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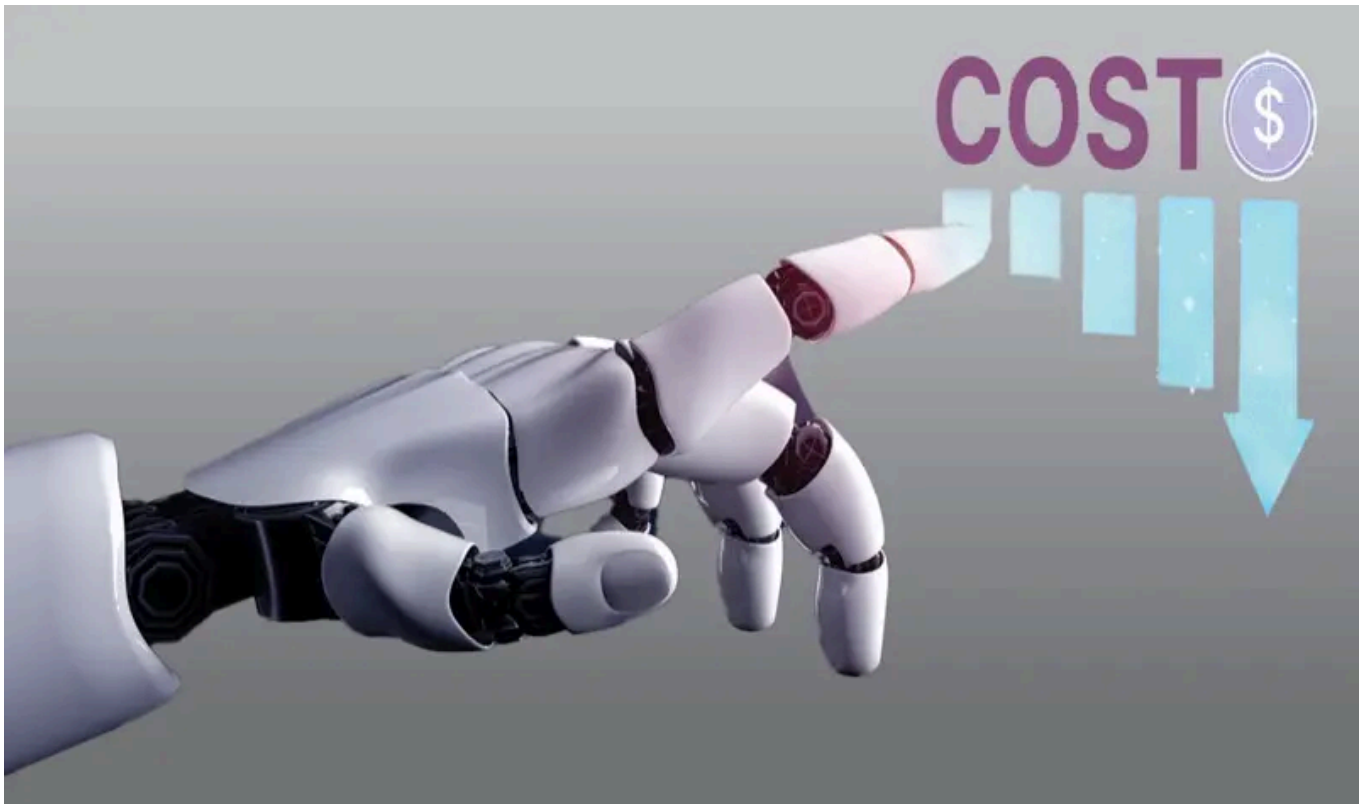
AI Tool Could Reduce Cost Burden of Chronic Pain

An artificial intelligence–powered digital tool to facilitate self-management of chronic pain could reduce treatment costs in addition to previously demonstrated reductions in pain interference, according to a post-hoc analysis (*Pain Med* 2026 May 4.).

Paindrainer is an FDA-registered class 1 medical device for daily use that incorporates components of acceptance and commitment therapy to guide patients with chronic pain in self-management strategies and lifestyle modifications.

The AI-powered tool was tested in a single-arm, open-label multicenter clinical trial (*Pain Med* 2026;24:1100-1110) by Antje Barreveld, MD, a researcher in the Department of Anesthesiology at Tufts University School of Medicine in the Newton-Wellesley Hospital, in Newton, Massachusetts, and colleagues. They sought to determine whether the tool could “provide patients with an individualized coaching to increase their control over their daily activities by identifying pain triggers, improving function, and decreasing pain.”

Thirty-four participants completed the 12-week trial and 41 completed six weeks, with each logging onto the AI tool while maintaining their ongoing treatment and rehabilitation. In each login, participants input factors such as sleep, work, leisure time, and the intensity of and satisfaction with performing activities. The investigators found that after approximately eight log-ins, the AI engine had “learned” enough to provide individualized suggestions on combinations of activities and predict corresponding pain levels.



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Applying the Patient-Reported Outcomes Measurement Information Systems as the primary measure, Barreveld and colleagues reported that participants experienced significant improvements in pain interference, physical function, and pain catastrophizing, and they felt less depressed and anxious.

Barreveld and colleagues noted that other trials with digital tools for managing chronic pain have shown statistically significantly greater effect of active treatment over the control condition but have not determined differences that are clinically significant to the individual participant. They described this study as the first to demonstrate that a personalized AI-powered tool can facilitate a clinically significant improvement for individual subjects with chronic pain.

“We were able to demonstrate a first-of-its kind, patient-centric digital tool to help [individuals with] chronic pain understand what works best for their own pain journey,” stated senior author Neel Mehta, MD, the medical director of the Division of Pain Management in the Department of Anesthesiology at Weill Cornell Medicine, in New York City, in a Paindrainer press release. “Rather than relying on non-specific population data, the tool let patients guide their own path to improved pain relief.”

Reducing Resource Use and Costs

The post-hoc analysis was conducted by Sara Olofsson, PhD, a researcher at The Swedish Institute for Health Economics, in Lund, Sweden, and colleagues to ascertain whether the AI-powered tool could help in reducing the cost burden associated with chronic pain. They cited research estimates of the annual financial costs of pain in the United States., in terms of incremental healthcare costs and productivity losses, at $560 to $635 billion in 2010 (*J Pain* 2012;13:715-724). This, they noted, is higher than the annual costs attributed to heart disease ($398 billion), cancer ($243 billion), or diabetes ($188 billion).

The investigators accounted for both direct costs, such as healthcare use and medications, and the indirect costs of lost productivity and lower health-related quality of life (HRQoL) incurred by trial participants. Use of medication and healthcare resources, as well as changes in HRQoL, were then converted to monetary values with several assumptions and estimations, including the following:

- Costs of the reported medications and resources were calculated as a proportion of a previously published average annual medication cost of $2,656 and office visit cost of $1279 (*J Altern Complement Med* 2019;25:S138-S146).
- The monetary value associated with a change in capacity to work was derived using the human capital approach (*Cost–Benefit Analysis and Health Care Evaluations, Second Edition*. Edward Elgar Publishing; 2014).
- Gain in HRQoL was converted to monetary value by its fraction of an estimated quality-adjusted life year (QALY) threshold of $50,000 (*N Engl J Med* 2014;371:796-797).

Olofsson told *Pain Medicine News* that their study should not be considered a cost-benefit analysis, as “we only consider the benefit side.”

“A full cost-benefit would, of course, have to consider the cost of the tool and the cost of using the tool—which, in some situations, may also include a brief introduction and follow-up by healthcare staff,” Olofsson explained. “However, our study shows that the gross benefit can be expected to be substantial.”

Olofsson and colleagues reported that, relative to baseline, use of the AI-powered tool was associated with 12% fewer participants using any treatment (these had principally been physical therapy, cognitive behavioral therapy, and chiropractic treatment) by six weeks, and that increased to 23% after 12 weeks. The number of participants taking any pain or mental health medications was reduced by 10% at six and 12 weeks, with that reduction primarily in nonsteroidal anti-inflammatory drugs and antidepressants.

The average HRQoL at baseline was 0.424 (0.576 below full health at 1.0), with an average increase of 0.170 by six weeks from significant improvement in all domains except physical function. The level of improvement in HRQoL did not continue through 12 weeks, however, with a gain of 0.119 from baseline reflecting a slight reduction in the domains of anxiety and pain interference relative to six weeks.

The QALY gain at 12 weeks, based on the HRQoL gain of 0.119 at that fraction of a year (12/52 weeks), was 0.0275 over baseline. The average daily capacity to work at baseline was 371 minutes, which use of the AI tool increased by 26.1 minutes and 32.6 minutes at the six- and 12-week follow-up, respectively.

Olofsson explained the rationale for not accounting for the amount of time that participants interacted with the AI-powered tool, including the approximate eight sessions that were found to be necessary before it could provide personalized directions.

“Patient time is most likely incorporated as part of the impact on quality-of life, and accounting for that separately could lead to double-counting,” she remarked. “However, it is a relevant component to consider. Learning costs are not included, as the aim was to focus on the gross benefit in healthcare, productivity and quality of life.”

Olofsson and colleagues converted the changes in healthcare utilization measured at 12 weeks to a reduction of $127 in costs per participant and projected that the annual productivity of each increased by $930. The increase in health by 0.275 QALY at 12 weeks corresponded to a monetized value of $1,375. A total annual potential gain of $2,432 per participant was projected from the measured parameters, increasing to $7,380 per year when extrapolated to 70% compliance with regular use of the tool.

“The analysis of cost savings and quality-of-life gains associated with the use of an AI-powered digital tool for pain self-management demonstrates significant potential improvements in measured parameters, supporting this as an important treatment alternative,” Olofsson said in a press release.

Among the clinicians in the US who have incorporated Paindrainer in their practice is Edward Rubin, MD, the past president of the New York Society of Interventional Pain Physicians. In a press release, Rubin explained that the AI-powered tool has utility for the practitioner as well as the patient.[9]

“Paindrainer allows pain practitioners the capability to remotely monitor their patient’s progress during treatment. This patient-centric digital tool empowers patients to stay in daily communication with their treating physician.

“We can only manage what we can measure,” Rubin remarked. “The future of health care reimbursement depends on our ability to provide data surrounding our treatment outcomes.”

—Kenneth Bender

Olofsson reported no relevant financial disclosures, noting that The Swedish Institute for Health Economics received funding for the study from Paindrainer AB. Rubin is a participant in the first commercial partnership with Paindrainer AB in the United States.