Digital Pain Medicine at the University of Pittsburgh:

Something for everyone!

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Disclosures

- GW Pharmaceuticals—Consultant
- Parallel—Investigator-initiated grant

- NO off label use will be discussed

Pittsburgh Fun Facts

- 2.3 million in the metro area

- "City of Bridges" 446 bridges, more than any other city in the world

- Home to Heinz Ketchup—invented there

- First gas station in the country opened here in 1913

- *Mr. Rogers Neighborhood* was a PBS show made in Pittsburgh by Fred Rogers

UPMC Pain Medicine: A Hub and Spoke Group Care Network

- 12 Pain clinics across Pittsburgh metropolitan area
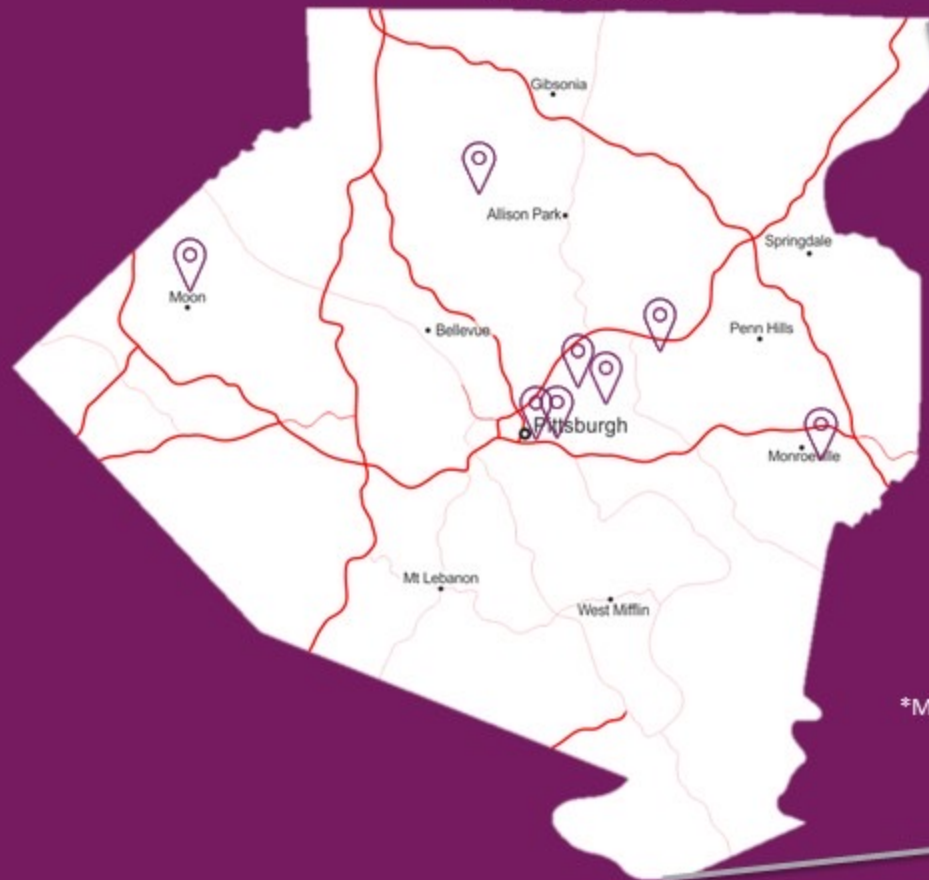- 8 Inpt services
- Avg 165 outpts seen per day

Central Hub:
Centre Commons in Shadyside—site of multidisciplinary care

Treatments include:
- Medications
- Injections
- Rehabilitation
- Mental health care
- Refer for integrative medicine (acupuncture, massage, etc)

Pain Specialist

PT/OT

Psychology & Psychiatry

Total Patient Care

Health Behaviors (smoking, weight loss)
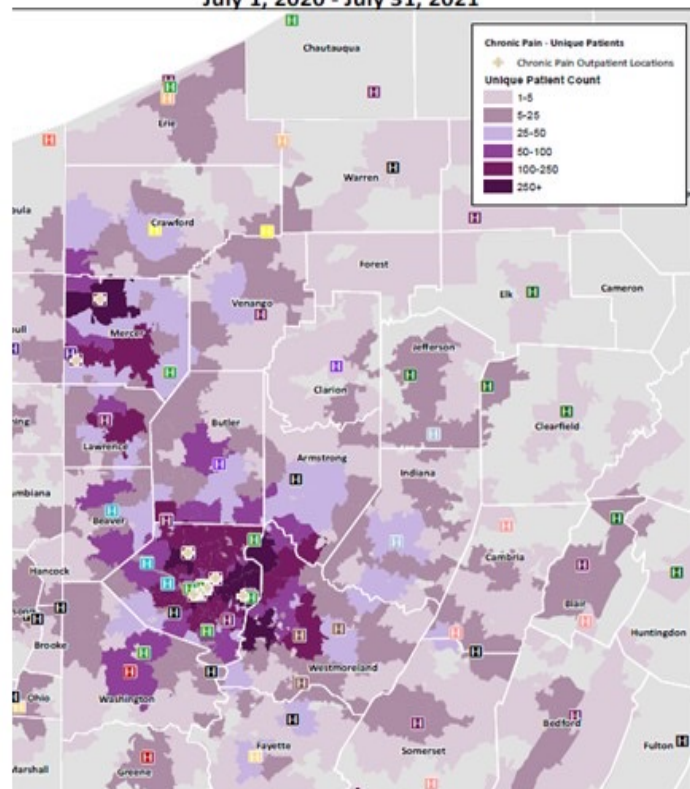
Integrative Medicine

Social Work (addiction)

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Chronic Pain Location Map

Heat Map

July 1, 2020 - July 31, 2021

- **Large variability in pain treatment response is the norm**

  33% Worse
  33% Better
  33% No Change

- **Requires a personalized approach using multiple modalities**

HHS, *Pain Management Best Practices Interagency Task Force Report: Updates, Gaps, Inconsistencies, Recommendations,* 2019, Department of Health and Human Services: Washington DC. p. 1-116.

AAPM

2.1 APPROACHES TO PAIN MANAGEMENT

Patient A
Patient B
Patient C
Patient D

Therapeutic alliance and shared decision-making

Diagnostic Evaluation: Biopsychosocial Approach

Pain Management Toolbox*

- NSAIDs, OTCs
- Medications
- TENS
- Yoga
- Epidural steroid injections
- Gabapentinoids
- Interventional procedures
- Specialty referral

- Massage
- Self-management
- Nerve blocks
- Behavioral health
- Neuromodulation
- Acupuncture
- Neuropathic Rx
- Physical therapy
- Short-term opioid

*This list is non-exhaustive nor in any particular order

Clinical Indication

Integrative Treatment Plan:

Multimodal, multidisciplinary, individualized

- NSAIDs
- Yoga
- Nerve blocks

- Short-term opioids
- Behavioral health
- Physical therapy

- Acupuncture
- Trigger point injection
- Self-management

- Gabapentinoids
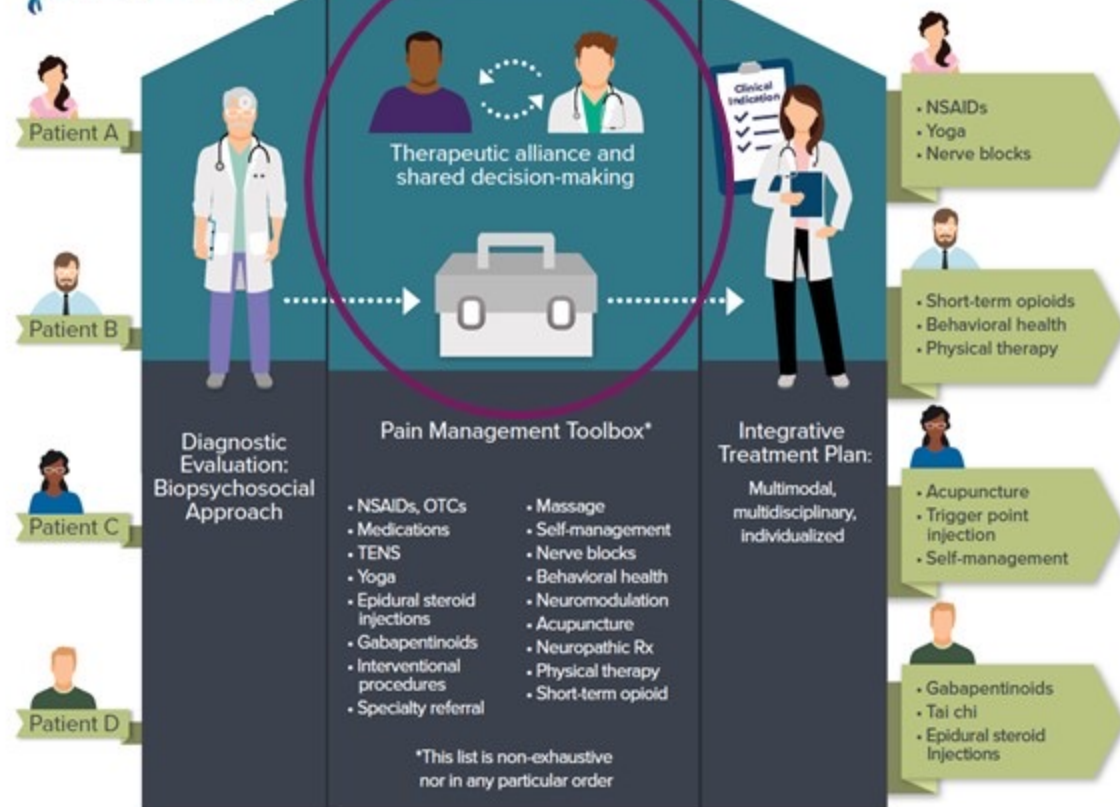- Tai chi
- Epidural steroid injections

Figure 6: Individualized Patient Care Consists of Diagnostic Evaluation That Results in an Integrative Treatment Plan That Includes All Necessary Treatment Options

Measuring the Context of Healing – Implementing Context Factors Assessment in Clinical Settings Patient-Centered Outcomes Research Institute (PCORI ME-1402-10114)

- **Chronic Pain**
  - A leading cause of disability worldwide
  - Effective treatment remains elusive

- *Can measuring and discussing context factors such as <u>expectations and attitudes</u> enhance patients' and clinicians' experience of care?*
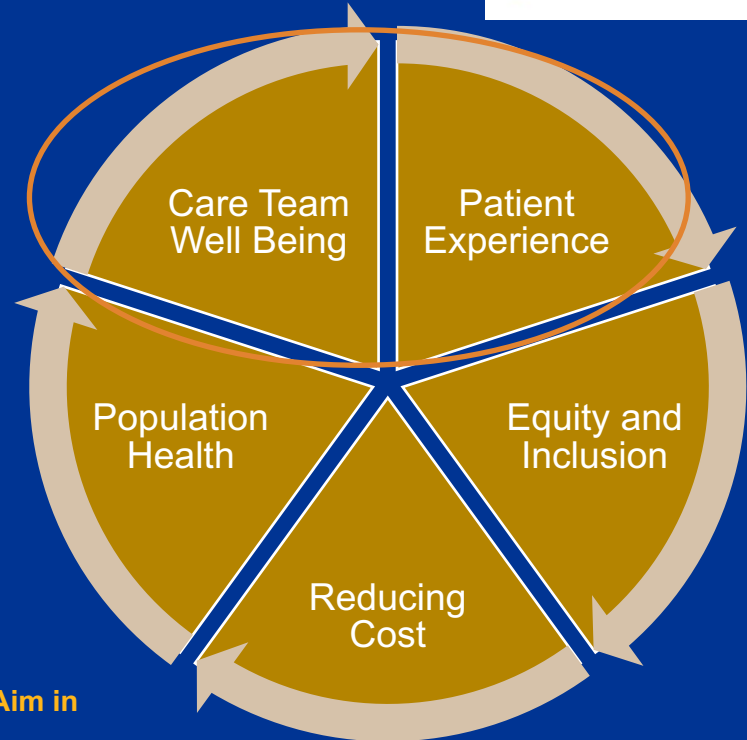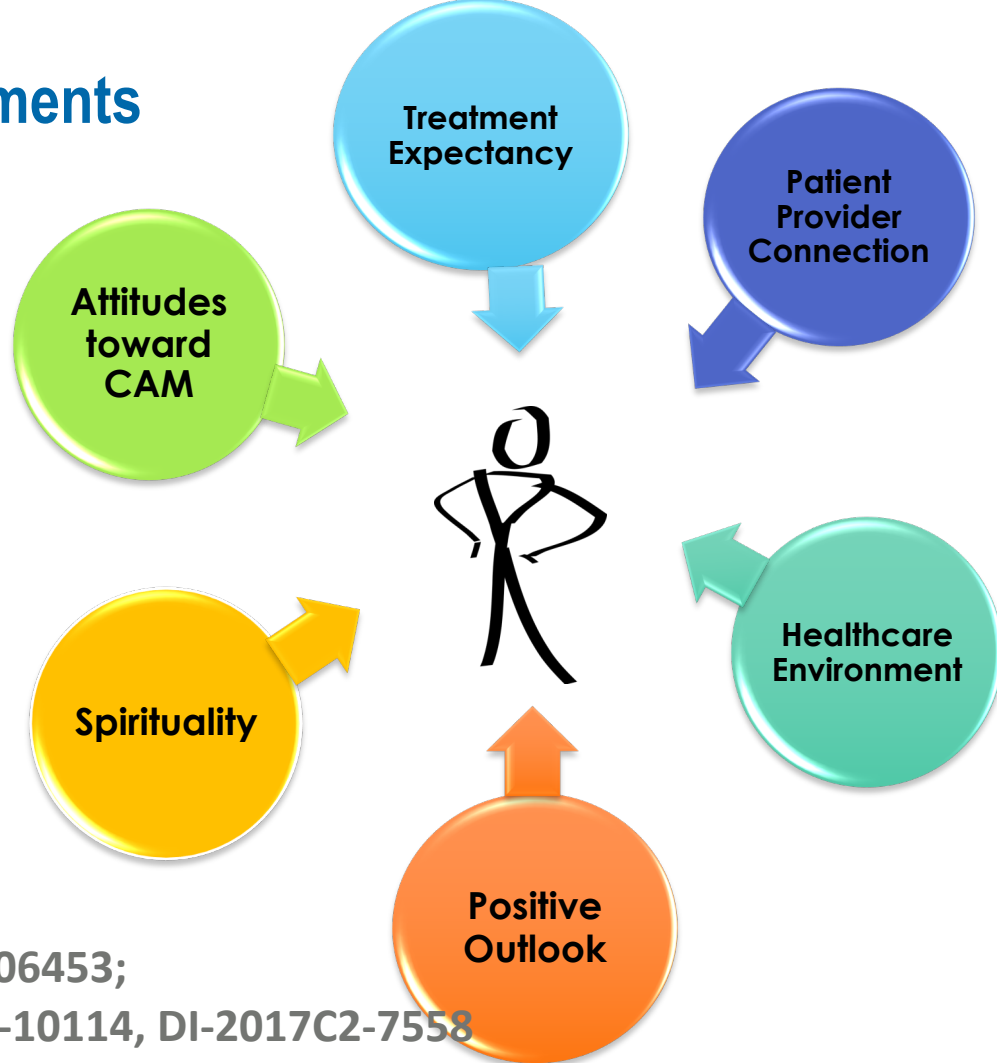
Quintuple Aim in Healthcare

Context Factors Assessments

- Healing Encounters and Attitudes Lists (HEAL)
  - PROMIS methodology
  - 6 Context Factors
  - Short forms

Goals:
- Add HEAL measures to patient surveys
- Encourage discussions during treatment encounters

Healing Encounters and Attitudes List (HEAL) survey items (Greco, et al, 2016, 2017)

Treatment Expectancy
I am confident in this treatment.
This treatment will be successful.
I feel good about this treatment.
I expect good outcomes from this treatment.
This treatment is right for me.
I value this treatment.

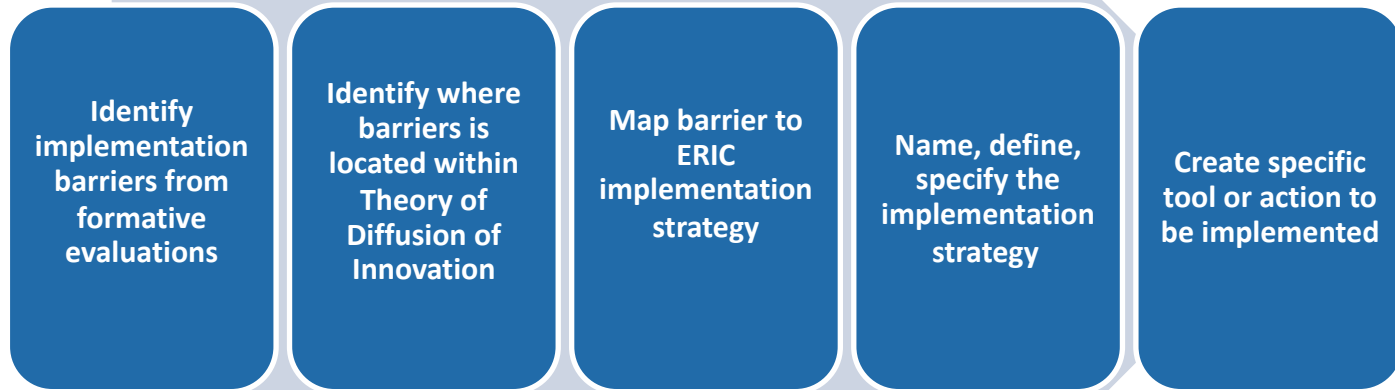# Implementation Frameworks

Theory of Diffusion of Innovations

Key features of the innovation for adoption include:

- a perceived **relative advantage,**
- **compatible** with perceived needs, values and norms,
- low complexity,
- amenable to being **tested out** on a limited basis,
- benefits are **observable**, and
- potential for **reinvention or adaption** to local circumstances

Evaluation plan: RE-AIM

- **Reach, Evaluation, Adoption, Implementation, Maintenance**
- **Allowed us to study and document how we implemented CHOIR initially in 2016, the changes we made and how we adapted CHOIR going forward**

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Implementation Strategy Mapping Process

| Identify implementation barriers from formative evaluations | Identify where barriers is located within Theory of Diffusion of Innovation | Map barrier to ERIC implementation strategy | Name, define, specify the implementation strategy | Create specific tool or action to be implemented |

"Methods or techniques used to enhance the adoption, implementation and sustainability of a clinical program or practice" (Powell et al, 2015)

Lots of Strategies!

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Why are my treatment expectations important?

Jack was starting treatment for his chronic pain.

While completing his pre-appointment questionnaires, he noticed he was rating his confidence in the treatment as low (treatment expectancy).

He told his pain management specialist that he did not have high hopes for this treatment.

Jack used the **treatment expectancy questions** to talk to his doctor and gain more confidence in his treatment.

Jack and the pain management specialist discussed the treatment plan, why the treatment could help his condition, and how they could work together.

Frequently Asked Questions (FAQs)

New questions about your current treatment expectations are included in your pre-appointment questionnaires.

Q: These questions seem repetitive. Do I really need to answer these?
A: Patients and doctors at this health site have said they are interested in talking about your treatment expectations. These questions can help you start that conversation with your doctor. It can also help make your appointments more give-and-take.

Q: Will my doctor talk about these with me?
A: Yes. Doctors in this health site have said they are interested in talking about your treatment expectations, mostly when they are very low or high.

Q: Will these discussions affect my treatment?
A: Maybe. Starting the conversation will help address any issues you may have with the treatment and allow your doctor to talk about typical results of the treatment.

Develop and Distribute Educational Material (Patients)

You Tube: "Healing Encounters and Attitude List"
https://www.youtube.com/watch?v=iQfN2N59Kq0

Cost of Implementation—PCORI Funded

- Documentation of all costs and effort of HEAL/CHOIR implementation in the UPMC setting in order to provide information that may inform further uptake and reach of the intervention at new sites.

- ***Creation of informational materials, and educational modules for providers, staff, and patients which can easily be tailored to work in other settings. We did the work so you don't have to.***

- Cost for implementing the HEAL/CHOIR project at UPMC, using a cost-shared model, was **$20,000**. The majority of those costs are computer programming. We estimate that in settings where cost-sharing is not an option, implementation will still cost less than $30,000.

- Will meld with Stanford efforts on these issues

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Phase/Stage	Activity	Persons	Time per person	site-based costs-clinic personnel	CIPC time estimate	site-based cost: CIPC consultation	Assumptions: All training time for site staff is regarded as 'regular practice and education' so cost is 100% shared. Site Lead is an attending physician whose cost is 100% shared. Project Coordinator is a clinic manager/nurse manager whose cost is 100% shared. Other hourly rates for site staff are based on ours: Database Coordinator $45/hr; IT $75/hr
Pre-implementation							
Stage 1: Engagement (Learn and Decide)	Engagement with leadership on adding HEAL questions to CHOIR; clinic admin, faculty, IT	Site Lead	5% effort for Pre-implementation Phase and Implementation Phase				Assumptions: CIPC will provide consultation for specific aspects of implementation and will also be available for consultation as needed throughout implementation and beyond through maintenance. For COI, hourly rates for CIPC are based on $50/hr.
Stage 1: Engagement (Learn and Decide)	Assemble project team	Site Lead, Project Coordinator, Database Coordinator	For Pre-imp and Imp Phases: Site Lead 5% effort; Project Coord 10% effort; Database Coord 10% effort				
Stage 1: Engagement (Learn and Decide)	Regular project team meetings through preimplementation and implementation phases, including a Kickoff meeting with CIPC staff, includes development of timelines and processes for clinic engagement activities	Site Lead, Database Coordinator, Project Coordinator, CIPC staff	3 months of 1 Hour weekly meetings through implementation project: 12 meetings (Database Coord:$540)	$ 540.00	6 hours	$ 300.00	Assumption: 3 months of weekly meetings, with CIPC attendance 2 x month (6 meetings); phone calls and emails between site and CIPC staff
Stage 1: Engagement (Learn and Decide)	Clinic staff engage with CIPC staff	Site Lead, Database Coordinator, Project Coordinator, CIPC staff	Phone calls and emails between CIPC and site			$ 100.00	CIPC Consultation as needed (~2 hours), estimated 2 hours for CIPC

Staff Hired and Trained (Support)	Develop materials for clinic Lunch and Learns		Andrea (Angie's time included, above)	3 hr prep Andrea for first HEAL kick off and includes CHOIR;		
Staff Hired and Trained (Support)	Schedule lunch and learns with each clinic		Andrea and Shannon	2 hr for clinic manager		
Staff Hired and Trained (Support)	Arrange catering for each lunch and learn		Nate (clinic manager would sched)	2 L and L's per clinic - 14 catering orders at 20 min each = 5 hr (est)		
Staff Hired and Trained (Support)	1:1 coaching is needed on how to use HEAL but became clear that people needed scripts for what to say to patients		Andrea (would spend 1-2 hr per clinic -- doing ipad updates and also brief check ins)	Andrea's time for this is already in the table	10 min per clinic person trained (include 55 persons: clin manager, admin, nurse, Mas, LPNs, front desk	$ 219.00
Staff Hired and Trained (Support)	Trainings: lunch and learns, email blasts, FAQs lines 77 on		Andrea / Angie / research staff to create FAQs/ stakeholder editing as needed (Check- did this include the emails to patients with some expl of CHOIR/HEAL and asking them to completer survey?)	Angie, 30 hours @ $100/hr for L&L prep, presentation, feedback	1 hr per each attendee per L&L-- calculated for all positions-- one hour	$ 3,589.00
Staff Hired and Trained (Support)	FAQ sheet development and editing	April 2019, May 2019	MR and Nicole Kelly	4 hours total, per person		

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Implementation Playbook

- Step-by-step guide to implementing HEAL/CHOIR in a clinical setting through all stages of implementation.

- Guidance in estimating implementation and sustainment costs at any new future site.

- **Benefits of using HEAL/CHOIR in the clinic as well as considerations, beyond cost, required to implement, for example: institutional buy-in and availability of staff or new hires to undertake certain aspects of implementation and sustainment of the project.**

- The playbook will be available through CIPC and PCORI.

6. Training materials for HEAL site champions to train other staff

Our UPMC team has used a variety of strategies to education our clinic staff on the importance of using both CHOIR and HEAL in their clinics. Successful strategies have included:

Conducting educational meetings with clinical providers and staff.

- Half-day department retreat, to discuss the importance of CHOIR and HEAL, and to provide feedback on how the systems would be adapted based on feedback we learned from clinicians, staff and patients during the formative evaluations (see below)
- Journal club with residents and fellows, to consider other effective forms of pain management, such as acupuncture or psychotherapy, as alternatives to prescribing pain medication

Conduct ongoing trainings with clinical staff during the roll-out of the HEAL questionnaires in CHOIR

- "Lunch and Learn" sessions at each clinic, conducted by coach trained in motivational interviewing
- Site champion created six YouTube videos, explaining the evidence behind each HEAL survey, and why it's important to incorporate discussion of these HEAL items in conversations about pain management with patients. Our YouTube channel information is below. We encourage each new implementation site to create its own videos, as it is critical that the messenger in these videos be credible to those who are involved in the HEAL/CHOIR implementation efforts.
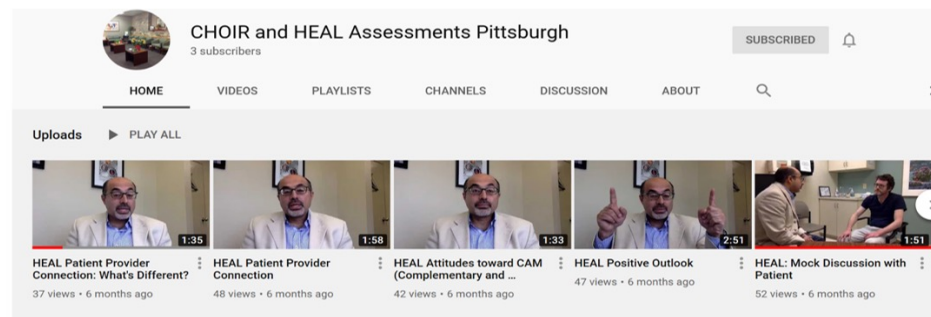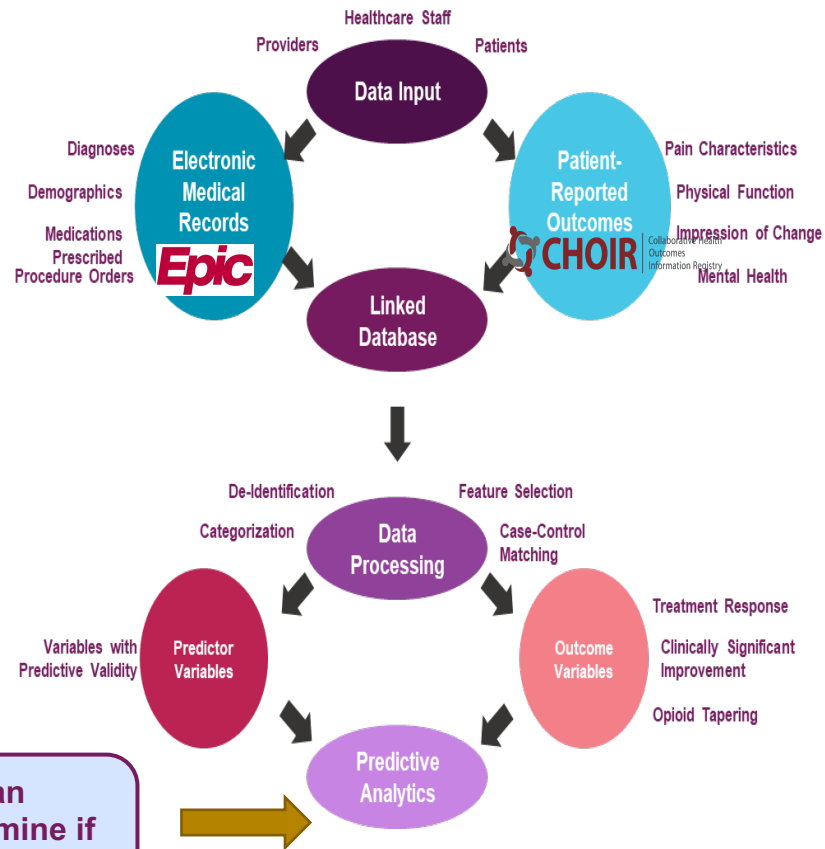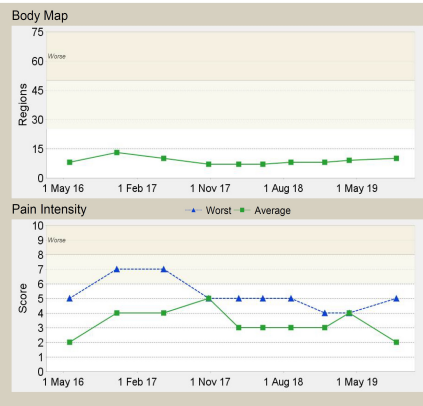
Unique Underlying Technology: Patient-Outcomes Repository for Treatment—(PORT)=CHOIR + EPIC
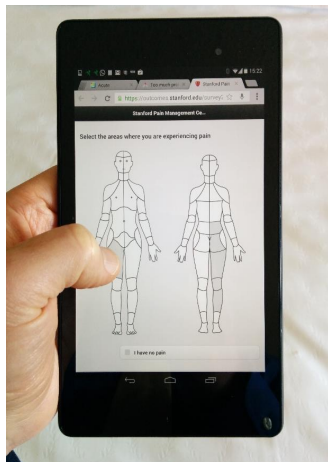
- **Data from comprehensive pain treatment centers**
- **>150k surveys in >51k patients!**
- **Uses the gold standard of pain outcomes measurement**
- **PORT has 125 variables linked to each visit**

Body Map

Pain Intensity
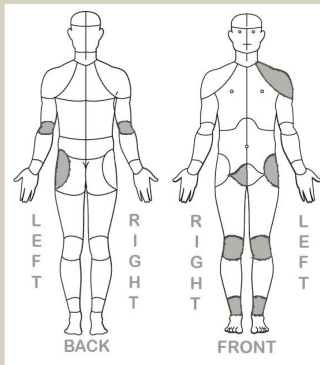
10 areas selected on the most recent body map

Data Input
- Healthcare Staff
- Providers
- Patients

Electronic Medical Records (Epic)
- Diagnoses
- Demographics
- Medications Prescribed
- Procedure Orders

Patient-Reported Outcomes (CHOIR)
- Pain Characteristics
- Physical Function
- Impression of Change
- Mental Health

Linked Database

Data Processing
- De-Identification
- Categorization
- Feature Selection
- Case-Control Matching

Predictor Variables
- Variables with Predictive Validity

Outcome Variables
- Treatment Response
- Clinically Significant Improvement
- Opioid Tapering

Predictive Analytics

We can determine if treatments are effective

Dressler, A.M., A.G. Gillman and A.D. Wasan, *A narrative review of data collection and analysis guidelines for comparative effectiveness research in chronic pain using patient reported outcomes and electronic health records.* J Pain Res, 2019. 12: p. 491-500.

Patient Outcomes at UPMC Pain Medicine

Treatments Prescribed

- **34% had some type of multimodal treatment that combined modalities**

- **62% prescribed any type of medication**

- **24% Anticonvulsants**

- **20% NSAIDS**

- **10% Muscle Relaxants**

- **9% Antidepressants**

- **9% Weak Opioids**

- **18% Strong Opioids**

- **24% had some type of injection**

- **14% referred to our pain psychologist**

- **19% referred to rehabilitation with PT/OT**

- **3 and 6 month outcomes were the same in the analyzed cohort**

Outcomes at 3 month follow up for new treatments prescribed or injections performed (N=6,669) *, **

Percent of Patients with Clinically Significant Response at 3-Month Follow-up

Measure	Percent
Pain or Function or Impression of Change	46%
Impression of Change "Very Much Improved"	21%
Pain Intensity ≥ 30% Improvement	21%
Physical Function ≥ 5 T-Score Improvement	17%
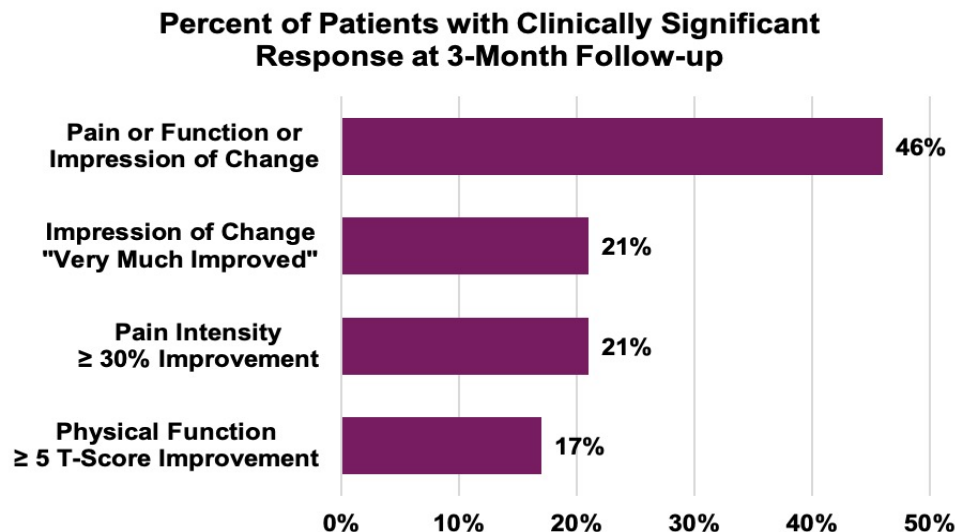
*Combined responders includes a positive response to pain, function, OR impression of change ratings benchmarks

**Standardized treatment benchmarks used in our field

- **Nociceptive Pain**: Pain perception transmitted from 'intact' nervous systems pathways.
  - Fracture pain, routine postoperative pain
- **Neuropathic Pain**: Pain as a consequence of a disease or lesion to the nervous system
  - Diabetic peripheral neuropathy
- **Nociplastic Pain**: Pain that arises from altered nociceptive function
  - Fibromyalgia
  - Neuropathic process amplifying a nociceptive process (burning or expanded joint pain of OA)

PAIN®

Recently introduced definition of "nociplastic pain" by the International Association for the Study of Pain needs better formulation

Nociplastic pain: Pain that (1) arises from altered nociception despite no (2) clear evidence of actual or threatened tissue damage causing the activation of peripheral nociceptors or (3) evidence for disease or lesion of the somatosensory system causing the pain (IASP Taxonomy 2017).

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PLOS ONE

RESEARCH ARTICLE

Hierarchical clustering by patient-reported pain distribution alone identifies distinct chronic pain subgroups differing by pain intensity, quality, and clinical outcomes

Benedict J. Alter[1]◉*, Nathan P. Anderson[1]◉, Andrea G. Gillman[1], Qing Yin[2], Jong-Hyeon Jeong[2], Ajay D. Wasan[1,3]

1 Department of Anesthesiology and Perioperative Medicine, University of Pittsburgh, Pittsburgh, Pennsylvania, United States of America, 2 Department of Biostatistics, University of Pittsburgh, Pittsburgh, Pennsylvania, United States of America, 3 Department of Psychiatry, University of Pittsburgh, Pittsburgh, Pennsylvania, United States of America

◉ These authors contributed equally to this work.
* alterbj@upmc.edu

Check for updates

- Studied digital pain body map at the initial evaluation or the 1st follow up CHOIR survey completed
- N=21, 658

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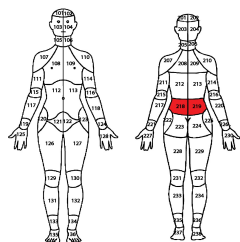
A-Axial Low Back Pain
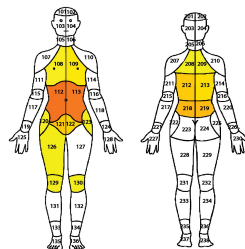
B-Abdominal Pain
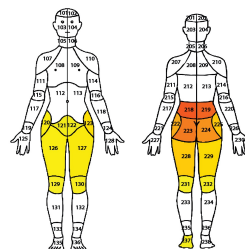
C-Lower Back Pain Radiating to the Thigh
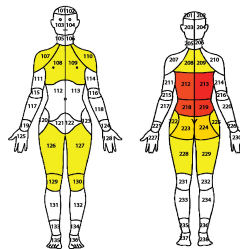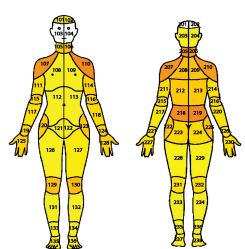
D-Upper and Lower Back Pain
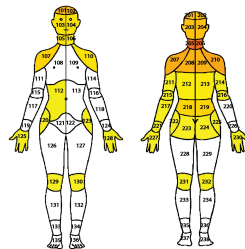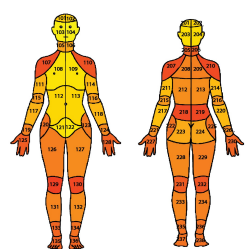
E-Neck and Shoulder Pain
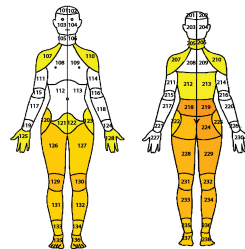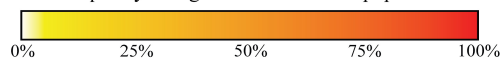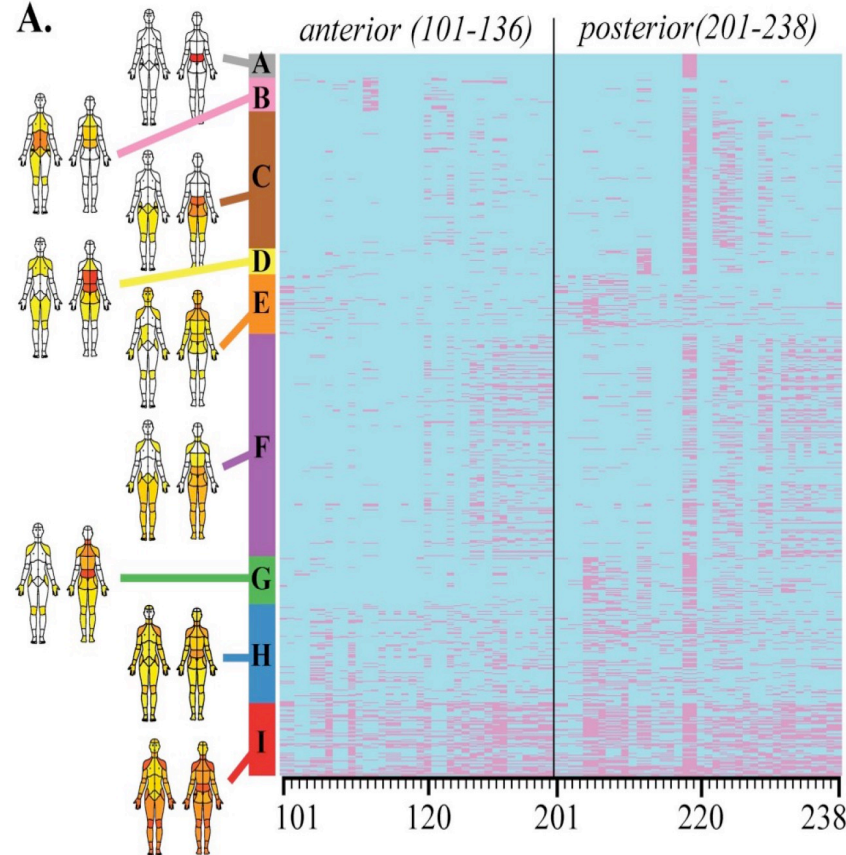
F-Lower Back Pain Radiating Below the Knee
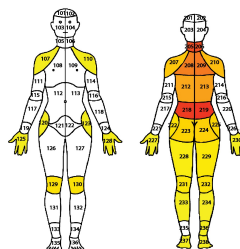
G-Neck, Shoulder, and Low Back Pain

H-Widespread Pain - Light

I-Widespread Pain - Heavy

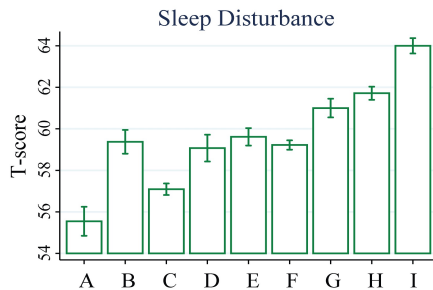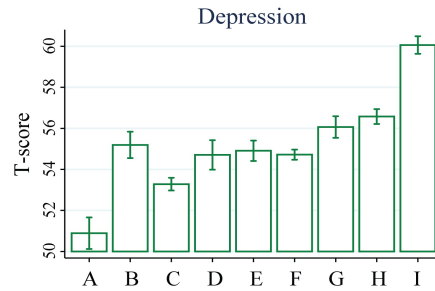Frequency of region selection in subpopulation
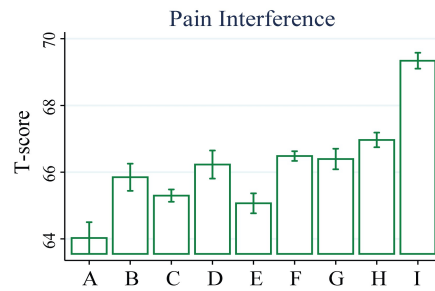
0%   25%   50%   75%   100%

A.

anterior (101-136)   posterior(201-238)

Body Map Region

101   120   201   220   238

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Conclusions

Bar chart — Responder rate (%):

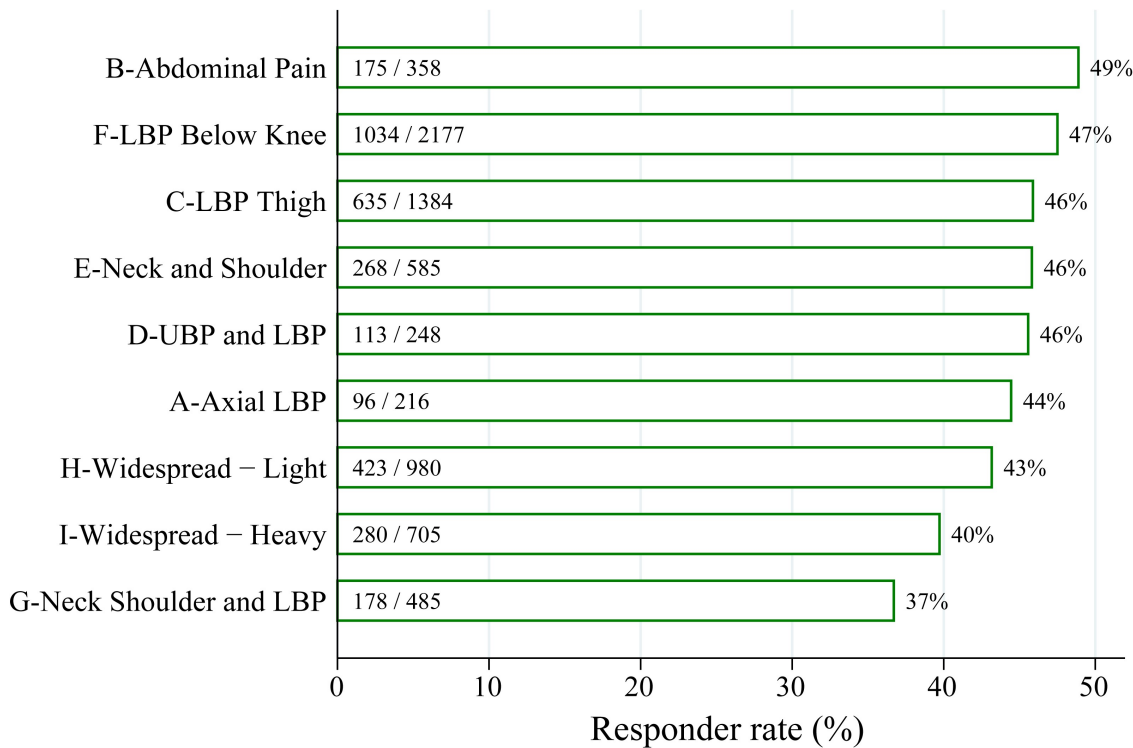| Category	Value	Rate
B-Abdominal Pain	175 / 358	49%
F-LBP Below Knee	1034 / 2177	47%
C-LBP Thigh	635 / 1384	46%
E-Neck and Shoulder	268 / 585	46%
D-UBP and LBP	113 / 248	46%
A-Axial LBP	96 / 216	44%
H-Widespread − Light	423 / 980	43%
I-Widespread − Heavy	280 / 705	40%
G-Neck Shoulder and LBP	178 / 485	37%
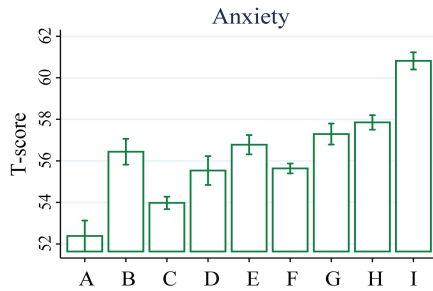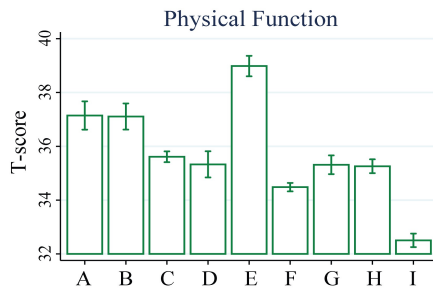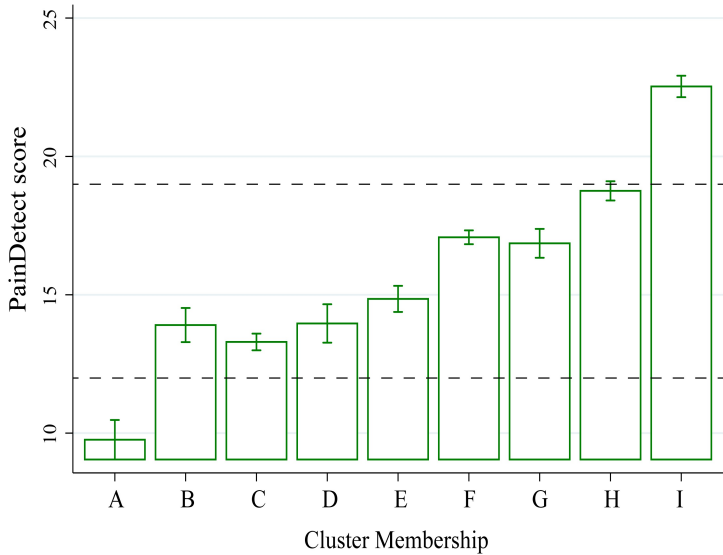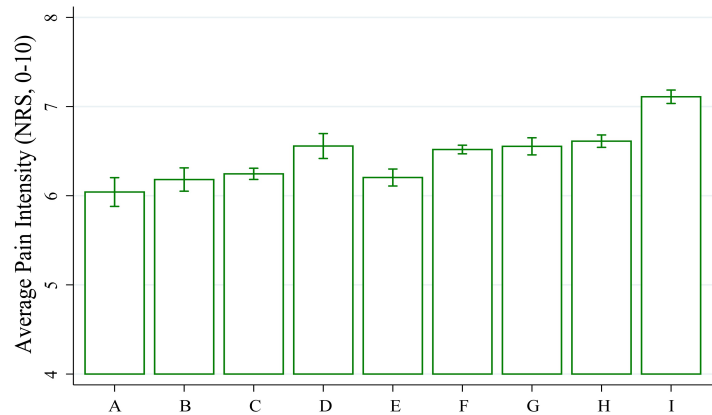
- Knowing the pain pattern helps with the diagnosis of nociplastic pain
- You could argue that it *MAKES* the DX of nociplastic pain
- Pain pattern is also predictive of treatment responses to multimodal care

Thank You!
I have been blessed with terrific colleagues!

- University of Pittsburgh
  - Ben Alter
  - Jim Ibinson
  - Trent Emerick
- Brigham and Women's Hospital/
Harvard Medical School
  - Robert Edwards
  - Srdj Nedeljkovic
  - Robert Jamison
  - Jeff Katz
- MGH Martinos Center/HMS
  - Marco Loggia
  - Vitaly Napadow
  - Randy Gollub
  - Jian Kong

THE WORST DOESN'T HAPPEN OFTEN

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Thank You!