



Improving Patient Access, Care and Transportation [IMPACT] by Paramedics

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No Conflicts of Interest to Disclose

The **IMPACT** Study

REB provided by:

- McMaster University
 - Southlake Regional Hospital
 - Mackenzie Health Hospital
 - Markham-Stouffville Hospital
-
- Supported by the
Regional Municipality of
York / York Region
Paramedic Services



The **IMPACT** Study

Health Care

System Pressures

**Increasing
Health Care
Needs**

**Availability of
Health Care
Services**



The **IMPACT** Study

Health Care

System Pressures – An Example

ED Use (and misuse)

As an Indicator of this Problem

Reliance; Availability of other Resources; As Admission
Pathways

The IMPACT Study

Health Care

System Pressures – An Example

ED Use (and misuse)

Financial Incentives / Education (to reduce misuse)

The IMPACT Study

Health Care

System Pressures

ED Use (and misuse)

↑ Availability of PC / AC (to reduce need)

The IMPACT Study

Health Care

System Pressures

ED Use (and misuse)

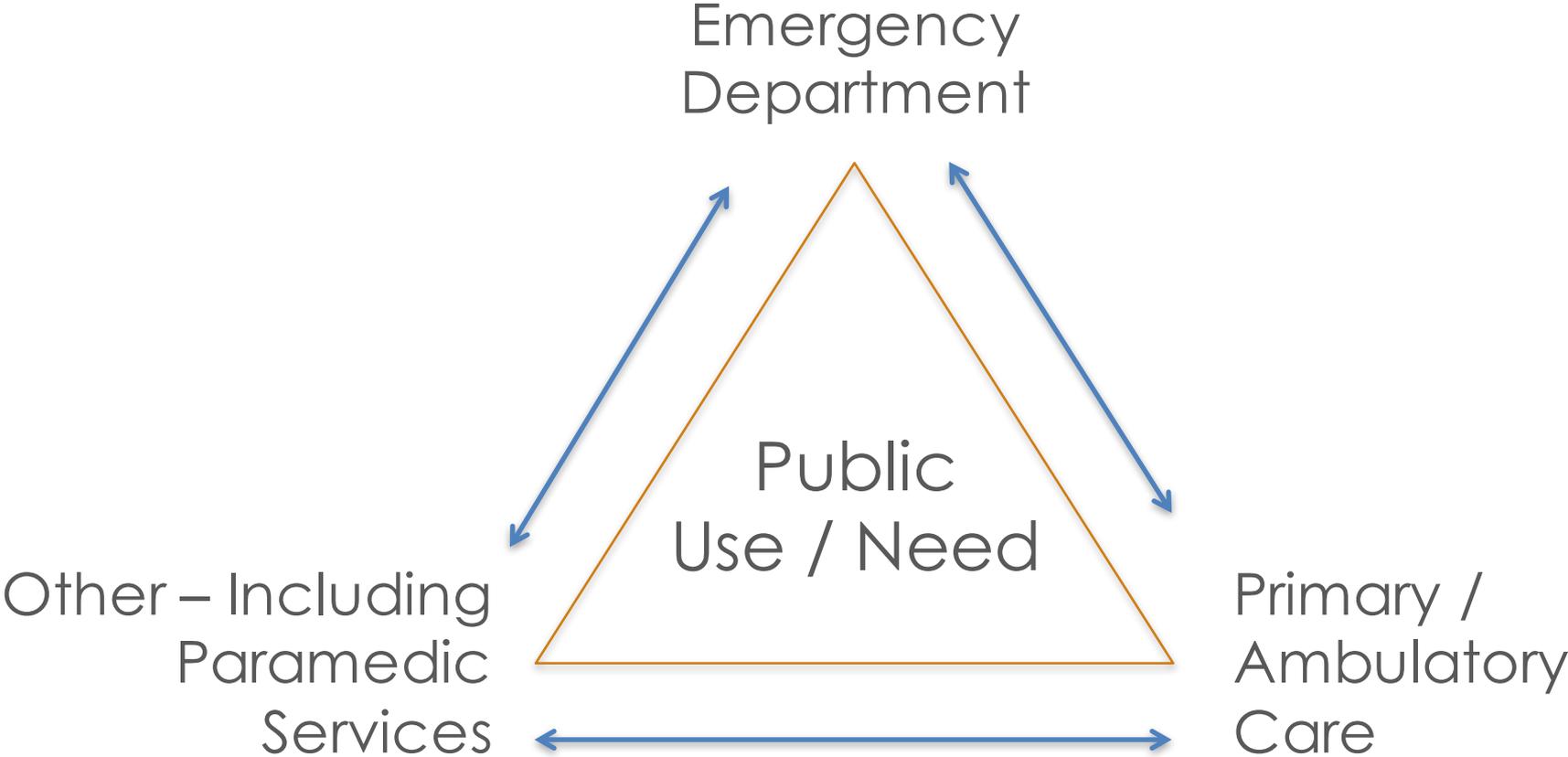
↑ Care Coordination / Managed Care
(to promote integrated care)

- Feeding back clinical information -

The IMPACT Study

Health Care

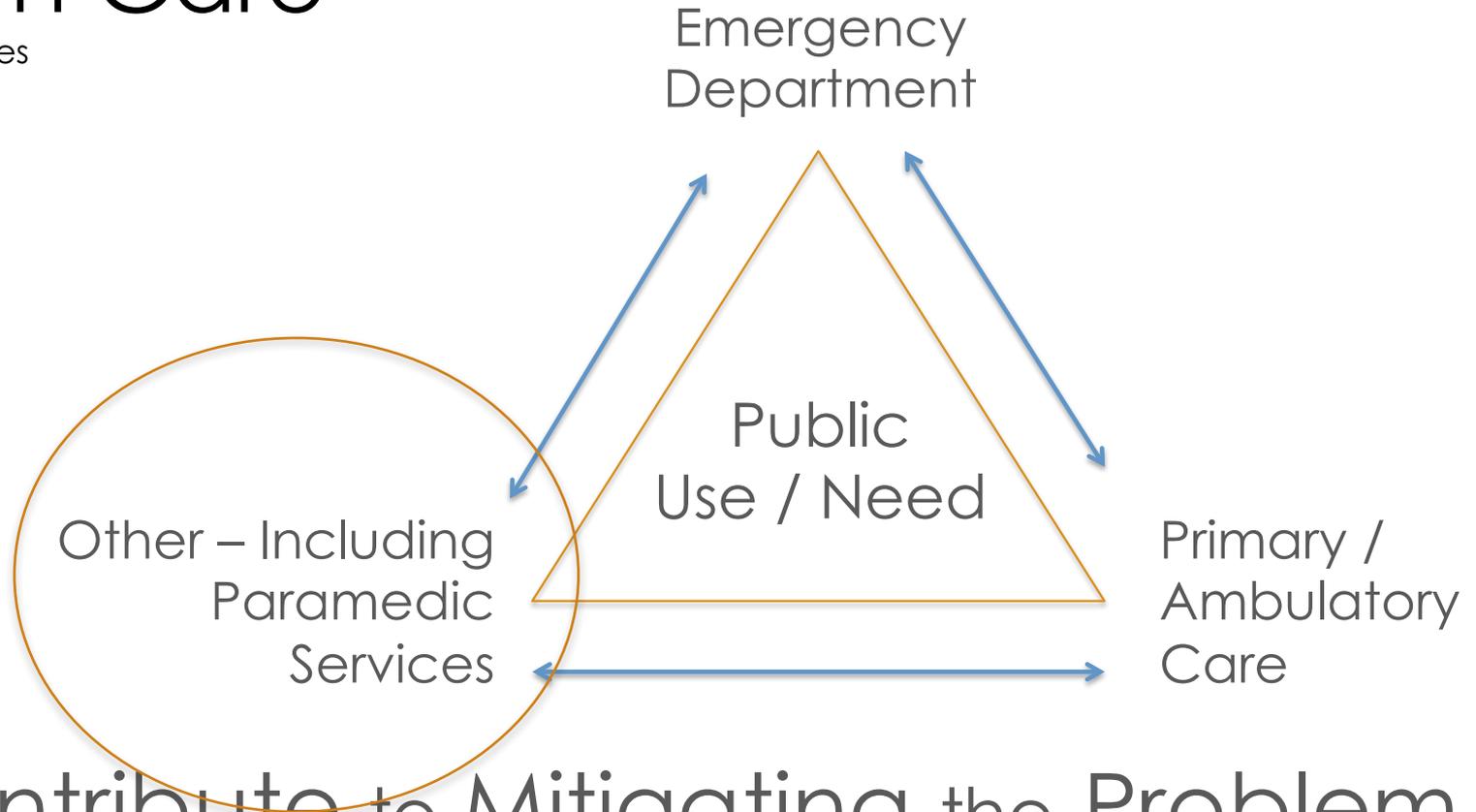
System Pressures



The **IMPACT** Study

Health Care

System Pressures

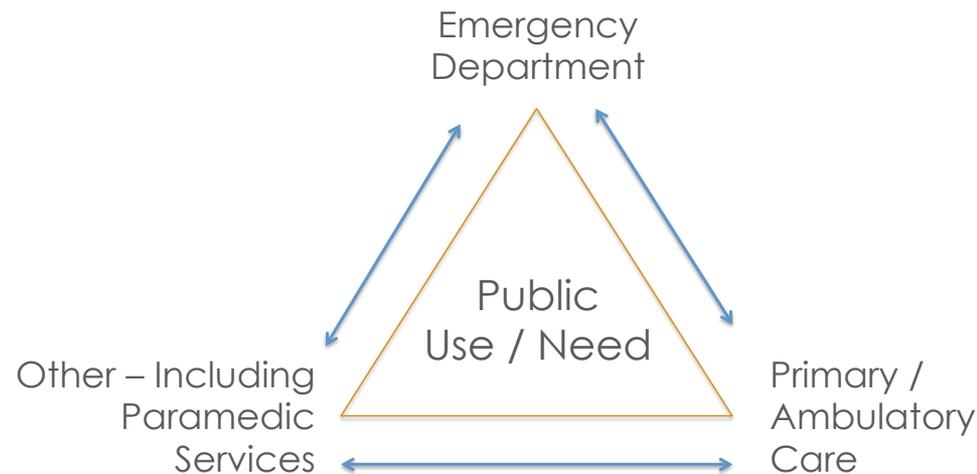


Contribute to Mitigating the Problem
by ultimately and meaningfully integrating

The **IMPACT** Study - As a Program of Research -

Research Question # 1

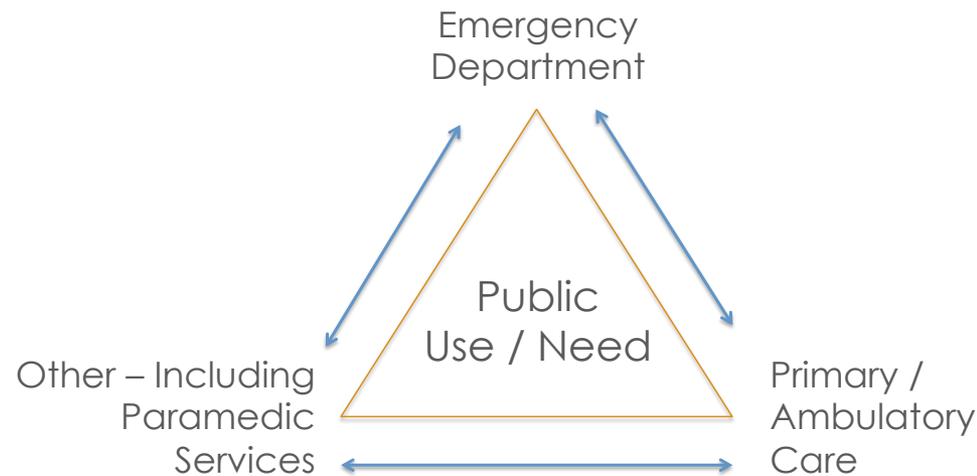
Of patients transported to an ED by paramedic services [following 911 activation], what is the **course of clinical care, disposition and most responsible diagnosis?**



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Research Question # 2

What additional clinical services provided by paramedics (in a 911 model) would result in the greatest **access, care and intelligent transportation** for patients encountered during emergent / urgent events?



The **IMPACT** Study

Shifting Clinical Services

And Working Toward Integration / Greater Capacity

**Increasing
Health Care
Needs**

**Availability of
Health Care
Services**



The **IMPACT** Study

Study Design

Overview

Retrospective Cross-sectional
Descriptive Study and Model Simulation

- As a Program of Research –
Phase 2 of 5

The **IMPACT** Study

Study Design

Setting

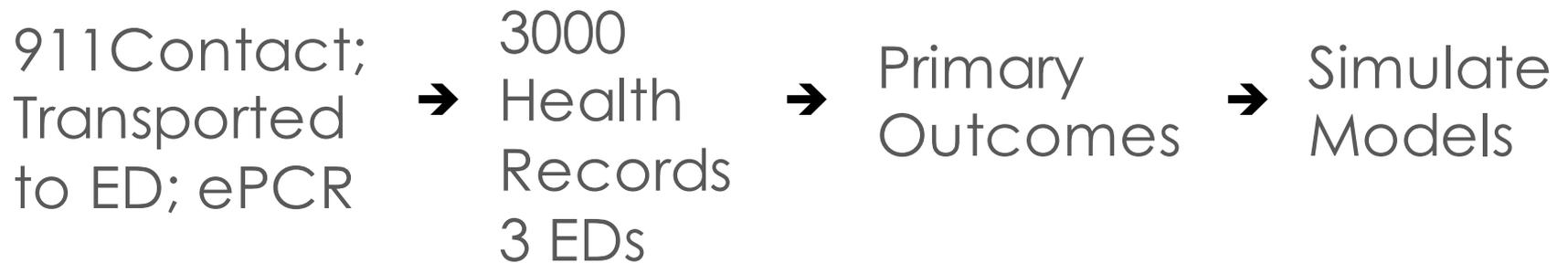


- 1.2 million
- Mix of density
- Res., Comm., Indus.
- Mix of demographics
- 3 Regional Hospitals
- 487 Paramedics
- 26-36 Amb. / 21 stations
- ePCR

The **IMPACT** Study

Study Design

Methods / Procedures



The **IMPACT** Study

Study Design

Methods / Procedures

911 Contact;
Transported
to ED; ePCR

- Resident
- > 18
- 911 activation
- Transported to 1 of 3 regional hospital
- CTAS 2-5 (by paramedic)
- Matching hospital record
- Not inter-facility
- Not bypassed

The **IMPACT** Study

Study Design

Methods / Procedures

911 Contact;
Transported
to ED; ePCR



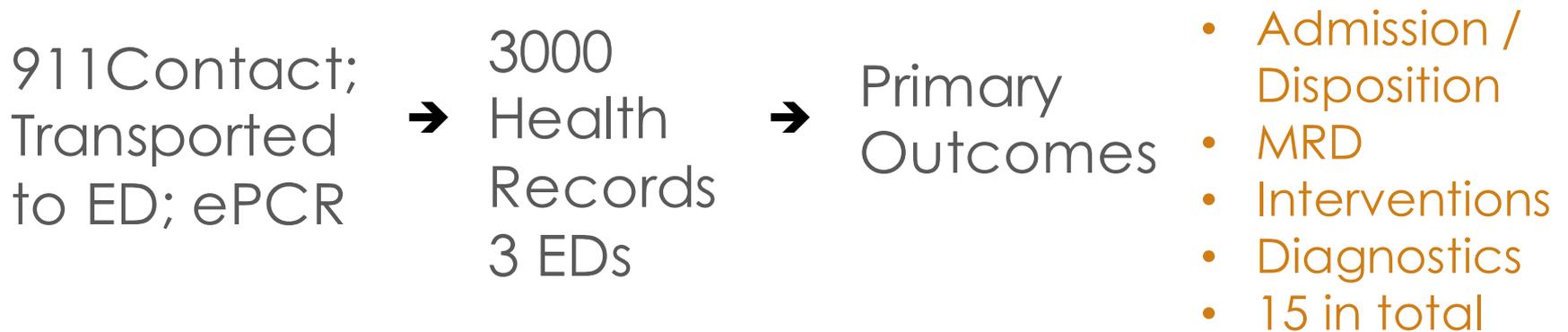
3000
Health
Records
3 EDs

- Stratified by hospital by CTAS (as per population)

The **IMPACT** Study

Study Design

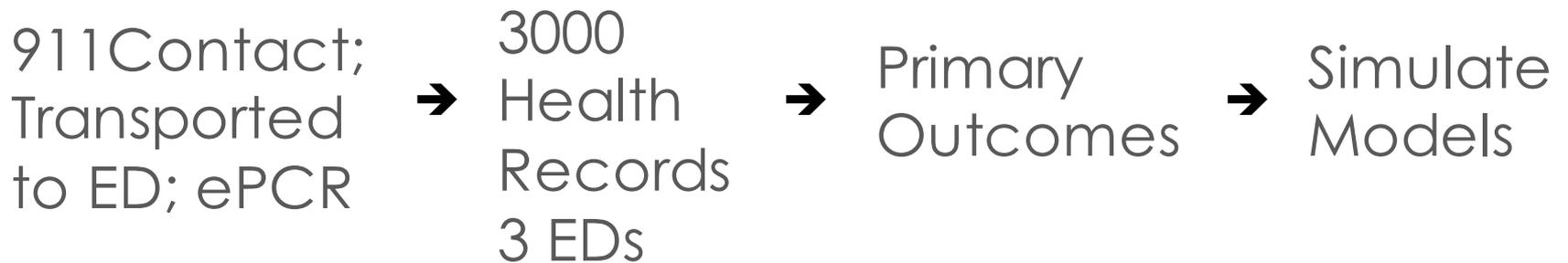
Methods / Procedures



The **IMPACT** Study

Study Design

Methods / Procedures



The **IMPACT** Study

Study Design

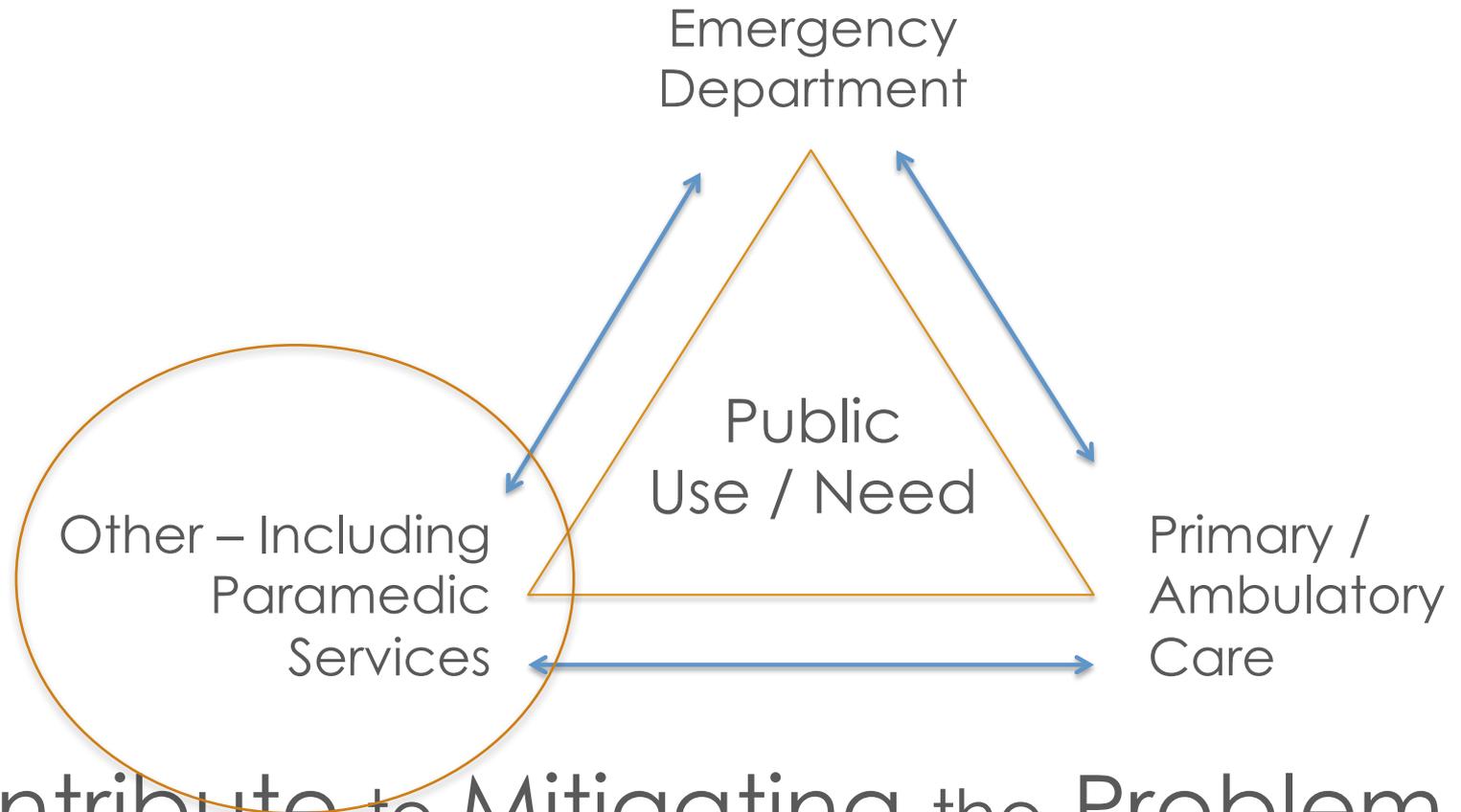
Analysis Plan

Classification System; Explore Interventions and Diagnostics by Group; Establish Index [Based on Freq. Assoc. with Admission]; Explore MRD [Same Index]

The IMPACT Study

Shifting Clinical Services

And Working Toward Integration



Contribute to Mitigating the Problem
by ultimately and meaningfully integrating

Results



- 77,864 records
- 55,294 post cleaning 1
- 32,009 post cleaning 2
- 3000
- 1000 records per ED – similar CTAS Distribution
- Mean age = 57.6
- N=1660 had ACP
- 23 Communities

Table 1: Descriptive statistics for interventions, diagnostics and admission status for 3000 patients transported by paramedics to local EDs.

| Group | Interventions | Diagnostics | Admitted | n | % |
|--------------|----------------------|--------------------|-----------------|----------|----------|
| 1 | No | No | No | | |
| 2 | No | Yes | No | | |
| 3 | Yes | No | No | | |
| 4 | Yes | Yes | No | | |
| | | | | | |
| | | | | | |
| 5 | Yes | Yes | Yes | | |
| 6 | Yes | Yes | Deceased | | |
| 7 | No | Yes | Yes | | |
| 8 | Yes | No | Yes | | |
| 9 | No | No | Yes | | |
| 10 | | | Left AMA | | |
| | | | | | |

Table 2: Descriptive statistics for interventions, diagnostics and admission status for 3000 patients transported by paramedics to local EDs.

| Group | Interventions | Diagnostics | Admitted | n | % |
|--------------|----------------------|--------------------|-----------------|-------------|---------------|
| 1 | No | No | No | 108 | 3.6 |
| 2 | No | Yes | No | 611 | 20.37 |
| 3 | Yes | No | No | 143 | 4.77 |
| 4 | Yes | Yes | No | 1092 | 36.4 |
| | | | | 1954 | 65.10% |
| | | | | | |
| 5 | Yes | Yes | Yes | 871 | 29.03 |
| 6 | Yes | Yes | Deceased | 2 | 0.07 |
| 7 | No | Yes | Yes | 92 | 3.07 |
| 8 | Yes | No | Yes | 8 | 0.27 |
| 9 | No | No | Yes | 2 | 0.07 |
| 10 | | | Left AMA | 71 | 2.37 |
| | | | | 1046 | 35.20% |

Table 3: Top 10 patient types (by CCS Grouping) with the highest frequency and correlation with admission.

| Patient Type | Freq. Out of 1954 | Discharge Out of 2927 | Index |
|---|--------------------------------|------------------------------------|--------------|
| Other injuries / cond. due to ext. causes | 184 | 0.95 | 174.52 |
| Nonspecific chest pain | 145 | 0.89 | 128.99 |
| Condi. associated with dizziness/vertigo | 91 | 0.94 | 85.37 |
| Abdominal pain | 88 | 0.89 | 78.22 |
| Superficial injury; contusion | 74 | 0.97 | 72.05 |
| Spondylosis; intervertebral disc disorders; other back problems | 65 | 0.96 | 62.13 |
| Syncope | 76 | 0.77 | 58.34 |
| Anxiety disorders | 54 | 0.93 | 50.28 |
| Open wounds of head; neck; and trunk | 44 | 0.96 | 42.09 |
| Sprains and strains | 43 | 0.96 | 41.09 |

Eg. Trauma to or injury to numerous parts of the body related; heat related injuries; allergens; foreign body; MVC

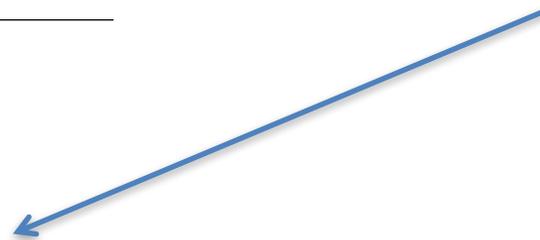
Table 4: Top 10 patient types (by CCS Grouping) by group assignment.

| Patient Type | Group Assignment | | | |
|--|-------------------------------|-------------------|------------|-------------------|
| | Of 1954 Non-Admitted Patients | | | |
| | 1 | 2 | 3 | 4 |
| Other injuries / cond. due to ext. causes | n=18;9.78% | n=60;32.6% | n=17;9.24% | n=89;48.3% |
| Nonspecific chest pain | n=0;0% | n=71;48.9% | n=1;0.6% | n=73;50.3% |
| Condi. associated with dizziness/vertigo | n=3;3.3% | n=34;37.3% | n=6;6.59% | n=48;52.7% |
| Abdominal pain | n=1;1.14% | n=23;26.1% | n=1;1.14% | n=63;71.5% |
| Superficial injury; cont. | n=0;0% | n=48;63.1% | n=0;0% | n=28;36.8% |
| Spondylosis; intervertebral disc disorders; other back | n=11;14.8% | n=33;44.5% | n=1;1.3% | n=29;39.1% |
| Syncope | n=2;3.08% | n=7;10.77% | n=17;26.1% | n=39;60% |
| Anxiety disorders | n=1;1.82% | n=16;29.0% | n=2;3.64% | n=36;65.4% |
| Open wounds of head; neck; and trunk | n=3;5.56% | n=28;51.8% | n=4;7.41% | n=19;35.1% |
| Sprains and strains | n=0;0% | n=7;15.56% | n=2;4.44% | n=36;80% |

Table 5a: Impact of models on group Assignment.

| | |
|-----------------------------|--------------------------------|
| BL | n=108 (5.53%/Δ0%) |
| ACP | n=146 (7.47%/Δ35.19%) |
| Diagnostics | |
| 1 | n=463 (23.69%/Δ328.7%) |
| 2 | n=463 (23.69%/Δ328.7%) |
| 3 | n=454 (23.23%/Δ320.37%) |
| 4 | n=507 (25.95%/Δ369.44%) |
| Interventions | |
| 5 | n=186 (9.52%/Δ72.22%) |
| 6 | n=216 (11.05%/Δ100%) |
| 7 | n=214 (10.95%/Δ98.15%) |
| 8 | n=215 (11%/Δ99.07%) |
| Interventions + Diagnostics | |
| 9 | n=584 (29.89%/Δ440.74%) |
| 10 | n=645 (33.01%/Δ497.22%) |
| 11 | n=617 (31.58%/Δ471.3%) |
| 12 | n=691 (35.36%/Δ539.81%) |

Diagnostics with greatest IMPACT on Group 1 overall and by patient type

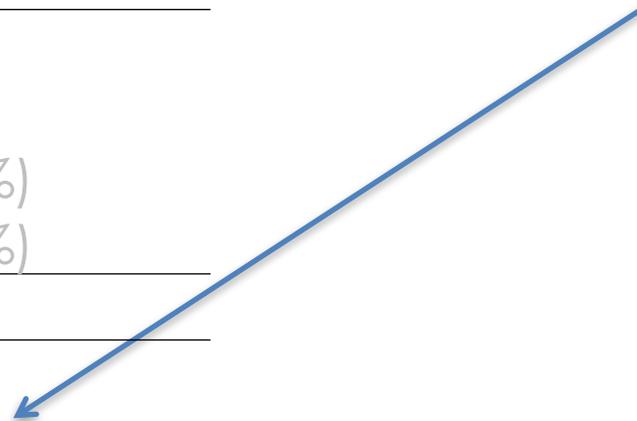


- CBC/Differential
- Chem7
- X-ray
- Consult with Crisis
- Troponin
- INR
- Creatine Kinase
- Consult with GEM
- PTT
- Urinalysis[POC]

Table 5b: Impact of models on group Assignment.

| | |
|-----------------------------|-----------------------------|
| BL | n=108 (5.53%/Δ0%) |
| ACP | n=146 (7.47%/Δ35.19%) |
| Diagnostics | |
| 1 | n=463 (23.69%/Δ328.7%) |
| 2 | n=463 (23.69%/Δ328.7%) |
| 3 | n=454 (23.23%/Δ320.37%) |
| 4 | n=507 (25.95%/Δ369.44%) |
| Interventions | |
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Intervention with greatest IMPACT on Group 1 overall and by patient type



- Zofran
- Percocet
- Tylenol 3
- Ativan
- Sutures
- TD
- Hydromorphone
- Metoclopramide
- Ranitidine
- Foley]

Table 5c: Impact of models on group Assignment.

| | |
|------------------------------------|--------------------------------|
| BL | n=108 (5.53%/Δ0%) |
| ACP | n=146 (7.47%/Δ35.19%) |
| Diagnostics | |
| 1 | n=463 (23.69%/Δ328.7%) |
| 2 | n=463 (23.69%/Δ328.7%) |
| 3 | n=454 (23.23%/Δ320.37%) |
| 4 | n=507 (25.95%/Δ369.44%) |
| Interventions | |
| 5 | n=186 (9.52%/Δ72.22%) |
| 6 | n=216 (11.05%/Δ100%) |
| 7 | n=214 (10.95%/Δ98.15%) |
| 8 | n=215 (11%/Δ99.07%) |
| Interventions + Diagnostics | |
| 9 | n=584 (29.89%/Δ440.74%) |
| 10 | n=645 (33.01%/Δ497.22%) |
| 11 | n=617 (31.58%/Δ471.3%) |
| 12 | n=691 (35.36%/Δ539.81%) |

Interventions + Diagnostics with greatest IMPACT on Group 1 overall and by patient type



CBC/Differential;
Chem7; X-ray; Consult with Crisis; TroponinI;
INR; Creatine Kinase;
Consult with GEM; PTT
Urinalysis[POC]

Zofran Percocet; Tylenol 3; Ativan; Sutures; Td; Hydromorphone; Metoclopramide; Ceftriaxone; Pink Lady

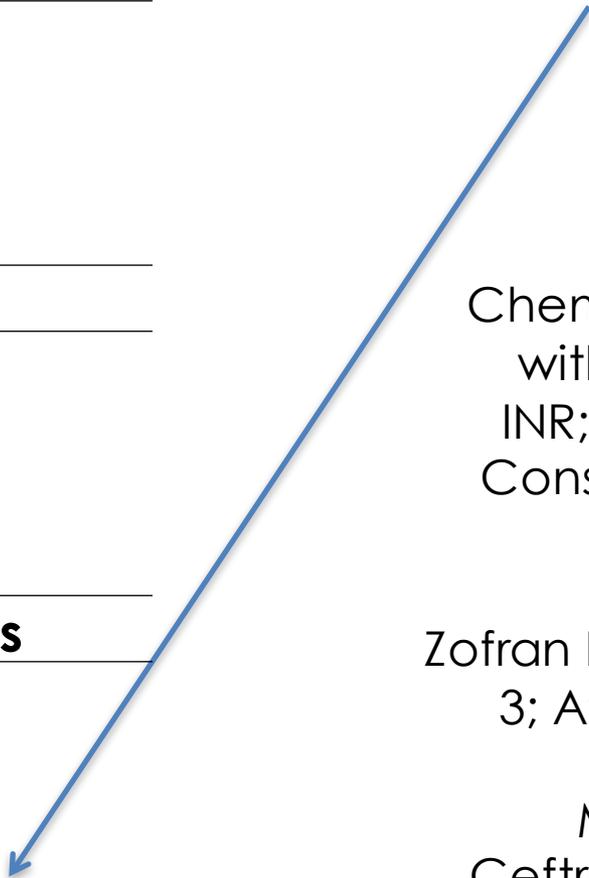


Table 6: Example of models on sample patient types

| | Other injuries / cond. d/t external causes (n=184) | Nonspecific chest pain (n=145) | Abdominal pain (n=88) |
|------|--|--------------------------------|-----------------------|
| None | n=18 (9.78%) | n=0 (0%) | n=1 (1.14%) |
| ACP | n=21 (11.41%) | n=1 (0.69%) | n=1 (1.14%) |
| 1 | n=84 (45.65%) | n=41 (28.28%) | n=3 (3.41%) |
| 2 | n=84 (45.65%) | n=41 (28.28%) | n=3 (3.41%) |
| 3 | n=59 (32.07%) | n=69 (47.59%) | n=3 (3.41%) |
| 4 | n=64 (34.78%) | n=72 (49.66%) | n=4 (4.55%) |
| 5 | n=26 (14.13%) | n=1 (0.69%) | n=1 (1.14%) |
| 6 | n=28 (15.22%) | n=1 (0.69%) | n=1 (1.14%) |
| 7 | n=28 (15.22%) | n=2 (1.38%) | n=1 (1.14%) |
| 8 | n=27 (14.67%) | n=2 (1.38%) | n=1 (1.14%) |
| 9 | n=108 (58.7%) | n=46 (31.72%) | n=4 (4.55%) |
| 10 | n=117 (63.59%) | n=47 (32.41%) | n=4 (4.55%) |
| 11 | n=84 (45.65%) | n=80 (55.17%) | n=4 (4.55%) |
| 12 | n=89 (48.37%) | n=84 (57.93%) | n=5 (5.68%) |

Discussion

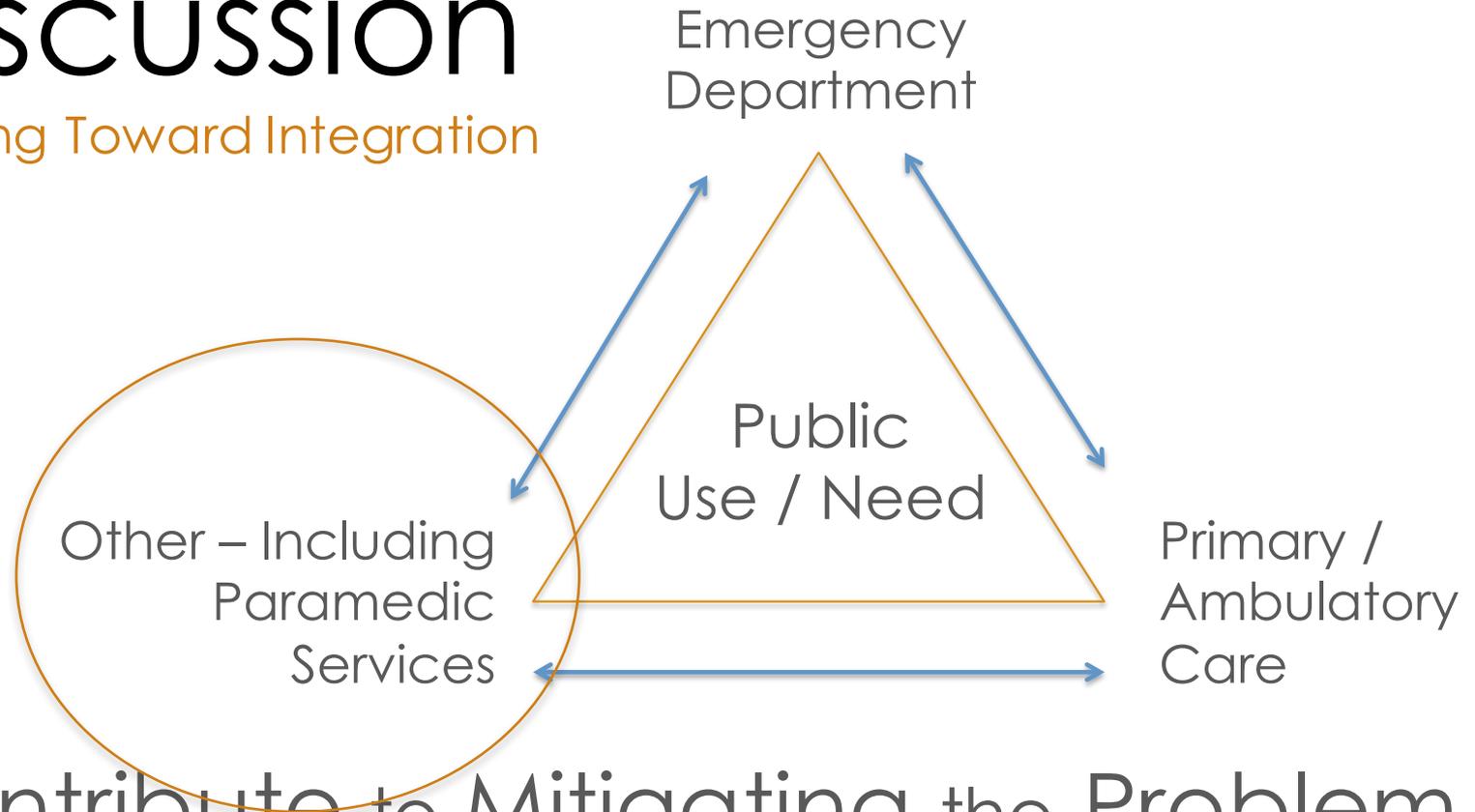
Shifting Clinical Services [and working toward integration]

Having an **IMPACT**



Discussion

Working Toward Integration



Contribute to Mitigating the Problem
by ultimately and meaningfully integrating

The **IMPACT** Study - As a Program of Research -

Discussion

Opportunity; Diagnostics; Patient Types and Culture

Having an **IMPACT**

- **Opportunity** with 65% non-admission rate (n=1954/3000)
 - Extrapolated = ~35,000 pts
- Still some risk
- Interventions and Diagnostics alone are insufficient [**obviously**]
 - **Clinical Reasoning!**

Discharge Rates

| |
|------|
| 0.95 |
| 0.89 |
| 0.94 |
| 0.89 |
| 0.97 |
| 0.96 |
| 0.77 |
| 0.93 |
| 0.96 |
| 0.96 |

The **IMPACT** Study

Discussion

Opportunity; **Diagnostics**; Patient Types and Culture

Having an **IMPACT**

- **Diagnostics** matter most
- Interventions have less of an impact
- Best when combined but gains may be limited
 - Training / costs

CBC/Differential
Chem7
X-ray
Consult with Crisis
Troponin
INR
Creatine Kinase
Consult with GEM
PTT
Urinalysis[POC]

The **IMPACT** Study

Discussion

Opportunity; **Diagnostics**; Patient Types and Culture

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The **IMPACT** Study

Discussion

Opportunity; Diagnostics; **Patient Types** and Culture

Having an **IMPACT**

- **Patient Types** matter
- Some minimal impact (e.g., Abdo pain)
- Others significant (e.g., MSK / Non-specific CP)

The **IMPACT** Study

Discussion

Opportunity; Diagnostics; Patient Types and Culture

Having an IMPACT

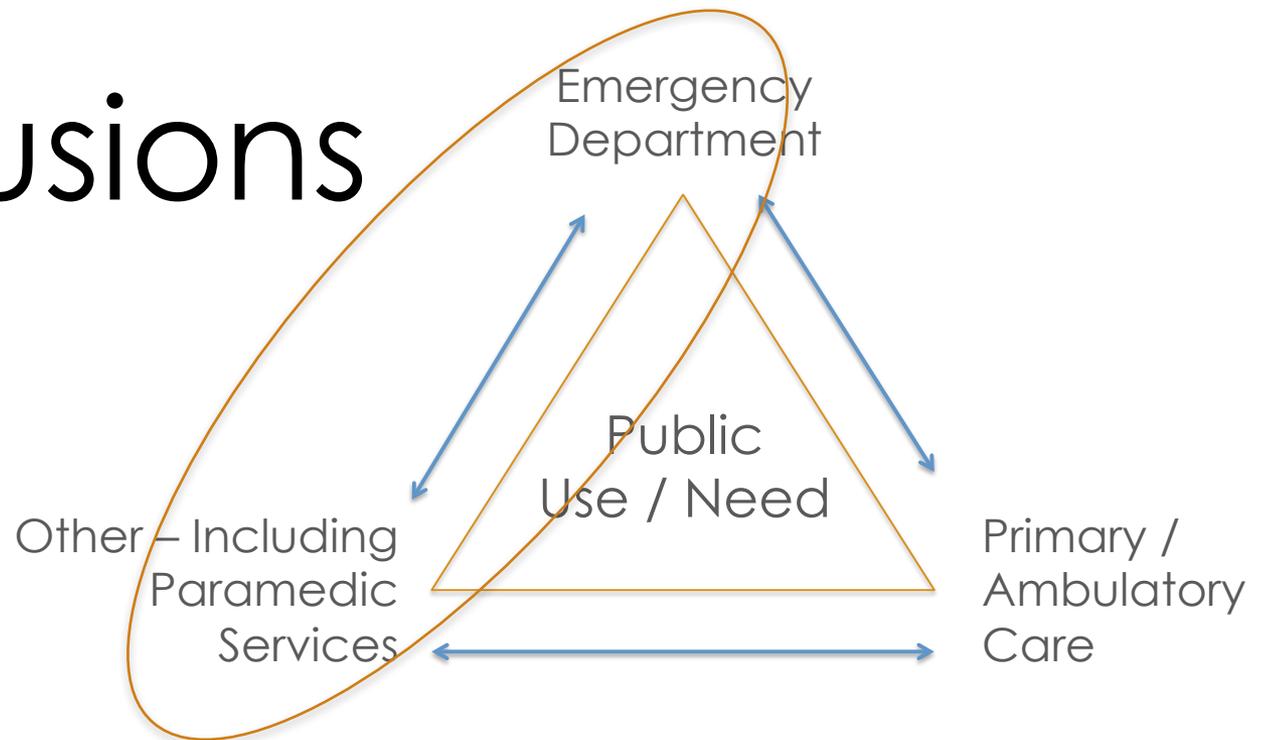
- Culture of practice matters
- Many transported unnecessarily
- Culture of “transport” requires attention
- ACP Skill set alone can have an impact (if permitted)

Limitations

- Aspirational / assumes no limitations
- Isolated to one region
- Multiple models possible / multiple approaches are possible
- These are simulations that cannot possibly consider all possible factors
 - Both over and underestimations are possible
- Feasibility limitations

Conclusions

IMPLICATIONS



Having an **IMPACT**

- **Consumption** of health care not likely to decline – shift to other settings
- **Underserved** population
- **Integrate services** / collectively expand services
- **Stop contributing and** begin mitigating
- We didn't discuss **ACSC**



Improving Patient Access, Care and Transportation **[IMPACT]** by Paramedics

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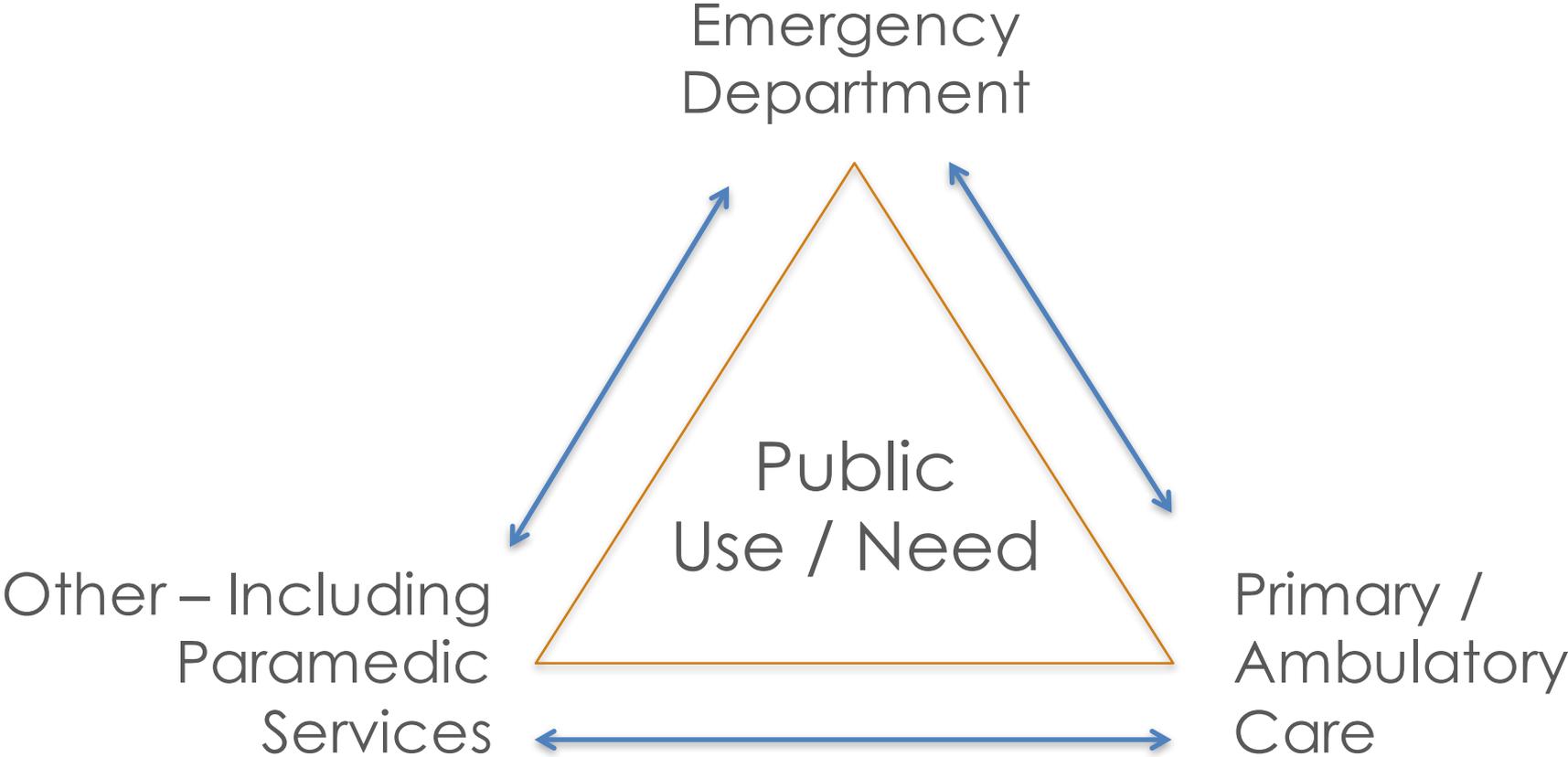
THANK YOU!



Presented by **Walter Tavares**, ACP, PhD
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Health Care

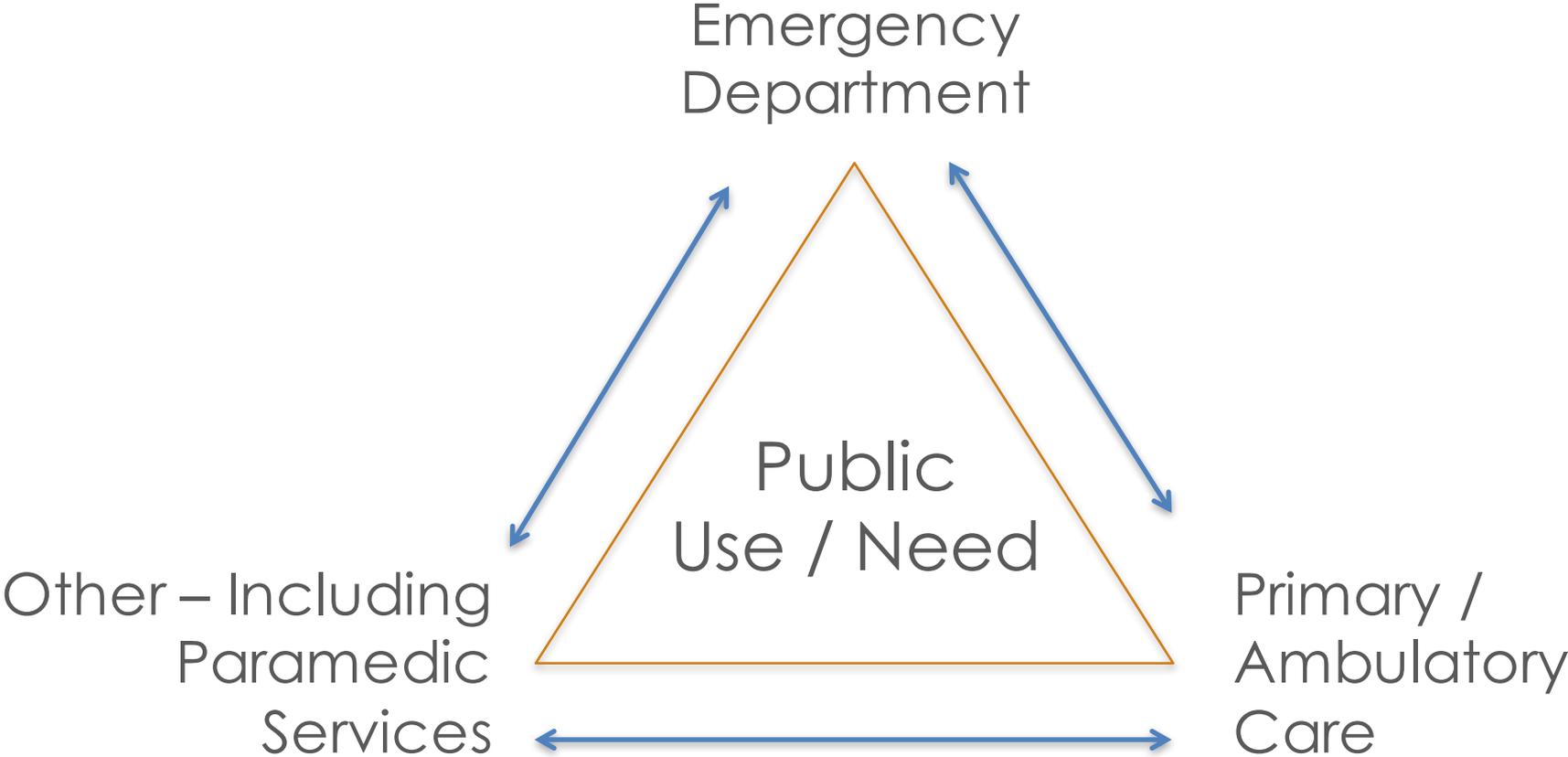
System Pressures



The **IMPACT** Study

Health Care

System Pressures



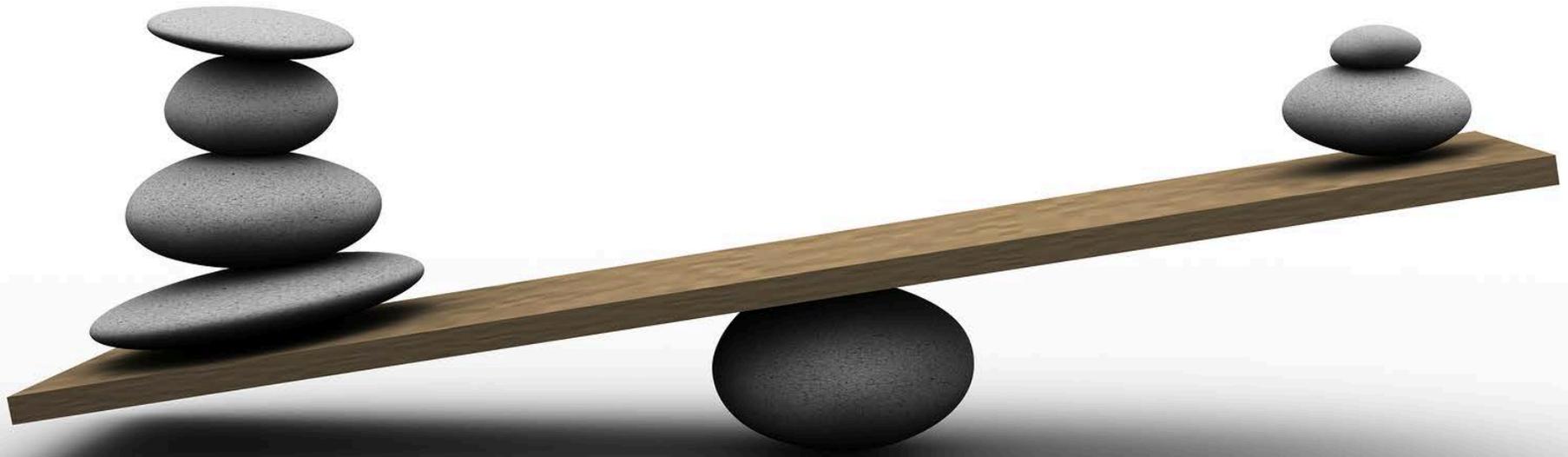
The **IMPACT** Study

Health Care

System Pressures

**Incr. Health
Care Needs**

**Availability of
Health Care
Services**



The **IMPACT** Study