ADVANCING RURAL BACK PAIN OUTCOMES USING REHABILITATION TELEHEALTH (**ARBOR TELEHEALTH**): *EARLY PROGRESS AND LESSONS LEARNED*

KEVIN MCLAUGHLIN, DPT
ASSISTANT PROFESSOR
JOHNS HOPKINS UNIVERSITY SCHOOL OF MEDICINE
PHYSICAL MEDICINE AND REHABILITATION

RICHARD SKOLASKY, SC.D.
PROFESSOR, VICE CHAIR OF RESEARCH
JOHNS HOPKINS UNIVERSITY SCHOOL OF MEDICINE, ORTHOPAEDIC SURGERY

Kevin McLaughlin, DPT *(Principal Investigator)*

Dr. Kevin McLaughlin is a physical therapist at Johns Hopkins with over 10 years of experience treating patients with low back pain. His research is primarily focused on identifying disparities in access to physical therapy in underserved communities, as well as methods for improving access to care, such as telehealth.

Richard Skolasky, ScD *(Principal Investigator)*

Dr. Richard Skolasky is a health services researcher at Johns Hopkins. For more than two decades, his research has focused on supporting patient engagement in healthcare through the identification of risk factors for poor treatment outcomes and development of interventions aimed at supporting patients on their journey to recovery following musculoskeletal diseases and injuries.

Elizabeth Colantuoni, PhD

Dr. Elizabeth Colantuoni is a Research Professor in the Department of Biostatistics at the Johns Hopkins Bloomberg School of Public Health. Her previous work has focused on improving outcomes for critically ill patients. She will serve as lead statistician for this study, overseeing all analyses of collected data.

Stephen Wegener, PhD

Dr. Stephen Wegener is a Professor of Physical Medicine and Rehabilitation in the Johns Hopkins School of Medicine and Professor of Health Policy and Management in the Bloomberg School of Public Health Johns Hopkins University. His clinical activity is focused on providing psychological services to persons with traumatic injuries and chronic illness. His research focuses on theories and projects that improve function and reduce disability following injury or illness.

Kisha Ali, PhD, MS

Dr. Kisha Ali is a health services research and policy scientist at the MedStar Health Institute for Quality and Safety, with expertise in implementation science, quantitative and qualitative evaluation, content development, and training healthcare facilitates with heterogeneity in resources and setting. Her research focus is on improving patient care in U.S. rural and underserved hospitals and comminutes. Dr. Ali is also an Associate Faculty member at the Johns Hopkins University Bloomberg School of Public Health.

BACKGROUND

- Low back pain (LBP) is most common cause of disability globally and in the US[1]
- Largest driver of US healthcare spending growth[2]
- Top non-cancer reason for opioid prescriptions[3]

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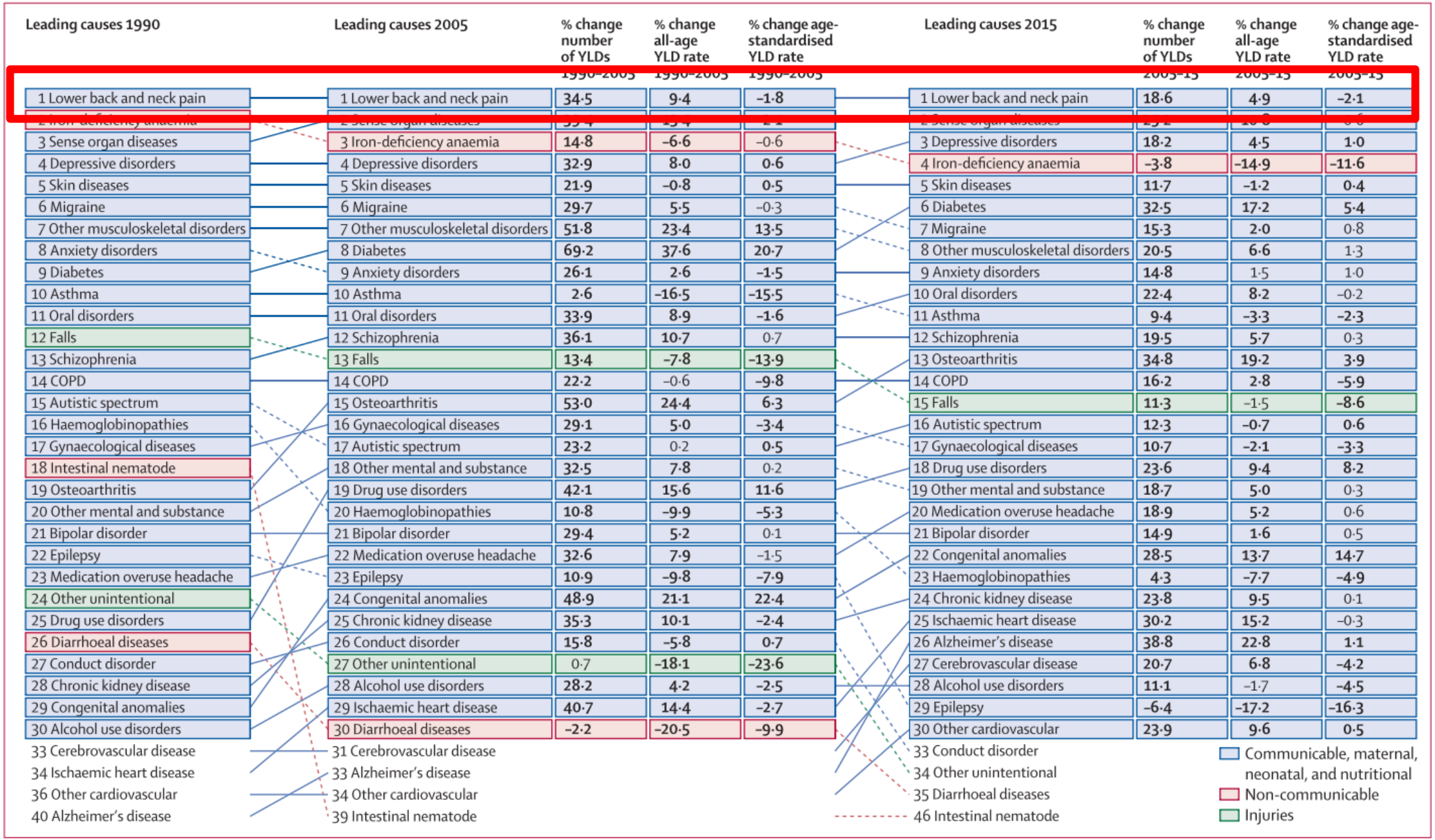
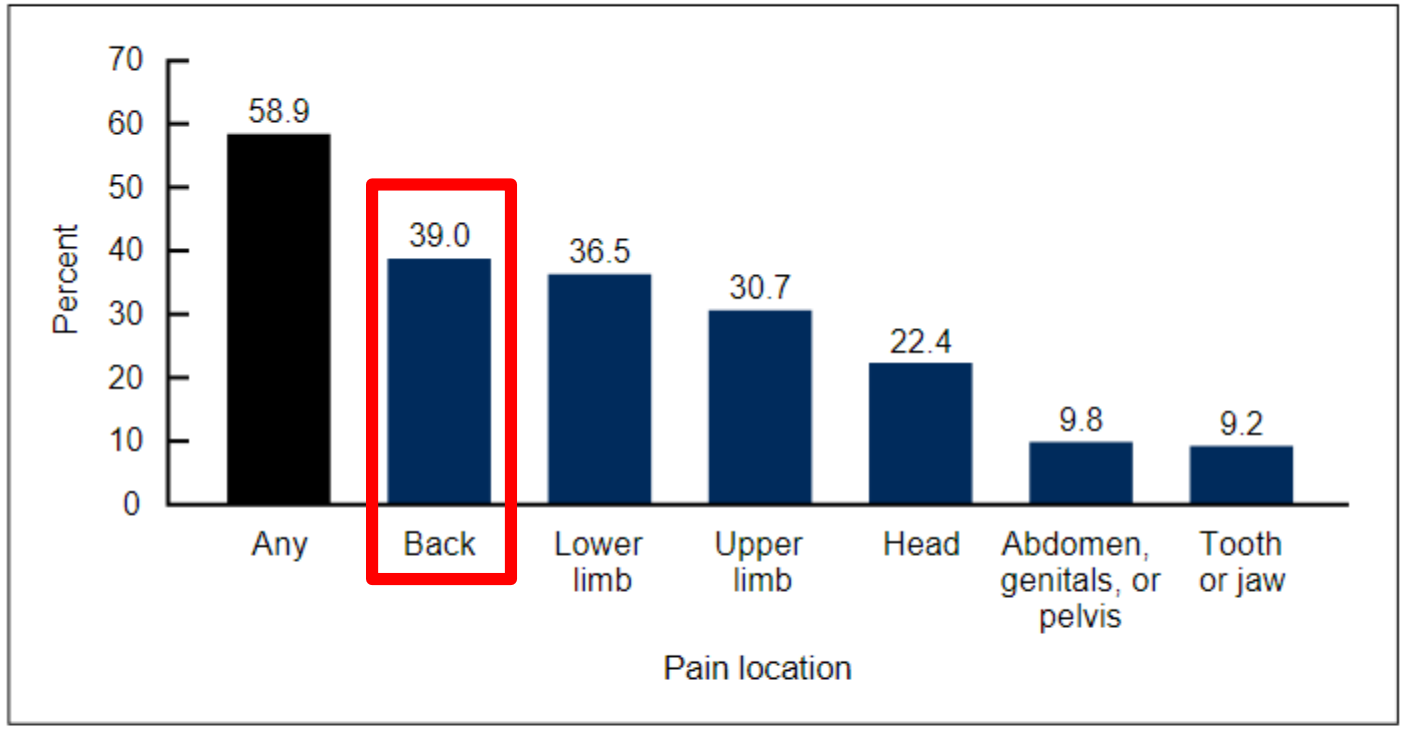


***Figure 2*: Leading 30 Level 3 causes of global YLDs for both sexes combined, 1990, 2005, and 2015, with percentage change in number of YLDs, and all-age and age-standardised rates**
Causes are connected by lines between time periods. For the time period of 1990 to 2005 and for 2005 to 2015, three measures of change are shown: percent change in the number of YLDs, percent change in the all-age YLD rate, and percent change in the age-standardised YLD rate. YLD=years lived with disability. COPD=chronic obstructive pulmonary disease.

Vos T, Allen C, Arora M, et al. Global, regional, and national incidence, prevalence, and years lived with disability for 310 diseases and injuries, 1990–2015: a systematic analysis for the Global Burden of Disease Study 2015. *The Lancet.* 2016;388(10053):1545-1602. doi:10.1016/s0140-6736(16)31678-6

Figure 1. Percentage of adults aged 18 and over with any pain and pain by body region in the past 3 months: United States, 2019



NOTES: Any pain is based on responses of "some days," "most days," or "every day" to a question asking how often the respondent had pain in the past 3 months. Pain at specific locations is based on responses of "a little," "a lot," or "somewhere between a little and a lot" to a question asking how much pain they had at these locations: 1) back; 2) hips, knees, or feet; 3) hands, arms, or shoulders; 4) headache or migraine; 5) abdomen, genitals, or pelvis; and 6) tooth or jaw. Respondents could indicate pain at more than one location. Estimates are based on household interviews of a sample of the civilian noninstitutionalized population. Access data table for Figure 1 at: https://www.cdc.gov/nchs/data/databriefs/db415-tables-508.pdf#1.
SOURCE: National Center for Health Statistics, National Health Interview Survey, 2019.

Lucas JW, Connor EM, Bose J. *Back, Lower Limb, and Upper Limb Pain Among US Adults, 2019. 2021. NCHS Data Briefs. 07/29/2021. https://stacks.cdc.gov/view/cdc/107894*

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Table 2. Health Care Estimated Spending in 2016 for the 100 Most Expensive Health Conditions of the 154 Health Conditions Analyzed

Health Care Spending Rank (High to Low)	Health Condition	Category Code[b]	Health Care Spending, 2016 $Billion (95% CI)	Estimate, %[a]											
				Aggregated Age Group, y			Type of Payer			Type of Care						Government Administration and Net Cost of Insurance Programs
				<20	20-64	≥65	Public Insurance	Private Insurance	Out-of-Pocket Payments	Ambulatory	Inpatient	Prescribed Pharmaceuticals	Nursing Care Facility	ER	Dental	
1	Low back and neck pain	A	134.5 (122.4-146.9)	1.9	67.9	30.3	33.7	57.2	9.2	58.7	22.4	3.5	1.4	3.9	0	10.0
2	Other musculoskeletal disorders[c]	A	129.8 (116.3-149.7)	3.9	60.7	35.4	36.2	56.4	7.5	64.5	8.6	8.7	5.5	2.5	0	10.2
3	Diabetes	B	111.2 (105.7-115.9)	2.5	57.4	40.1	49.8	44.2	6.0	27.1	8.6	46.3	5.8	2.1	0	10.1
4	Ischemic heart disease	C	89.3 (81.1-95.5)	0.4	42.7	56.9	54.0	42.4	3.5	23.8	49.5	7.5	3.8	5.1	0	10.3
5	Falls	F	87.4 (75-100.1)	5.2	38.4	56.4	46.7	39.7	13.6	27.7	31.1	1.1	21.1	9.7	0	9.2
6	Urinary diseases[d]	B	86.0 (76.3-95.9)	4.1	48.2	47.7	49.2	45.1	5.7	52.0	14.1	7.8	5.1	11.0	0	10.1
7	Skin and subcutaneous diseases[e]	E	85.0 (80.5-90.2)	15.2	55.3	29.5	35.0	58.0	7.0	54.1	12.3	13.6	3.8	5.9	0	10.2
8	Osteoarthritis	A	80.0 (72.2-86.1)	0	50.1	49.9	45.4	49.5	5.1	26.7	49.9	6.1	6.6	0.4	0	10.3
9	Dementias	H	79.2 (67.6-90.8)	0	3.1	96.9	56.1	19.2	24.6	2.2	9.3	2.4	77.1	1.2	0	7.8
10	Hypertension	M	79.0 (72.6-86.8)	0.7	48.1	51.2	56.9	36.5	6.6	60.1	5.2	12.1	7.1	5.6	0	9.9

Dieleman JL, Cao J, Chapin A, et al. US Health Care Spending by Payer and Health Condition, 1996-2016. *JAMA*. 2020;323(9):863–884. doi:10.1001/jama.2020.0734

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PHYSICAL THERAPY FOR LOW BACK PAIN

- First line treatment[5]
  - Exercise
  - Hands-on interventions
  - Modalities
- Cost-effective in reducing disability and pain[6]
- Decreased risk of opioid use, advanced imaging, injections, surgery[7,8]
- Only 7-13% of patients with LBP attend PT[9]
  - Barriers surrounding travel, missed work time, etc.

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Table 2. Rehabilitation Therapists by Metropolitan Status

	1980	1990	2000	Difference 1980-2000 Absolute	Difference 1980-2000 Relative (%)
Physical therapists per 100,000					
Metro counties	20.8	40.5	50.9	30.1	145
Non-metro counties	13.1	24.4	35.5	22.4	171
Occupational therapists per 100,000					
Metro counties	9.0	17.4	24.7	15.7	174
Non-metro counties	3.9	7.3	15.3	11.4	292
Speech-language pathologists per 100,000					
Metro counties	19.5	27.5	35.0	15.5	80
Non-metro counties	14.4	20.5	29.5	15.1	105

Wilson RD, Lewis SA, Murray PK. Trends in the rehabilitation therapist workforce in underserved areas: 1980-2000. *The Journal of rural health : official journal of the American Rural Health Association and the National Rural Health Care Association. 2009 Winter 2009;25(1):26-32. doi:10.1111/j.1748-0361.2009.00195.x*

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TABLE 2. Physical therapy utilization by rurality.

Rurality	Utilized physical therapy *N* (%)		Odds of utilizing physical therapy OR (95% CI)	
	Sample	*Weighted*	*Sample*	*Weighted*
Large central metropolitan	185 (28)	1,291,158 (27)	*Referent*	*Referent*
Large fringe metropolitan	152 (27)	975,588 (23)	0.99 (0.76–1.28)	0.83 (0.61–1.14)
Medium and small metropolitan	251 (24)	1,567,367 (22)	0.86 (0.69–1.1)	0.79 (0.61–1.03)
Nonmetropolitan	115 (18)	747,562 (18)	0.67 (0.51–0.88)	0.66 (0.47–0.92)
Overall	703 (24)	4,581,674 (22)	–	–

McLaughlin KH. The influence of rurality on self-reported physical therapy utilization among patients with severe chronic back pain in the United States. *J Rural Health. Jan 2025;41(1):e12923. doi:10.1111/jrh.12923*

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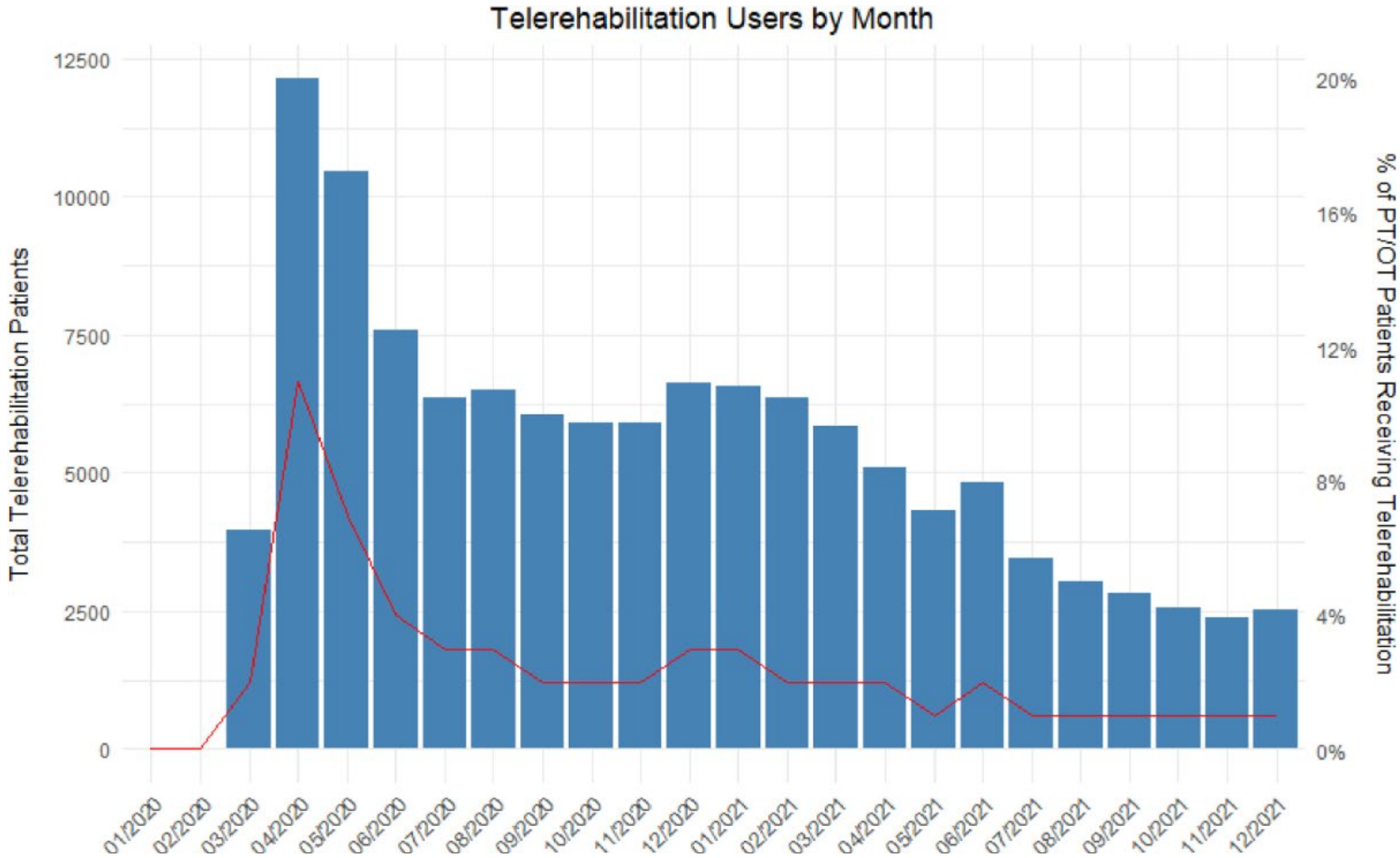
PHYSICAL THERAPY IN RURAL AMERICA

- Up to 40% fewer therapists per capita in rural areas compared to metro areas
  - Longer distance to travel to clinic[10]
- Patients with LBP in rural areas attend PT less frequently than those in metropolitan areas[11]
- Higher rates of opioid use and high-impact chronic pain in rural US[12]



McLaughlin KH, Levy JF, Fritz JM, Skolasky RL. Trends in Telerehabilitation Utilization in the United States 2020-2021. *Archives of Physical Medicine and Rehabilitation. 2024;*

OPPORTUNITY AND KNOWLEDGE GAP

- PT provided by televisits (AKA: *telerehabilitation*) for first time during pandemic
  - Reimbursed by CMS and most commercial insurances on COVID-19 telehealth waiver
  - Waiver extended through March 2025 (additional action pending)

- *Hypothesis*: Telerehabilitation may improve outcomes among patients with chronic LBP living in rural communities

- Effectiveness of telerehabilitation for chronic LBP is unknown
  - Not all components of PT can be delivered by video visit

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STUDY AIMS

- Aim 1: Examine the effectiveness of risk-informed telerehabilitation in reducing LBP-related disability compared to an educational control
- Aim 2: Compare the prevalence of opioid use among those receiving telerehabilitation and education
- Aim 3: Compared the effectiveness of Aims 1-2 in pre-defined subgroups based on gender, psychosocial risk, and baseline opioid use
- Aim 4: Examine the implementation of risk-informed telerehabilitation in a rural healthcare system(TidalHealth) using the RE-AIM framework

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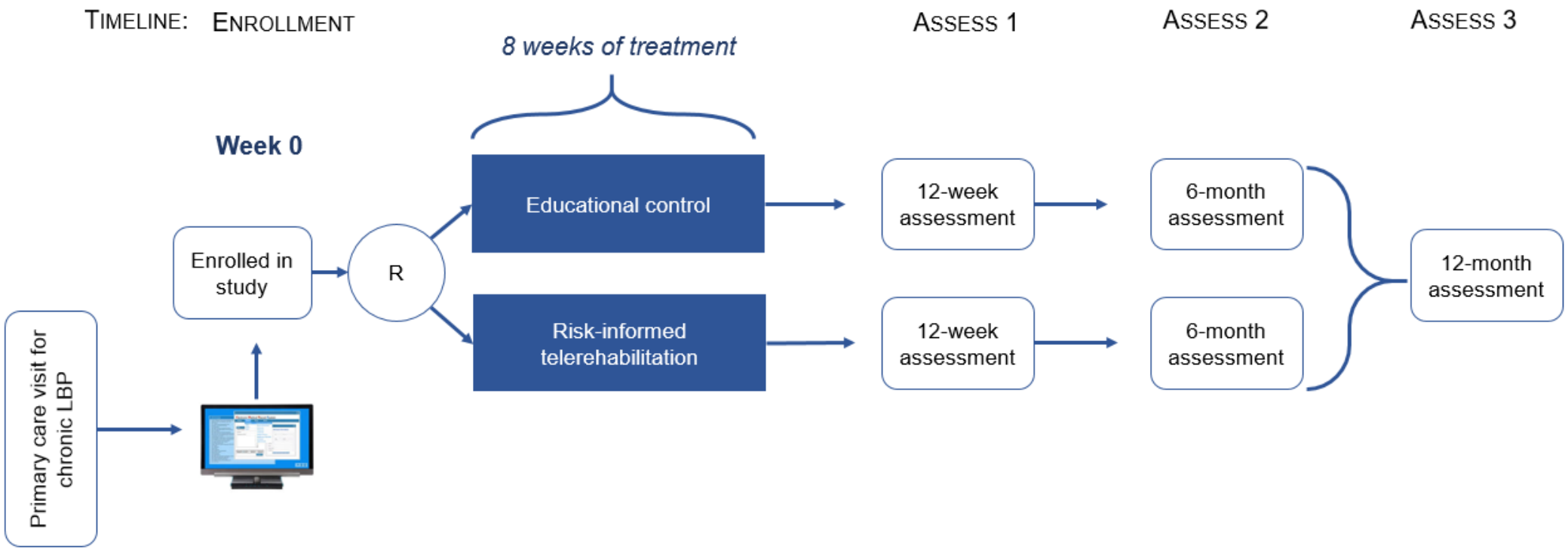
STUDY DESIGN



Target sample size = 434 patients enrolled over 3 years

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PARTICIPANTS

Inclusion Criteria

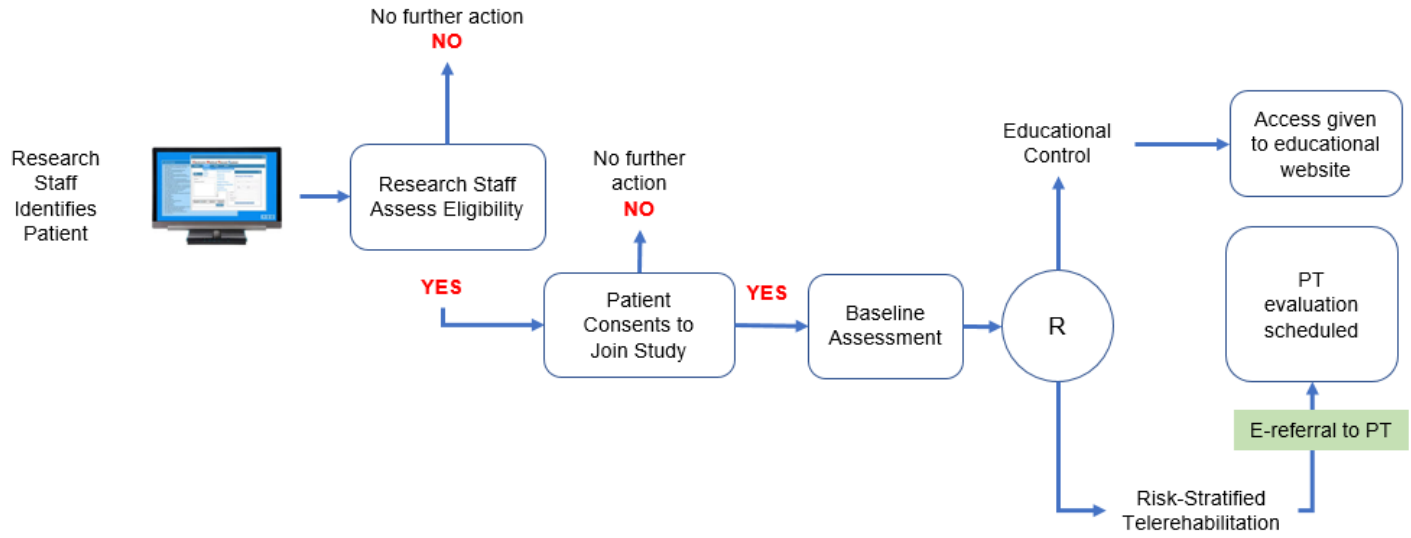
- Adults (>=18)
- NIH definition of chronic LBP
  - Duration of at least 3 months
  - Affecting patient at least half the days over the past 6 months
- At least moderate levels of pain and disability
  - Baseline ODI score >=24%
  - NPRS >=4/10

Exclusion Criteria

- Lumbar spine surgery in last 6 months
- Potential non-MSK cause of LBP
- Red flag pathologies that include LBP
- Neurologic disorders affecting movement
- Psychotic disorders
- Pregnancy

RECRUITMENT STRATEGY

- Recurring bulk query of EHR
  - PCP visit in last 90 days
  - New or existing diagnosis associated with LBP
- Welcome letter sent in mail
  - Option to opt-out of contact from study team
- Telephone call from research coordinator team for additional screening and enrollment



RANDOMIZATION

- In real-time during enrollment call (REDCap)
- Stratified permuted block randomization (1:1 ratio)
  - Age (18-44, >=45)
  - Psychosocial risk score (low-medium, high)

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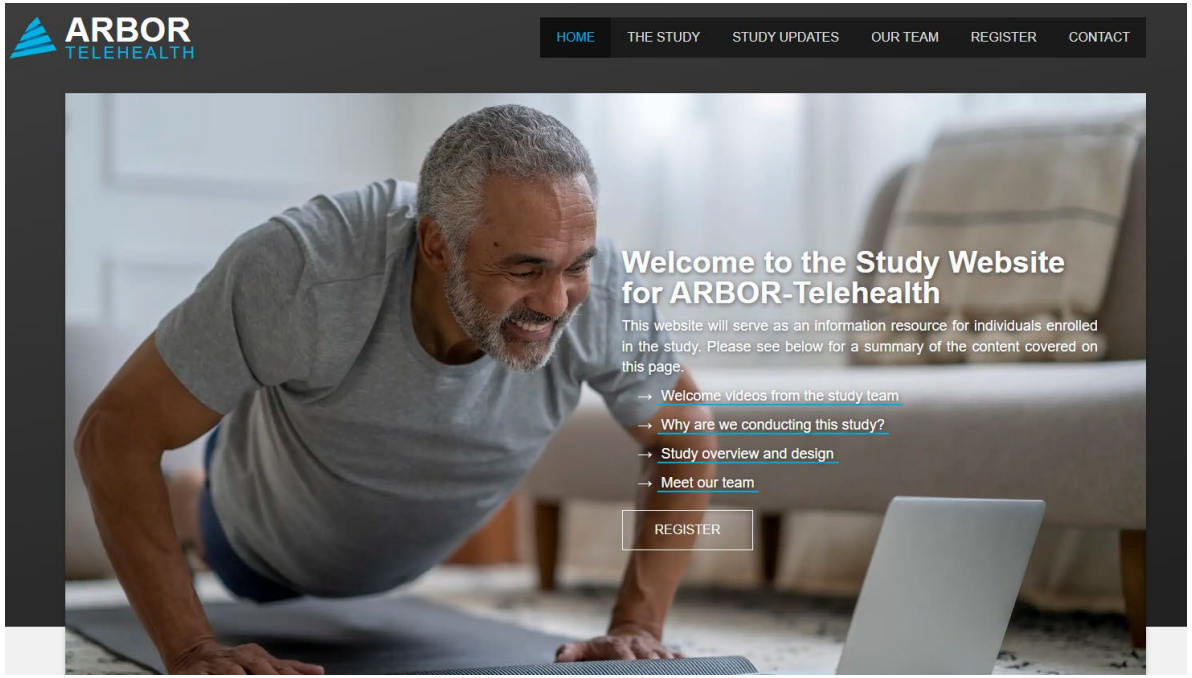
EDUCATIONAL CONTROL

- Best practice advice delivered through study website
  - What is back pain?
  - Self-management approaches
  - Lifestyle modifications
- Unique login allows study team to track utilization



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TELEREHABILITATION

- 8 video visits with a physical therapy (weekly)
- Incorporates psychosocial risk score to guide content
  - High risk
  - Low to medium risk
- Basic equipment provided
  - Bands, lacrosse ball, yoga mat, phone holder

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PRIMARY OUTCOMES

- Between-group differences in 12-week changes in low back pain related disability
  - Oswestry Disability Index
- Between group differences in prevalence of opioid use at 12 weeks
  - Self report
  - Medication orders extracted from EHR

KEY SECONDARY OUTCOMES

- Physical function (PROMIS-29)
- Health related quality of life (PROMIS-29)
- LBP-related healthcare utilization
  - Physician office visits, imaging, ED visits, injections, surgery

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IMPLEMENTATION MEASURES

- Acceptability
  - Eligible patients that agree to enroll
- Adoption
  - Survey of perceived advantages and disadvantages (PTs and patients)
- Feasibility
  - Treatment initiation and retention
- Fidelity
  - Number of key components delivered during telerehabilitation visits

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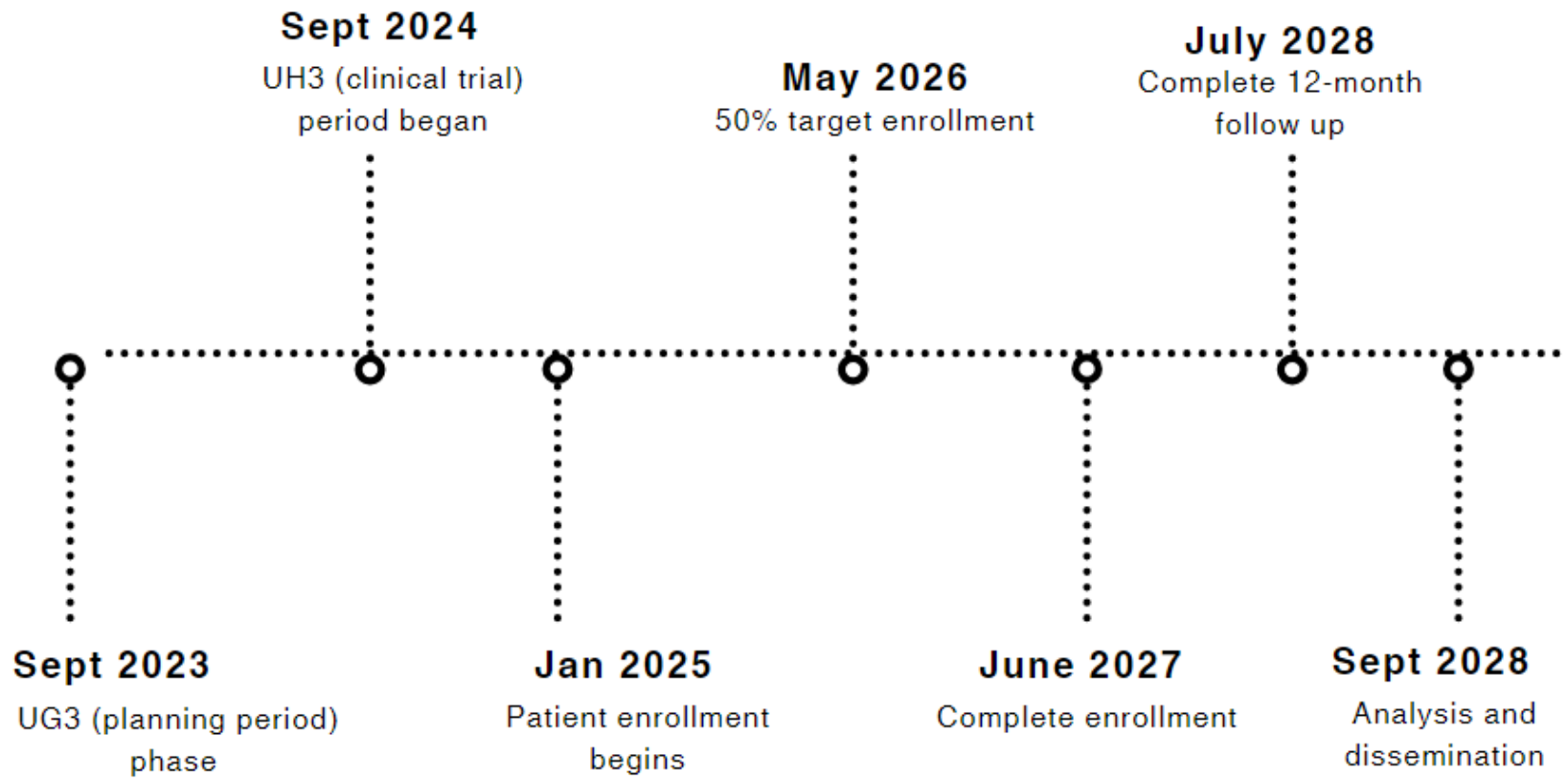
TIMELINE



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COMMUNITY ENGAGEMENT

- Patient Advisory Panel
  - 6 persons living with chronic low back pain

- Stakeholder Advisory Committee
  - Physical therapists
  - Primary care providers
  - Rural and public health advocates

KEY PLANNING MILESTONES ACHIEVED

- IRB Approval for clinical trial
- Physical therapist training completed
- Study website with educational control built
- REDCap projects built and tested
- Recruitment strategy finalized
- EHR data extraction plan finalized
- EHR-based treatment fidelity assessments built

CURRENT AND FUTURE CHALLENGES

- Individual versus group clinical trial

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CURRENT AND FUTURE CHALLENGES

- PT staffing at TidalHealth
  - Pivot to Johns Hopkins PTs
  - Blended model → transition treatment back to TidalHealth

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CURRENT AND FUTURE CHALLENGES

- Subawards and IRB coordination
- UG3/UH3 mechanism

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Thank you!

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