

Crowding Metrics in Association with Quality of Care

a systematic review

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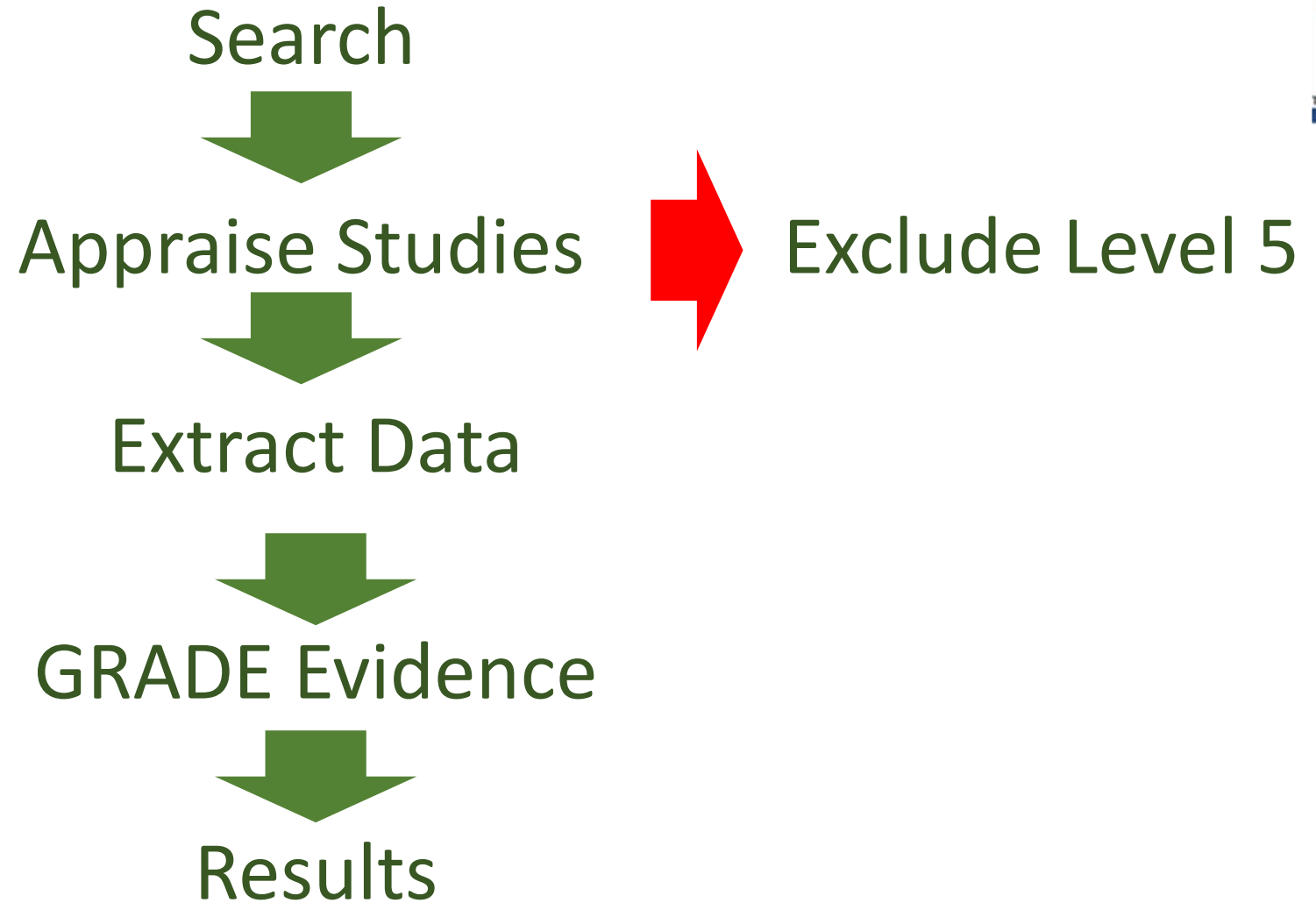
Introduction

- Evidence = First step in process to recommend a “Best” Metric
 - Quality and Strength of Evidence for Association with Quality of Care
- 12 prior systematic reviews
 - All Low or Very Low quality
 - Selection bias
 - Poor Evidence = Good Evidence
 - Imprecision = Still no answer

Introduction

- 12 prior systematic reviews
- One with a firm conclusion: Stang et al 2015
 - Based on 32 studies
 - “How many times were these metrics related to quality?”
 - Number in the Waiting Room 10
 - ED Occupancy 9
 - Number of Boarders 9
 - No consideration
 - Strength (direction) of association
 - Different quality of evidence
 - Which aspects of quality are more important

Method



Results

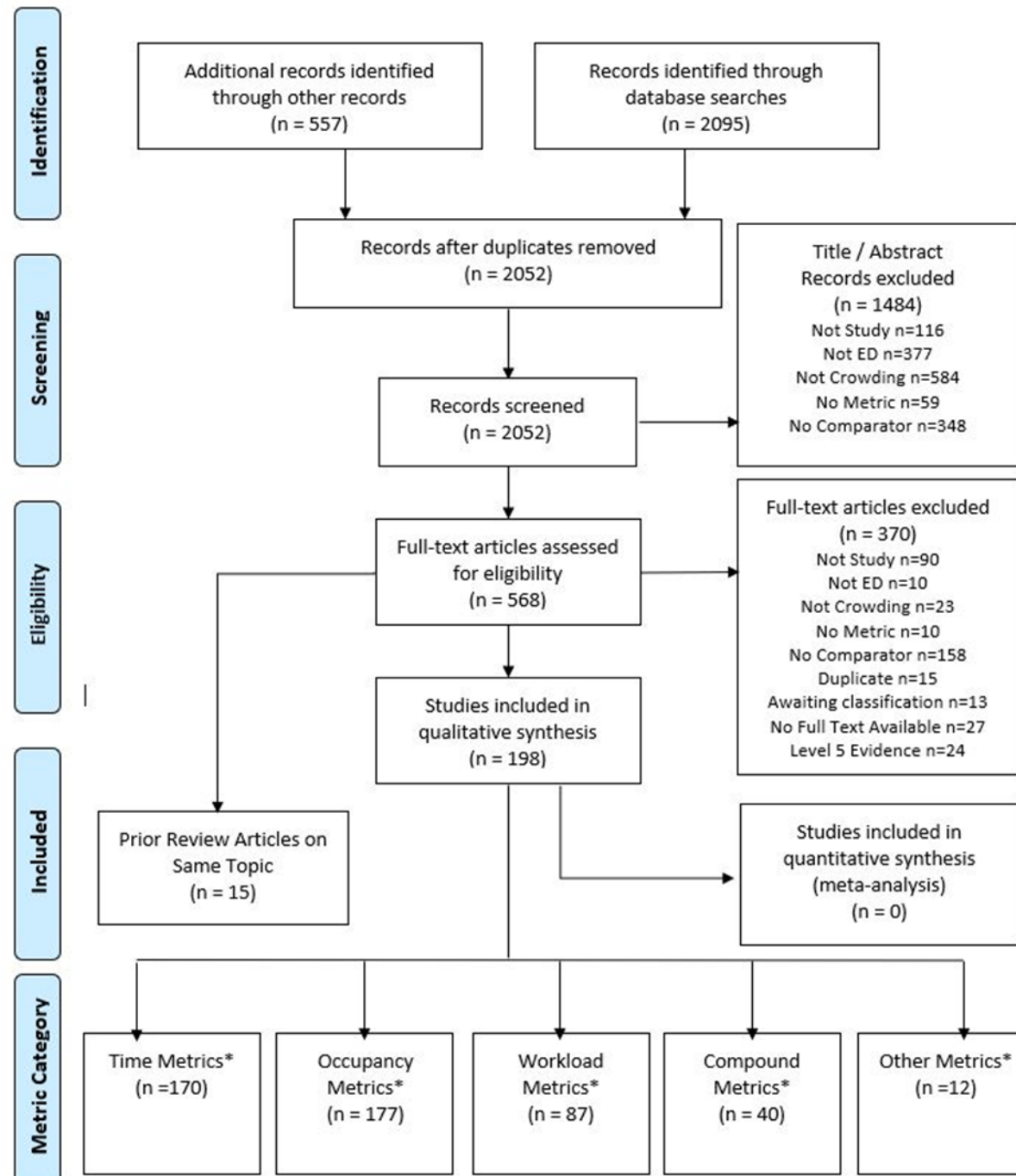
2052



568



198



1484

370

Not ED

Not Crowding

Not Studies

Not Comparing

No Full Text

Parameter	Descriptor	n=198	Percent
Setting	60% from North America		
Study Type	98% Observational		
Level of Evidence* n=486	33% at Low risk of bias		
Metric Category* n=486	1/3 Time 1/3 Occupancy 1/3 Other		

Effect Measures

Donabedian Framework	Processes
	Timeliness
	EDLOS
	Hospital LOS
	Outcomes
	Mortality
	Receiving Care
	DNW
	Re-Presentation
	Patient Experience
	Staff Experience
	Other

Effect Measures*

1/4 Timeliness, EDLOS

1/5 Staff Experience, Mortality

1/10 Patient Experience, DNW, Re-Presentation

GRADE Quality of the Body of Evidence



Strength of Effect
Dose Response
Plausible Confounding



Risk of Bias
Imprecise
Inconsistent
Indirect
Selective Reporting
Publication Bias

Results

- Graph show
 - Quality of Evidence
 - Number of Studies
 - Strength of Association
 - Direction of Association



Indirect Occupancy (Entry Block): Evidence for Associations with Outcomes of Care n≈4,732,676

Quality of Evidence

High

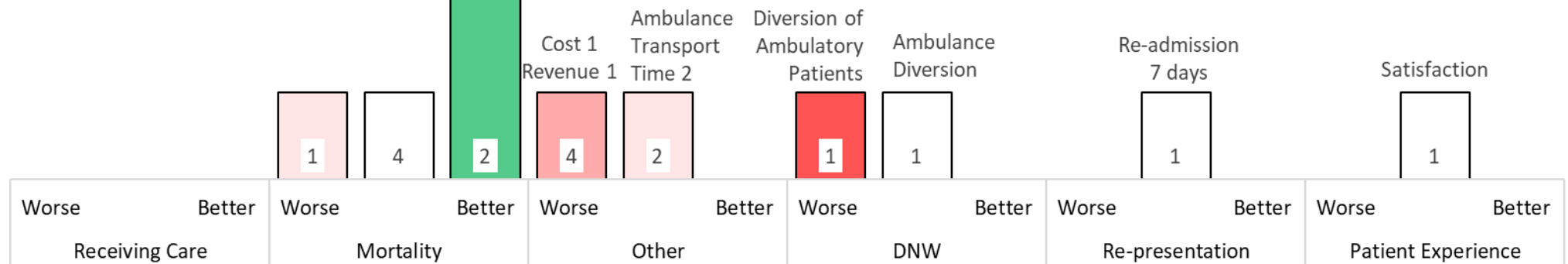
Not all potential metrics are consistently associated with worse outcomes at Departmental Level

Moderate

Diversion often used as Effect Measure in other studies

Low

Very Low



Number of Studies at Base of Bar

Darker Bar = Stronger Association

■ Worse with Crowding

□ No Association

■ Better with Crowding

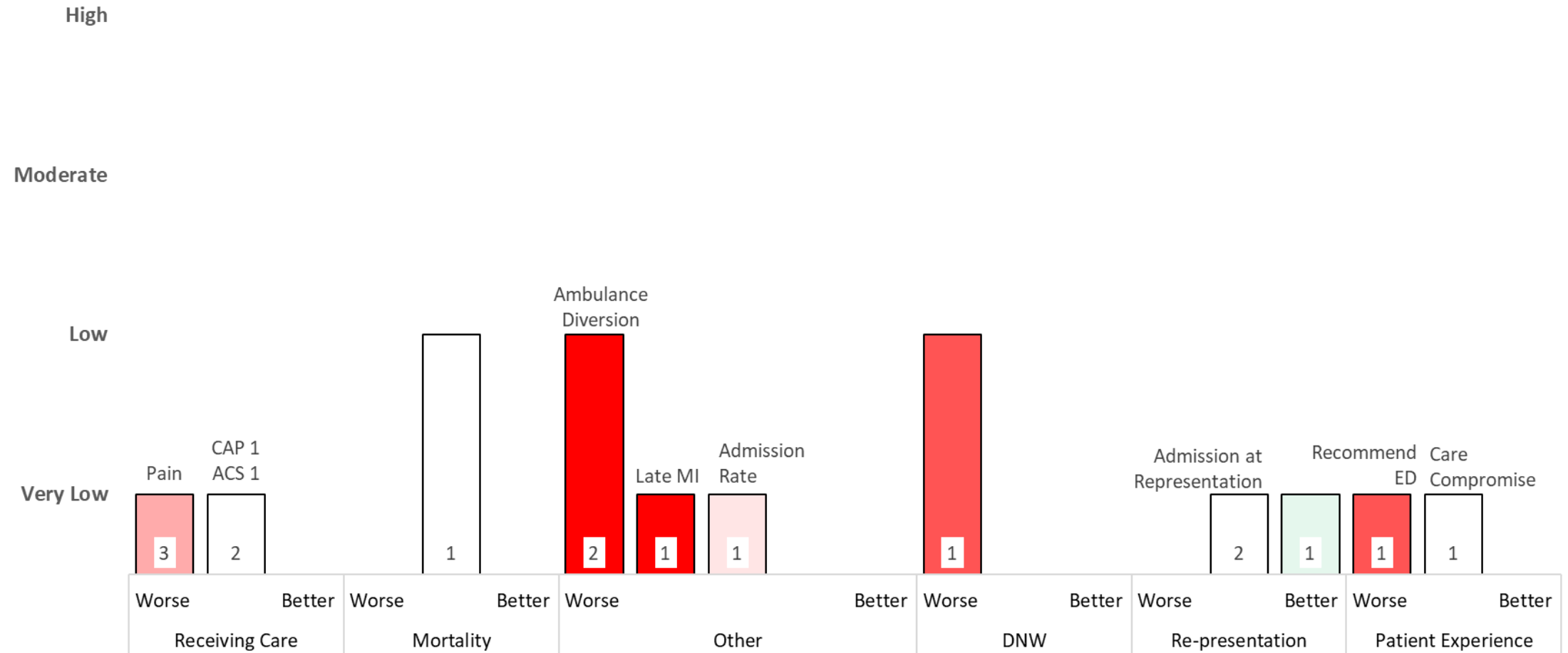
Stang et al.

- Number in the Waiting Room
- Number of Boarders
- ED Occupancy



Waiting Room Occupancy: Evidence for Associations with Outcomes of Care n≈806,806

Quality of Evidence



Number of Studies at Base of Bar

Darker Bar = Stronger Association

■ Worse with Crowding

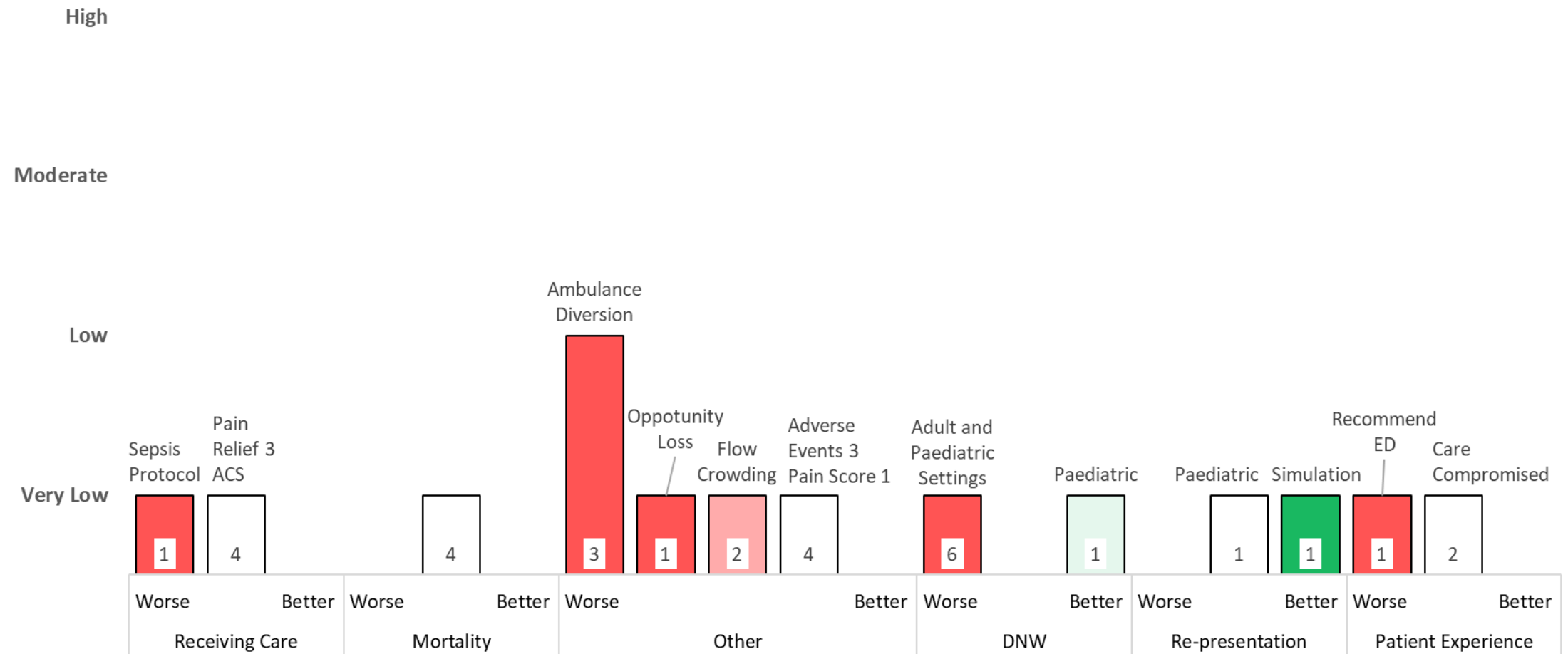
□ No Association

■ Better with Crowding



Occupancy by Boarding Inpatients: Evidence for Associations with Outcomes of Care n≈486,452

Quality of Evidence



Number of Studies at Base of Bar

Darker Bar = Stronger Association

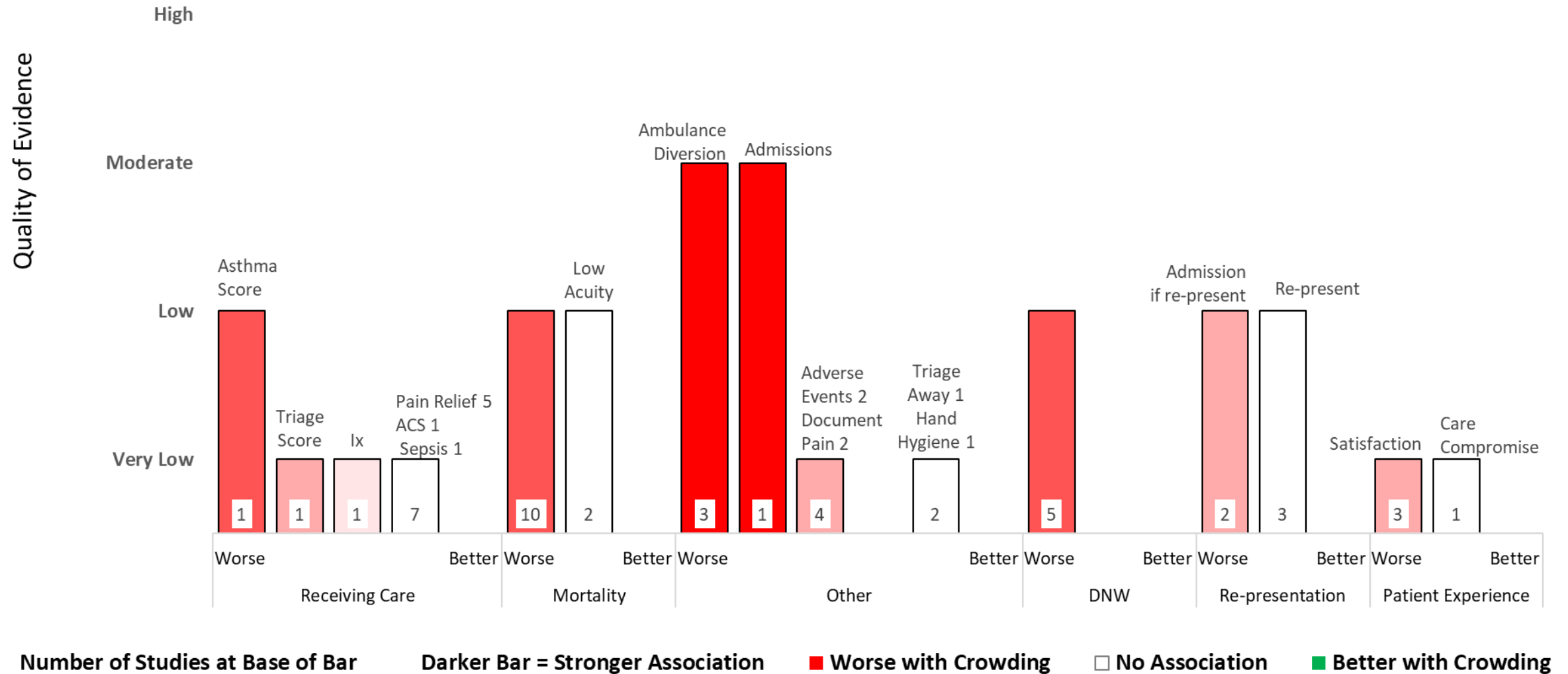
■ Worse with Crowding

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■ Better with Crowding



Total ED Occupancy: Evidence for Associations with Outcomes of Care n≈2,157,976

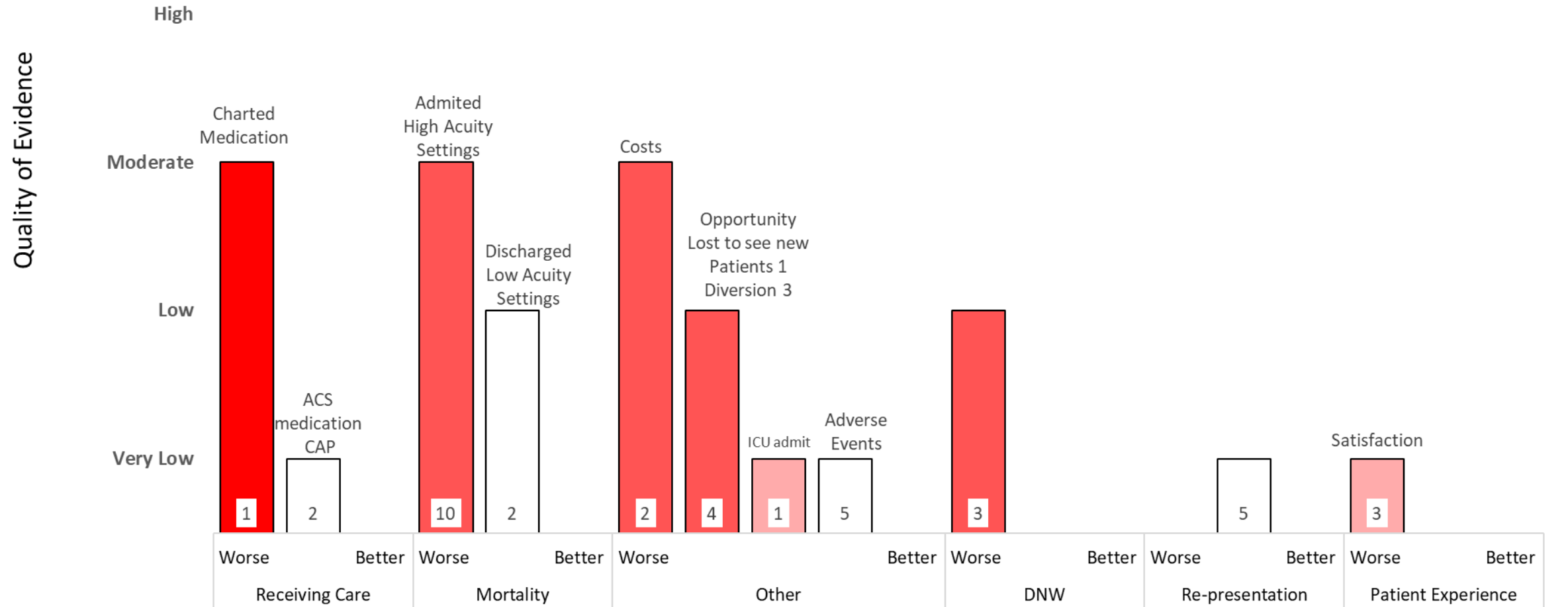


What About Time?





Boarding Time: Evidence for Associations with Outcomes of Care n≈998,018



Number of Studies at Base of Bar

Darker Bar = Stronger Association

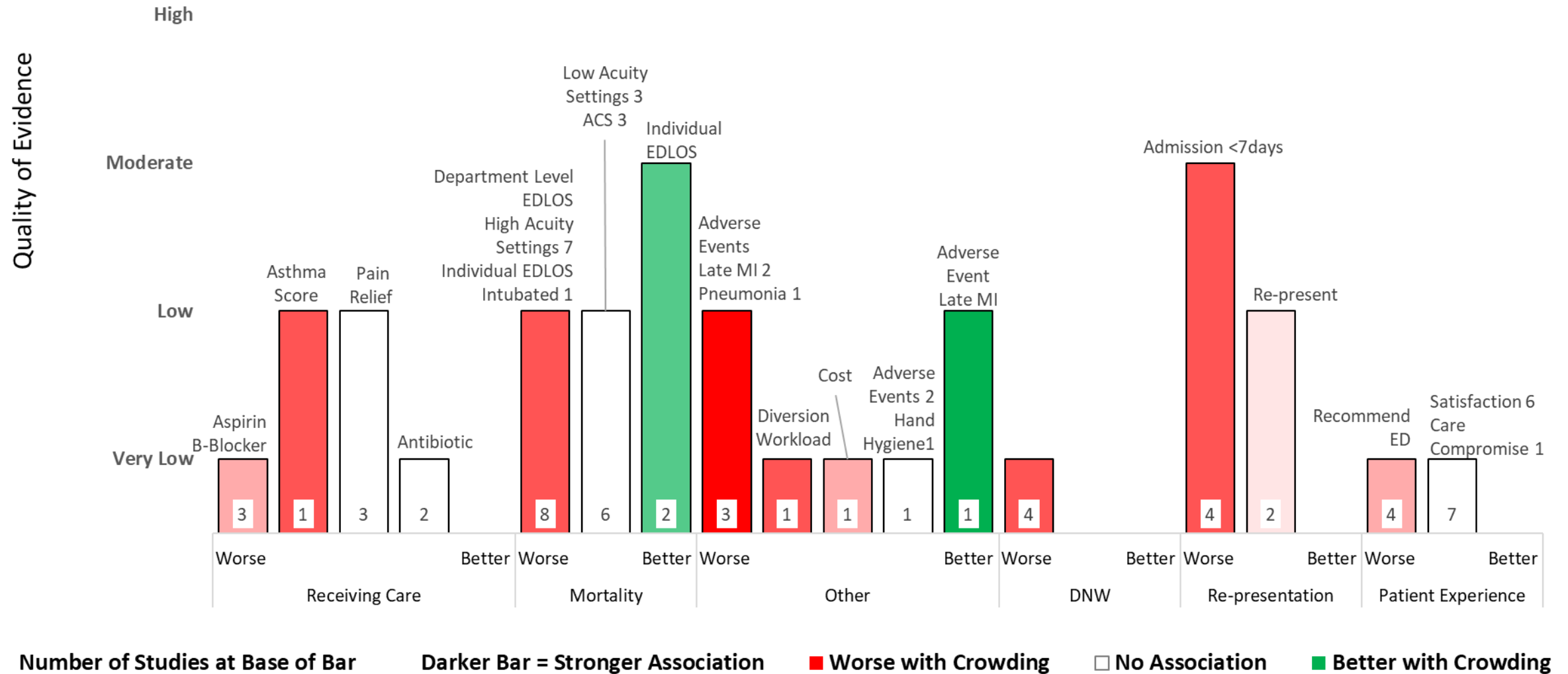
■ Worse with Crowding

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Total ED LOS: Evidence for Associations with Outcomes of Care n=17,635,151



Summary of Associations with Quality

	Institute of Medicine Quality Domain					
	Patient Centred	Timely	Efficient	Equitable	Effective	Safe
Time						
<i>Time to Assessment</i>	✓	✓	✓			
<i>Treatment Time</i>	✓?	✓	✓		✓	✓?X
<i>Boarding Time</i>	✓	✓?	✓?		✓	✓
<i>Total EDLOS*</i>	✓	✓	✓	✓?	✓	✓
Occupancy						
<i>Waiting Room</i>	✓	✓	✓		?	
<i>Treatment Area</i>	✓?	✓	✓			
<i>By Boarders</i>	✓?	✓	✓		✓?X	
<i>Total ED Occupancy</i>	✓	✓	✓		✓	✓
<i>Indirect Occupancy</i>		✓	✓		✓?	?X
<i>Hospital Occupancy</i>	✓	✓	✓		✓?	✓

Summary of Associations with Quality

	Institute of Medicine Quality Domain					
	Patient Centred	Timely	Efficient	Equitable	Effective	Safe
Workload						
<i>Arrivals</i>		✓	✓		✓?	
<i>Waiting to be Seen</i>		✓	✓		✓?	
<i>Acuity</i>		✓?				
<i>Admissions</i>		✓	✓?			
<i>SEAL</i>						
Compound						
<i>NEDOCS</i>			✓	✓?	✓?	
<i>EDWIN</i>	✓?	✓?	✓			
<i>READI-DV</i>			✓			
<i>IUI, CBS</i>		✓	✓			
<i>OHS</i>	✓					✓
Did Not Wait*	✓	✓	✓		✓?	

Conclusions

- Almost all metrics associated with Time and Efficiency
- **Boarding Time, EDLOS, ED Occupancy, Hospital Occupancy**
 - Strongest evidence for associations with Effectiveness and Safety
 - Association with the critical outcome mortality
- Evidence is only part of the story
- These need to be critically appraised as Quality Indicators before recommending them for use

Questions?



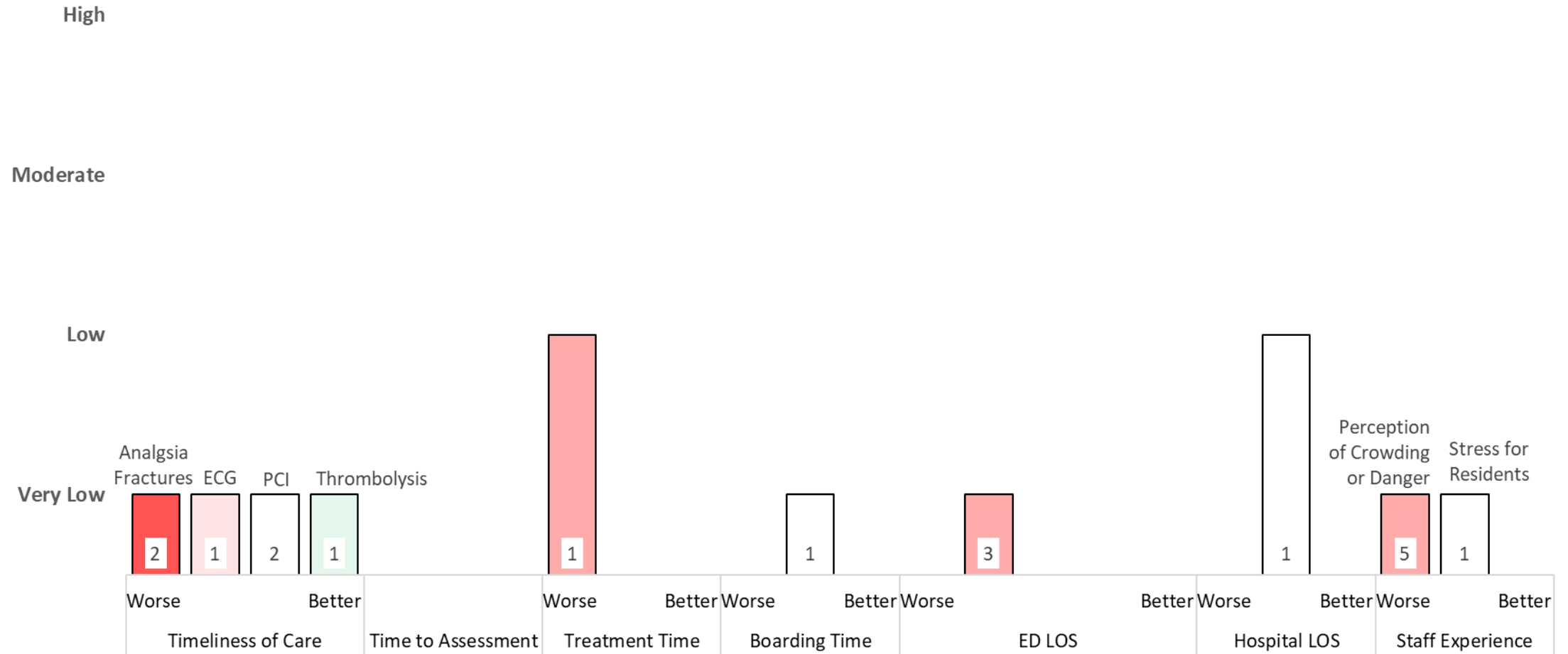
Results Time Metrics





Time to Assessment: Evidence for Associations with Processes of Care n≈394,781

Quality of Evidence



Number of Studies at Base of Bar

Darker Bar = Stronger Association

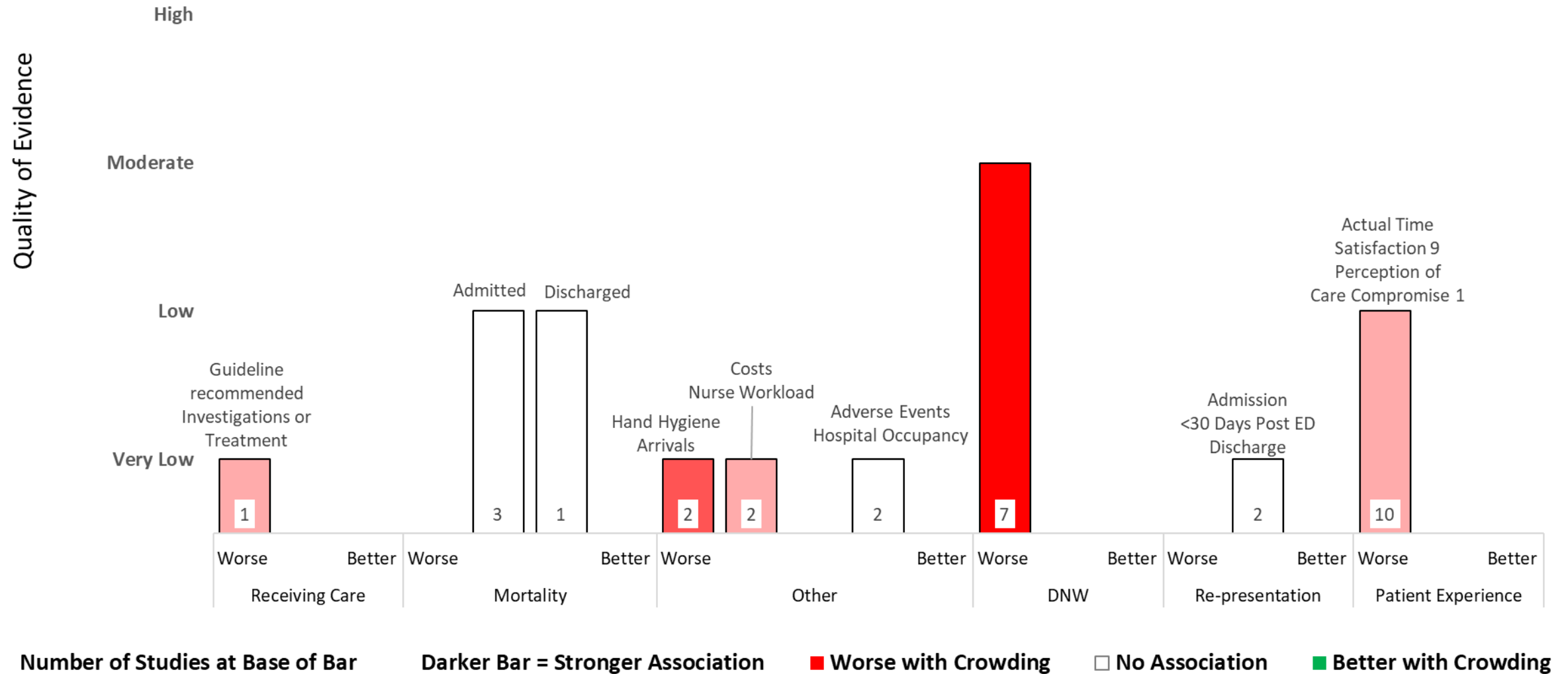
■ Worse with Crowding

□ No Association

■ Better with Crowding



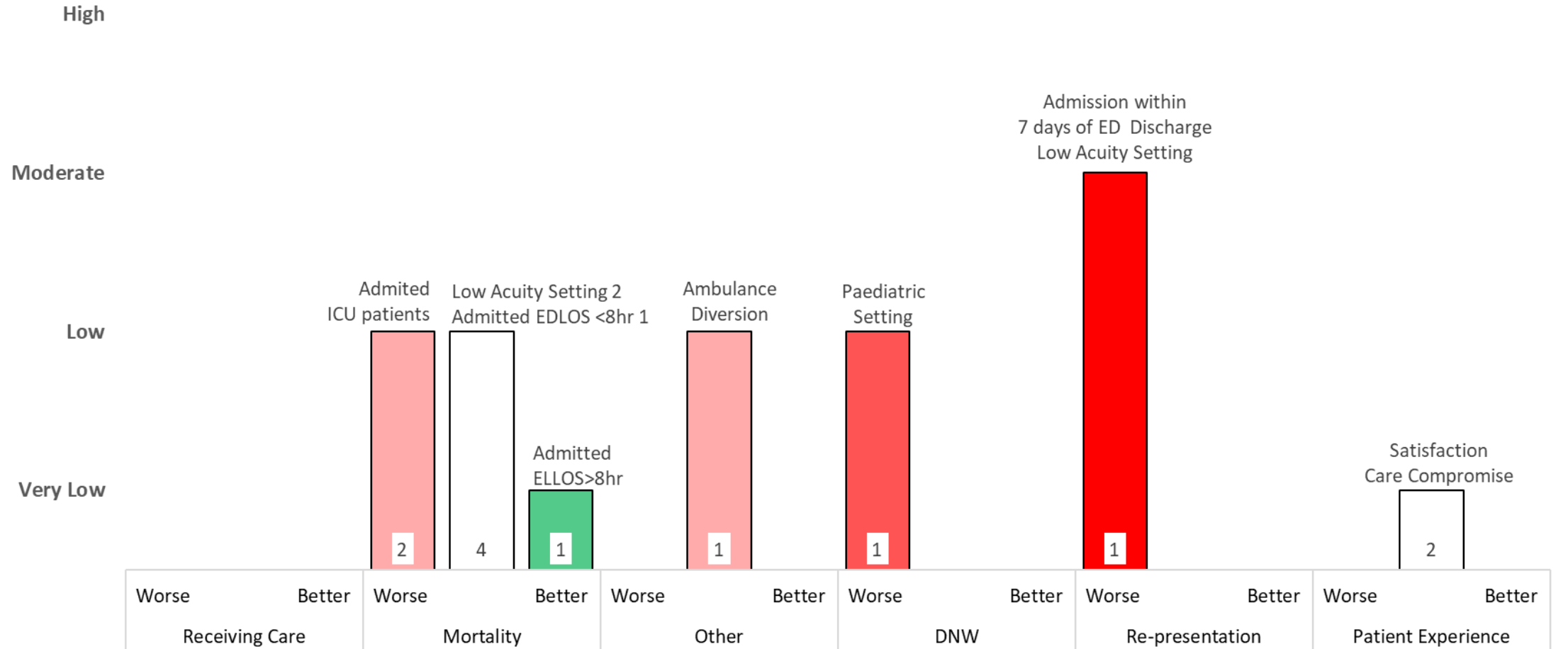
Time to Assessment: Evidence for Associations with Outcomes of Care n=814,617





Treatment Time: Evidence for Associations with Outcomes of Care n=841,091

Quality of Evidence



Number of Studies at Base of Bar

Darker Bar = Stronger Association

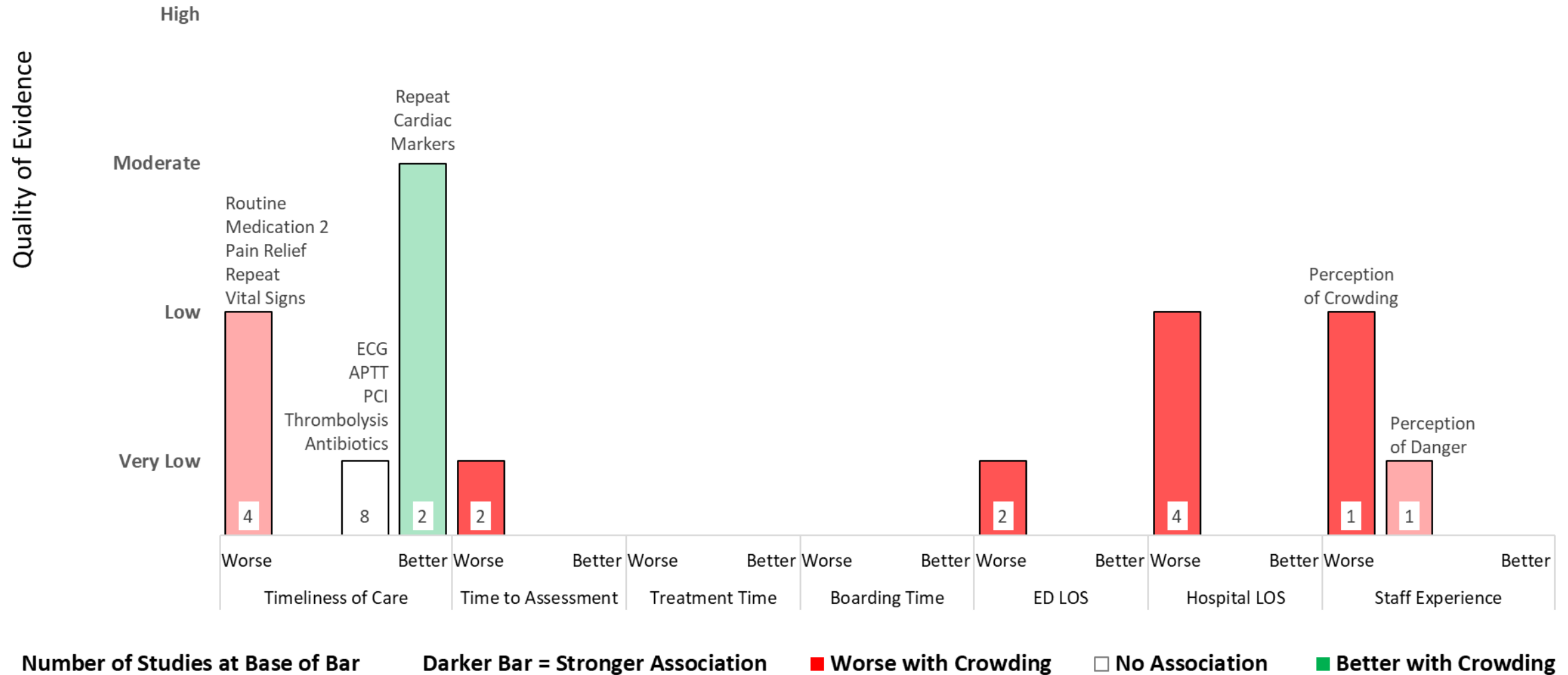
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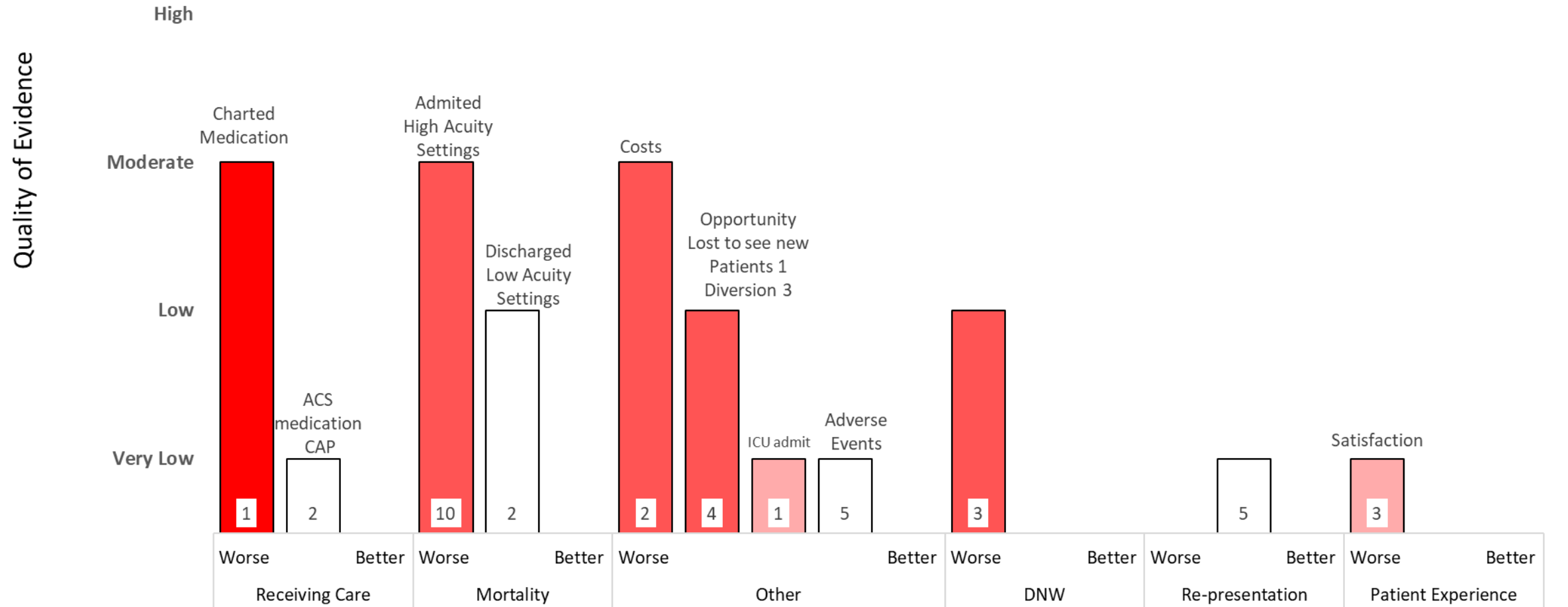


Boarding Time: Evidence for Associations with Processes of Care n≈249,814





Boarding Time: Evidence for Associations with Outcomes of Care n≈998,018



Number of Studies at Base of Bar

Darker Bar = Stronger Association

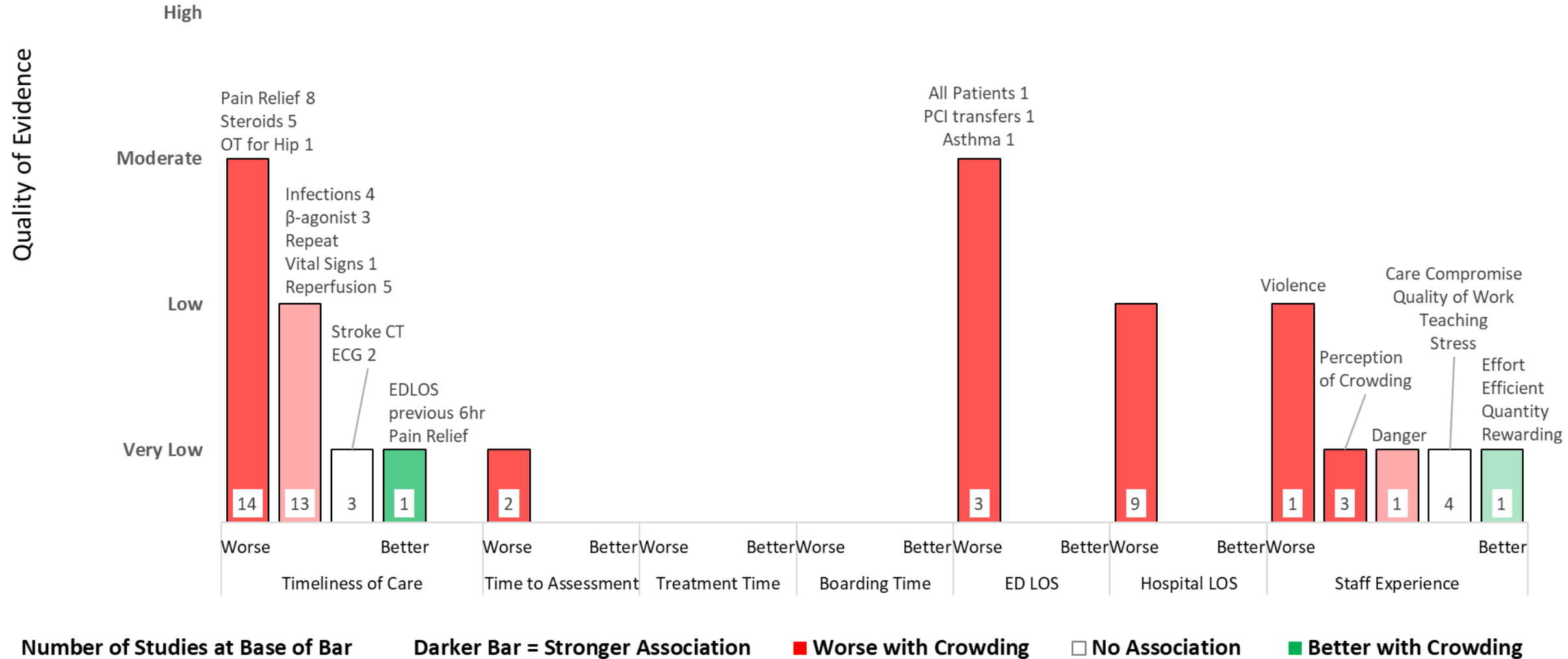
■ Worse with Crowding

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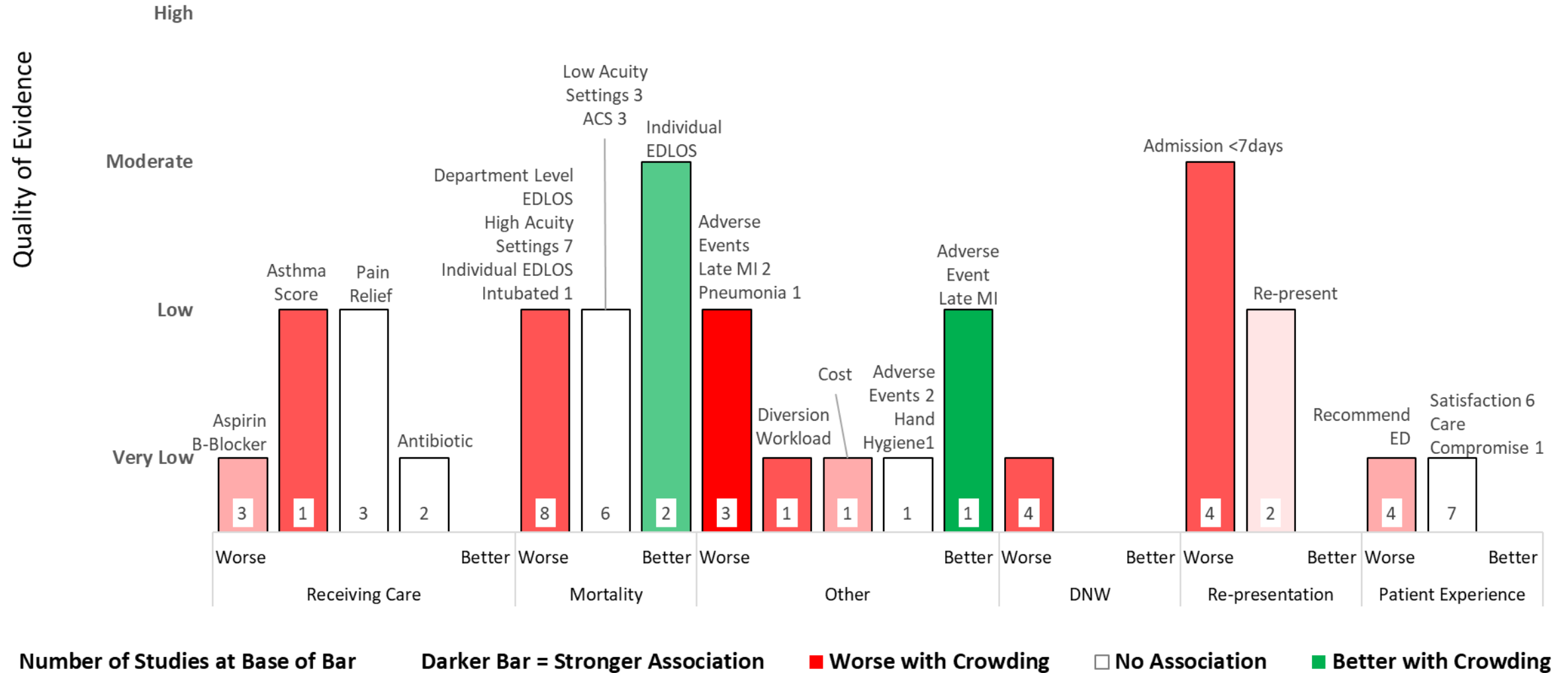


Total ED LOS: Evidence for Associations with Processes of Care n=288,519





Total ED LOS: Evidence for Associations with Outcomes of Care n=17,635,151



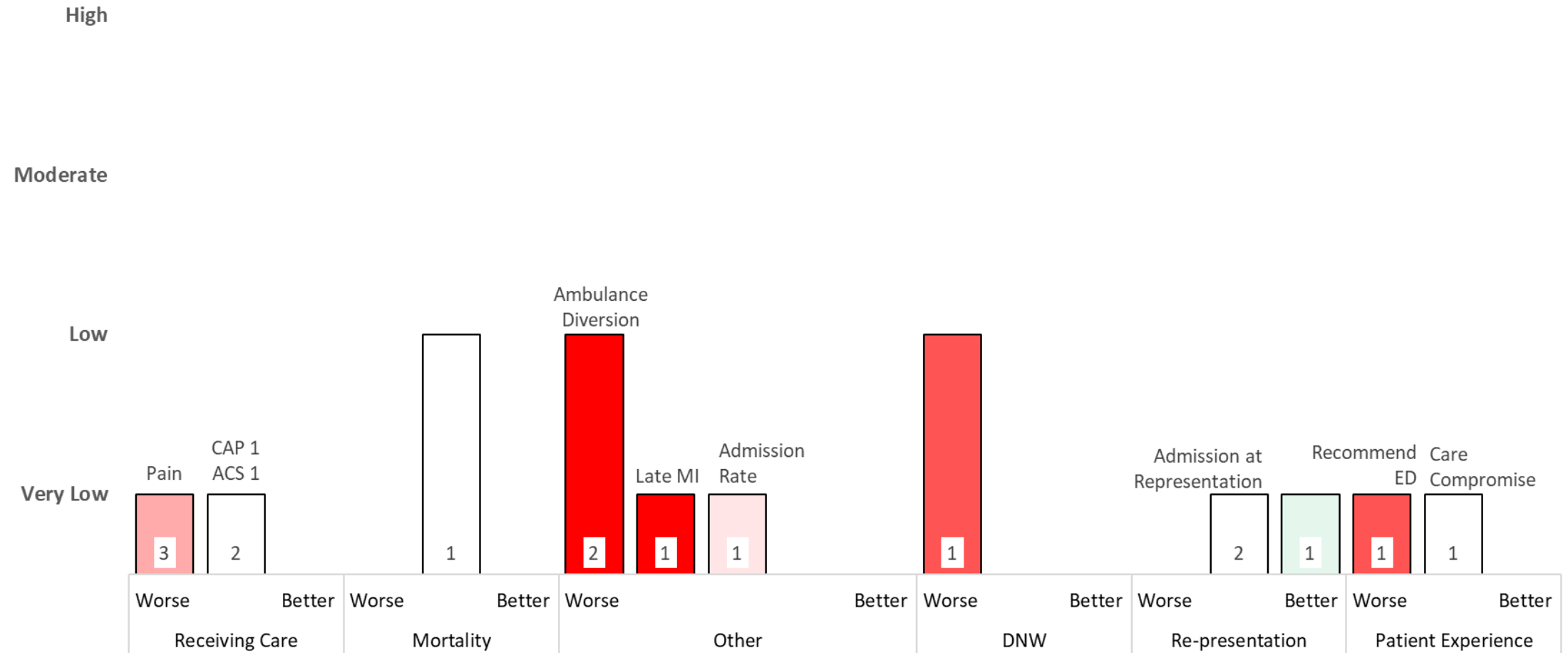
Results Occupancy Metrics





Waiting Room Occupancy: Evidence for Associations with Outcomes of Care n≈806,806

Quality of Evidence



Number of Studies at Base of Bar

Darker Bar = Stronger Association

■ Worse with Crowding

□ No Association

■ Better with Crowding



Occupancy by ED Patients under Treatment: Evidence for Associations with Processes of Care n≈234,386

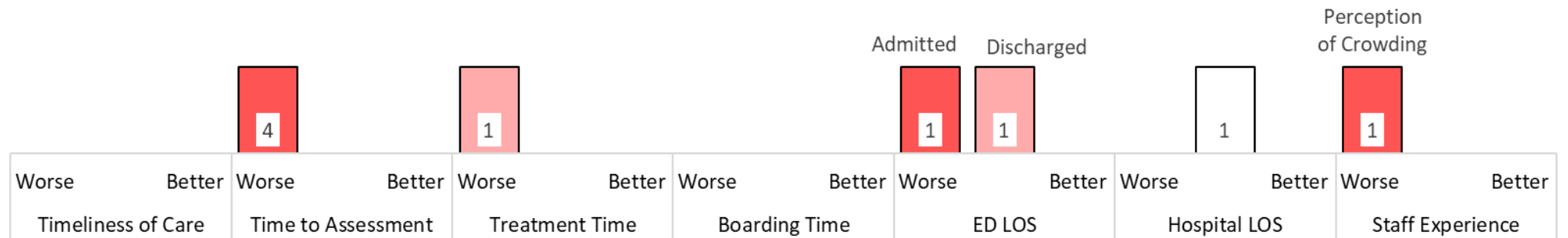
Quality of Evidence

High

Moderate

Low

Very Low



Number of Studies at Base of Bar

Darker Bar = Stronger Association

■ Worse with Crowding

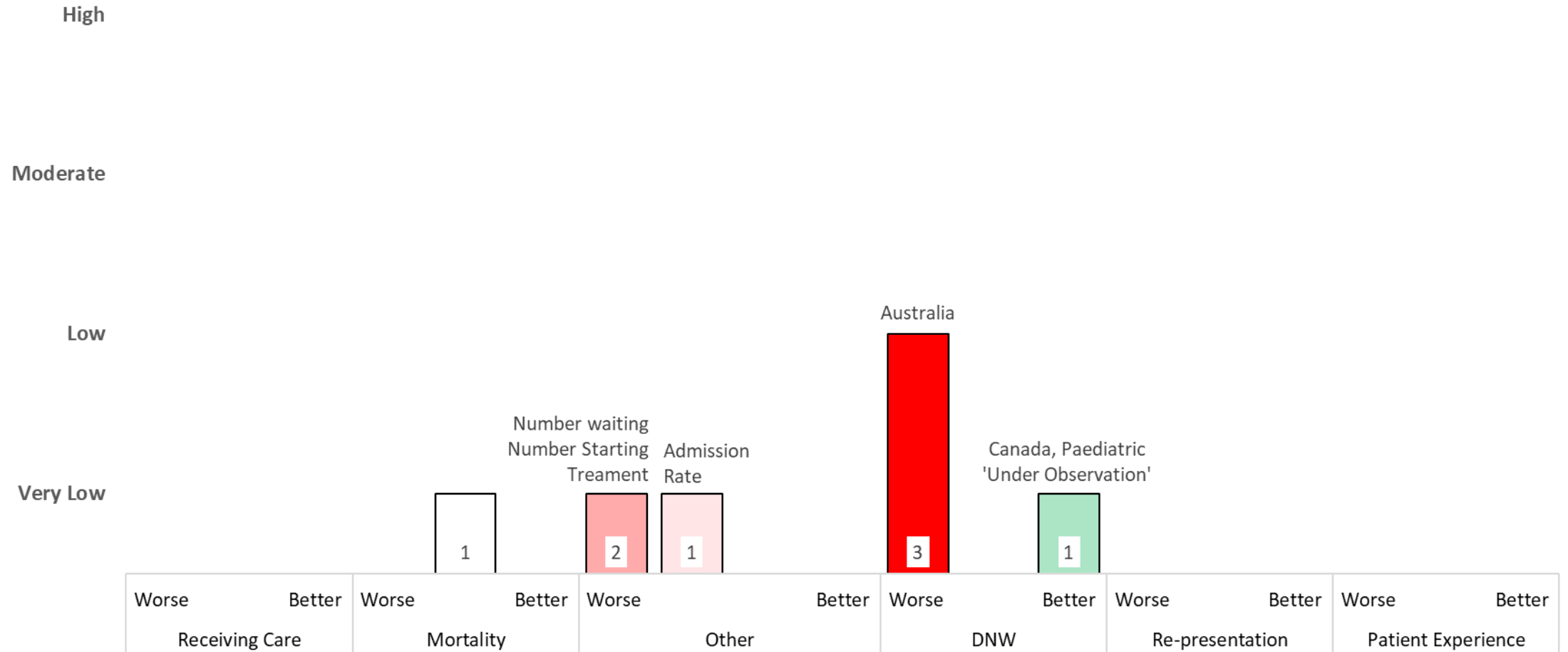
□ No Association

■ Better with Crowding



Occupancy by ED Patients Under Treatment: Evidence for Associations with Outcomes of Care n≈59,509

Quality of Evidence



Number of Studies at Base of Bar

Darker Bar = Stronger Association

■ Worse with Crowding

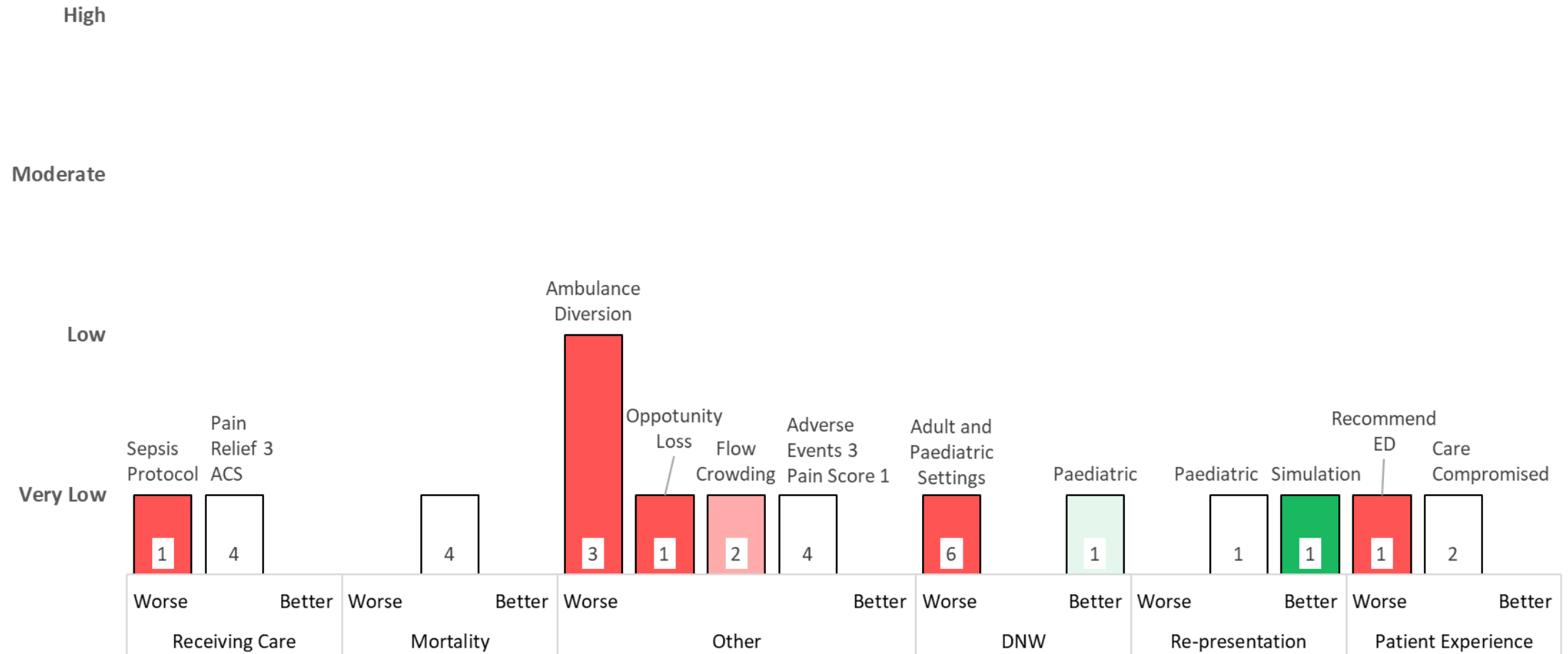
□ No Association

■ Better with Crowding



Occupancy by Boarding Inpatients: Evidence for Associations with Outcomes of Care n≈486,452

Quality of Evidence



Number of Studies at Base of Bar

Darker Bar = Stronger Association

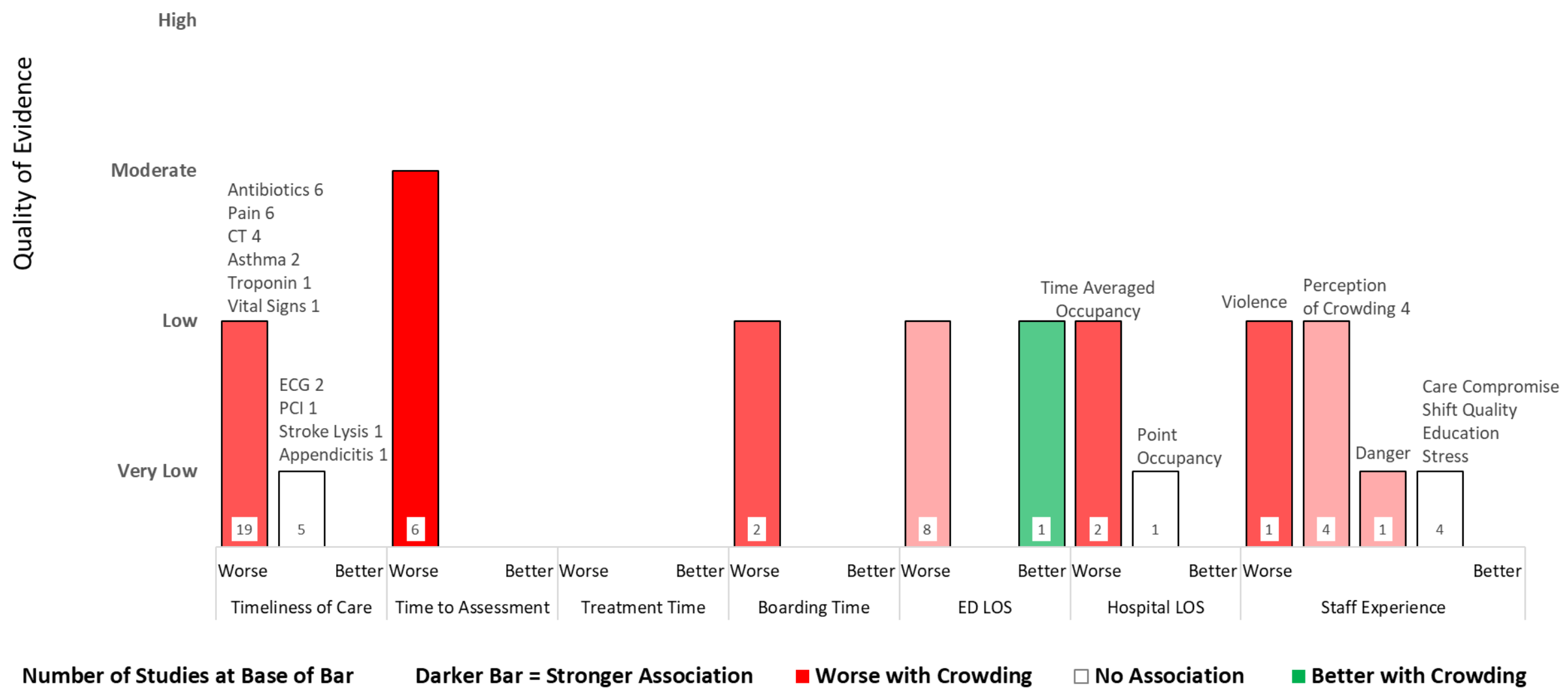
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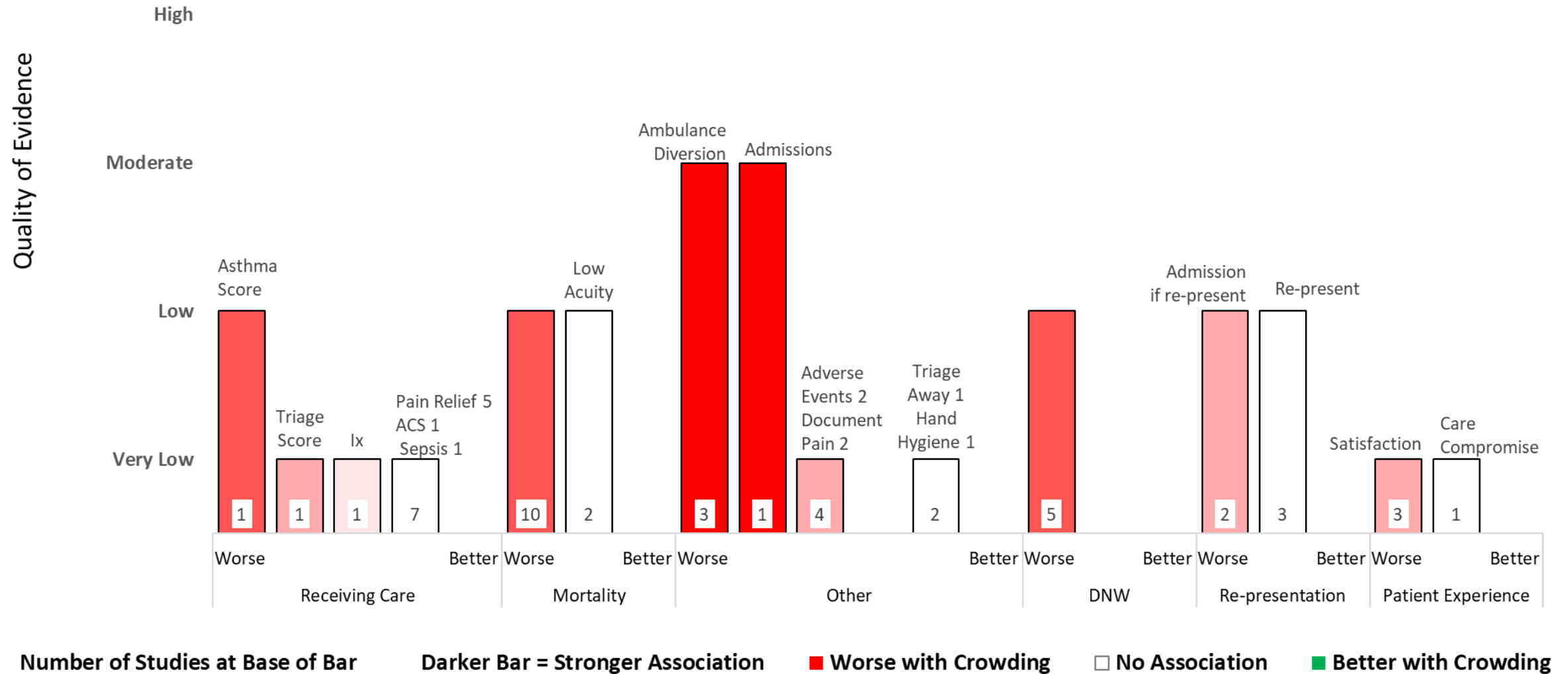


Total ED Occupancy: Evidence for Associations with Processes of Care n≈918,647





Total ED Occupancy: Evidence for Associations with Outcomes of Care n≈2,157,976



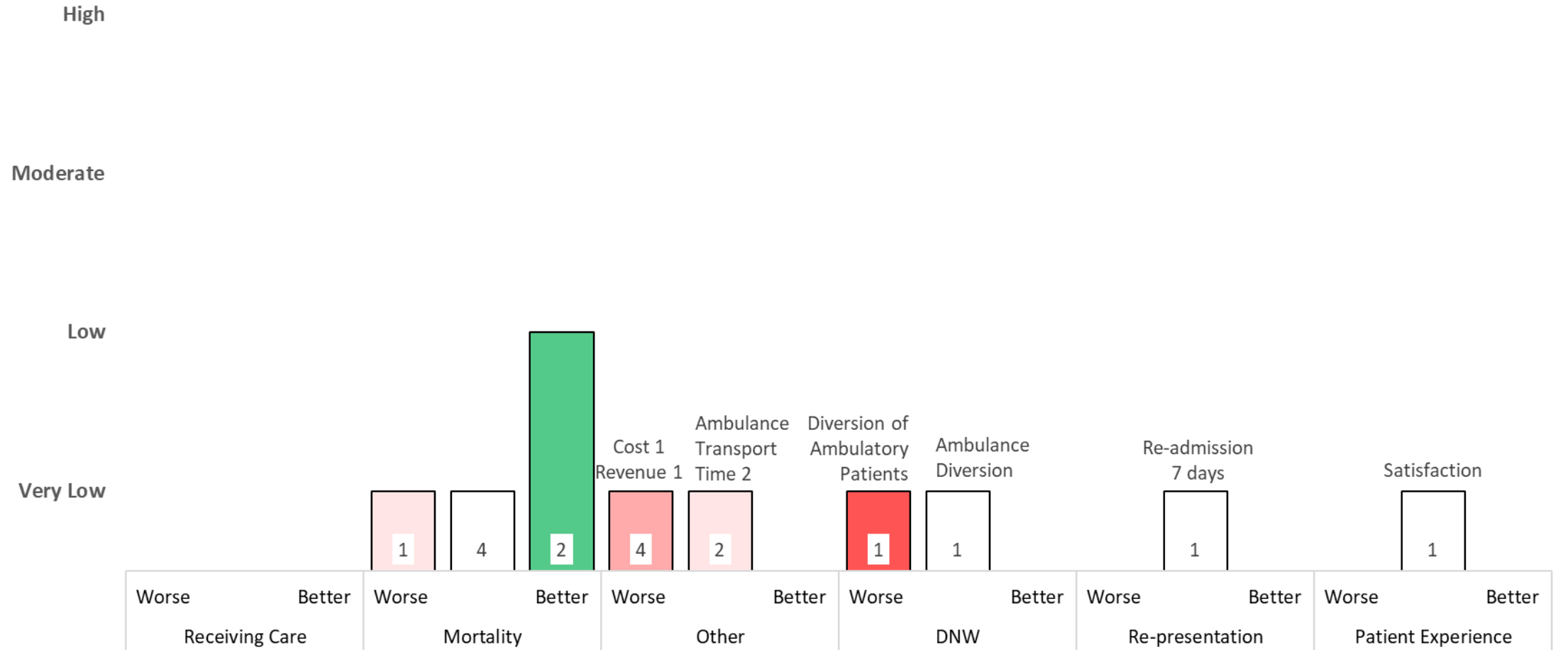
Results Other Occupancy Metrics / DNW





Indirect Occupancy (Entry Block): Evidence for Associations with Outcomes of Care n≈4,732,676

Quality of Evidence



Number of Studies at Base of Bar

Darker Bar = Stronger Association

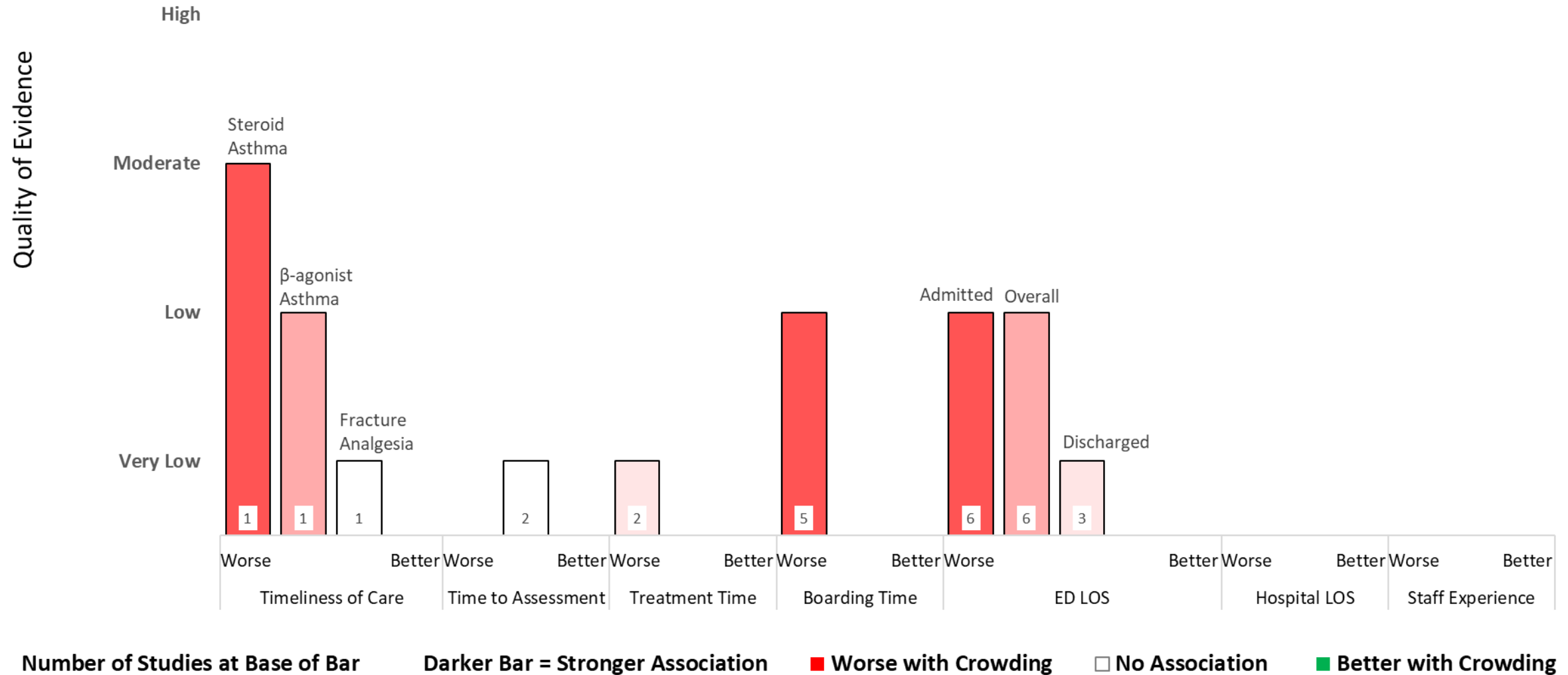
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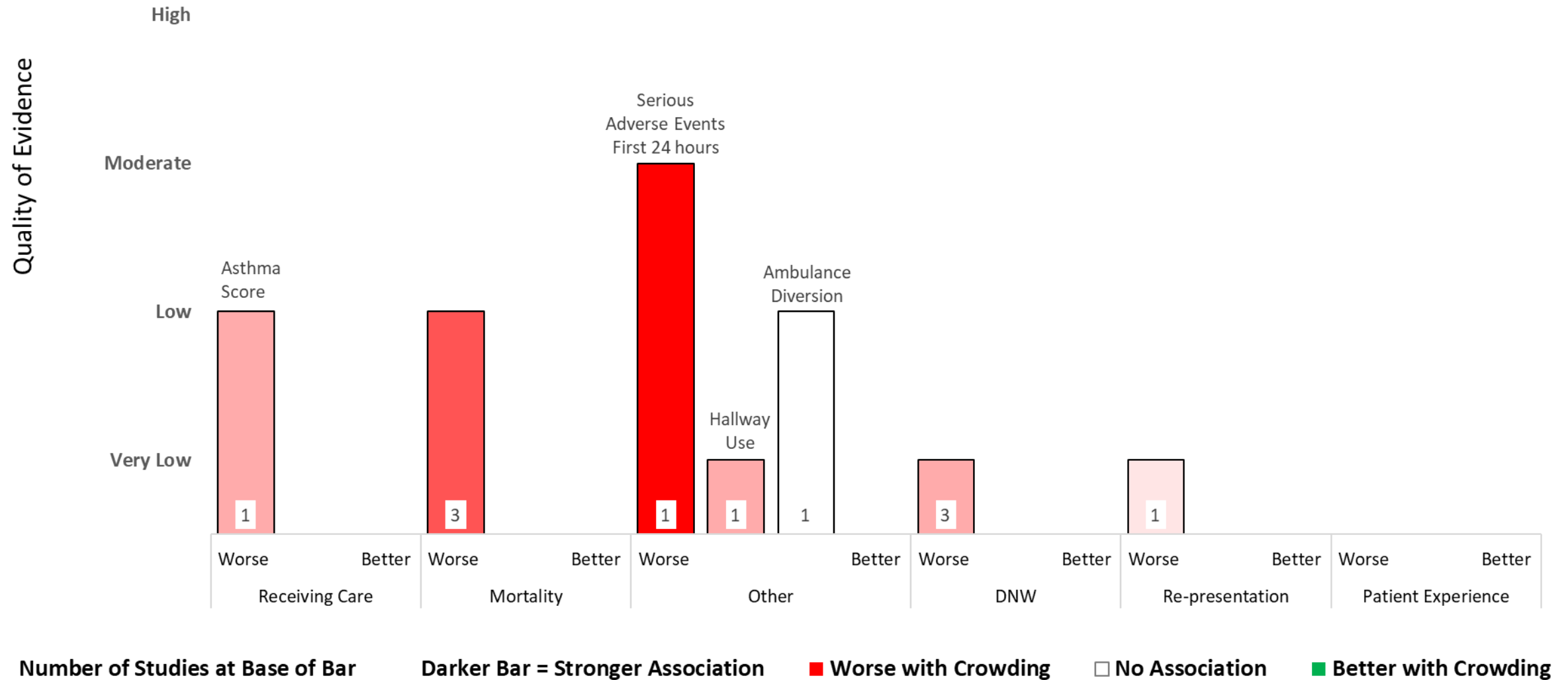


Hospital Occupancy: Evidence for Associations with Processes of Care n≈1,130,261





Hospital Occupancy: Evidence for Associations with Outcomes of Care n≈318,830





DNW: Evidence for Associations with Processes of Care n=6,384 Hospitals or Days

Quality of Evidence



Number of Studies at Base of Bar

Darker Bar = Stronger Association

■ Worse with Crowding

□ No Association

■ Better with Crowding



DNW: Evidence for Associations with Outcomes of Care n≈14,803,554

Quality of Evidence



Number of Studies at Base of Bar

Darker Bar = Stronger Association

■ Worse with Crowding

□ No Association

■ Better with Crowding

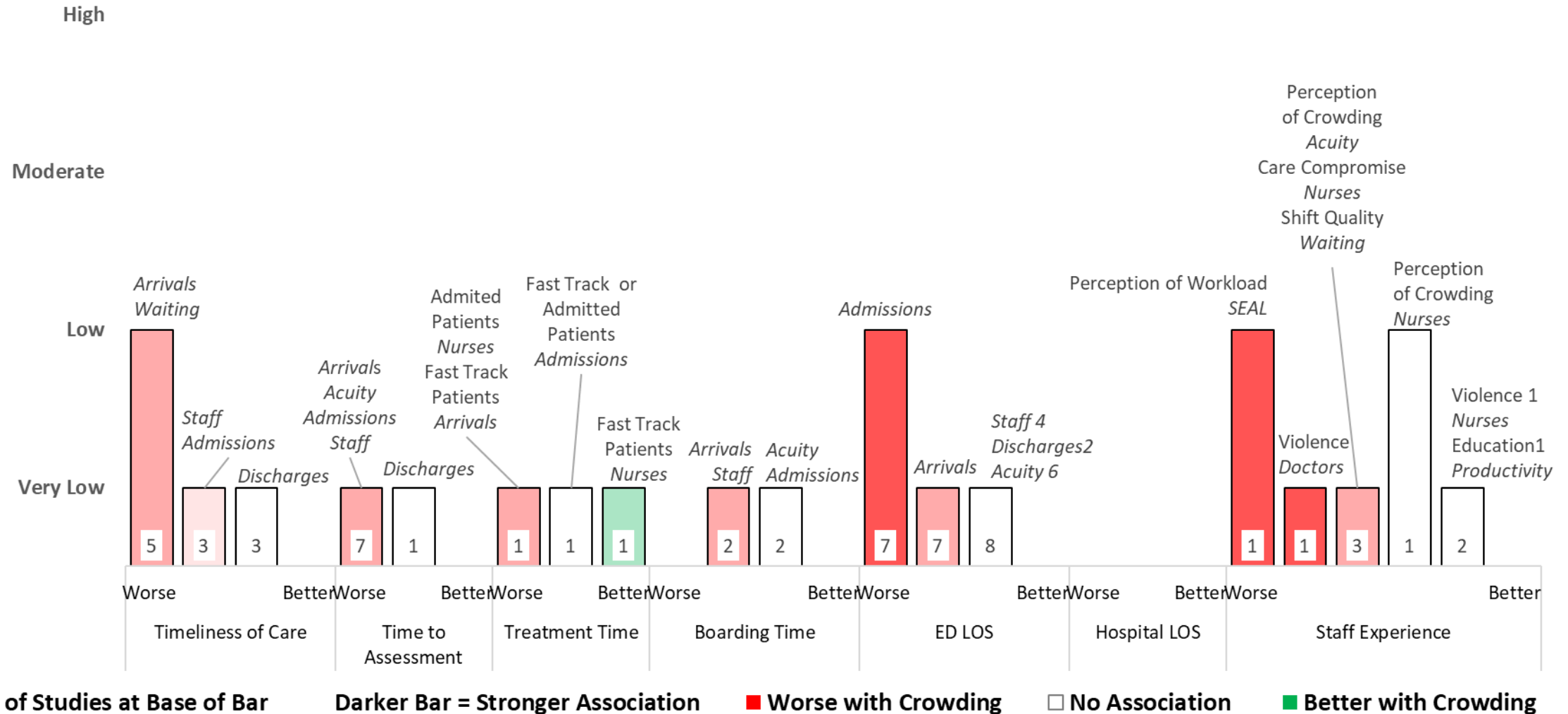
Results Workload





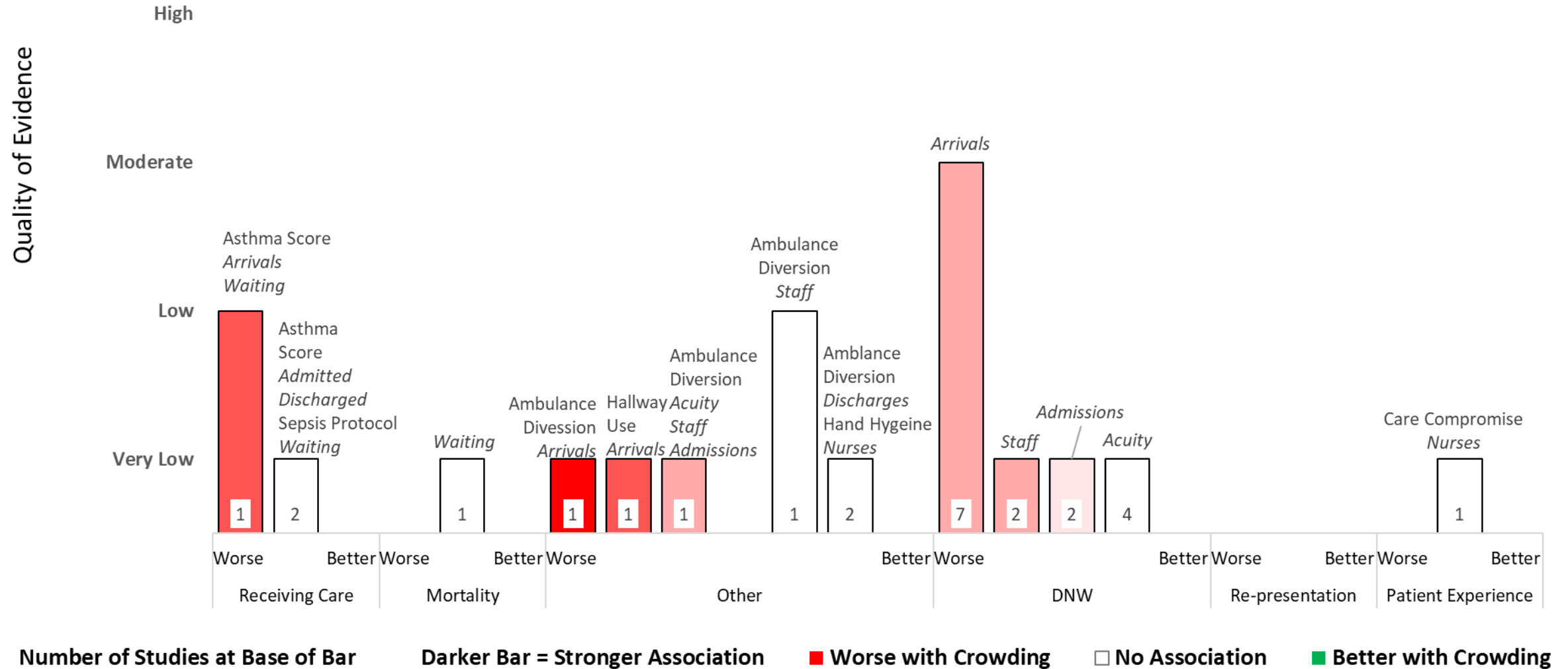
Workload Metrics: Evidence for Associations with Processes of Care n≈508,546

Quality of Evidence





Workload Metrics: Evidence for Associations with Outcomes of Care n≈298,579



Results Compound



Publication Bias?

- 28 studies as abstracts only

Category	Strength of Association				
	None	Weak	Moderate	Large	Not Quantified
Time	6	7	10	2	9
Occupancy	1	3	4		3
Workload	7	7			1
Compound	1	1	2	1	3
DNW	1				1
Total	19	18	18	3	17