low

- Treatment-oriented
- Cross-site communication from other HIT activities and Path2
- Pharmacists started to play larger role on the treatment team

Conclusion

- No single strategy was **necessary** for higher performance, as there were 3 different paths to the outcome featuring 6 different strategies
- One strategy – local technical assistance – was **sufficient** in itself, as the presence of it was always accompanied by the presence of the outcome
- CCMs allowed for **equifinality** (multiple paths to outcome)

Future Directions

- Use this approach to develop and test site-level implementation interventions
- Study and explain solution paths in greater depth to help select, design and package interventions
- Identify strategies and solution paths linked to outcomes across implementation years

Acknowledgements

- HIT Evaluation Team
  - Shari Rogal (co-lead)
- VA HHRC Leadership
  - Maggie Chartier, Lorenzo McFarland, Marge Petrucci, David Ross
- HIT Leadership Team
  - Angela Park, Timothy Morgan
- HITs
- Collaborators
  - Matt Chinman, JoAnn Kirchner, Byron Powell, Tom Waltz, Enola Proctor

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Questions/Comments?

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