performance period 3 due to decreases in utilization of post-acute care during the COVID-19 pandemic.

This study has limitations. Results may not generalize to the latest incarnation of the BPCI-A (beginning January 1, 2021), in which substantial changes were made to bundle selection and target price calculations. Estimates of break-even spending reductions are conservative because they do not account for additional incentive payments that participants would have received through additional reductions in clinical spending.

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1. Shashikumar SA, Gulseren B, Berlin NL, Hollingsworth JM, Joynt Maddox KE, Ryan AM. Association of hospital participation in Bundled Payments for Care Improvement Advanced with Medicare spending and hospital incentive payments. *JAMA*. 2022;328(16):1616-1623. doi:10.1001/jama.2022.18529

2. Barnett ML, Wilcock A, McWilliams JM, et al. Two-year evaluation of mandatory bundled payments for joint replacement. *N Engl J Med*. 2019;380(3):252-262. doi:10.1056/NEJMsa1809010

3. Dummit LA, Kahvecioglu D, Marrufo G, et al. Association between hospital participation in a Medicare bundled payment initiative and payments and quality outcomes for lower extremity joint replacement episodes. *JAMA*. 2016;316(12):1267-1278. doi:10.1001/jama.2016.12717

4. Agarwal R, Liao JM, Gupta A, Navathe AS. The impact of bundled payment on health care spending, utilization, and quality: a systematic review. *Health Aff (Millwood)*. 2020;39(1):50-57. doi:10.1377/hlthaff.2019.00784

COMMENT & RESPONSE

Sublingual Buprenorphine-Naloxone Exposure and Dental Disease

To the Editor The recent Research Letter[1] about the association between sublingual buprenorphine-naloxone use and dental disease reflects a timely and critical issue; however, concerns exist regarding the classification of cases that require clarification to better understand the study's conclusions.

The warning from the US Food and Drug Administration (FDA) in January 2021 that sublingual and buccal formulations of buprenorphine regularly used to treat opioid use disorder may cause oral disease is concerning, given its potential to deter patients from using a potentially life-saving medication.[2] This underscores the importance of this Research Letter[1]; however, comparing patients prescribed sublingual buprenorphine-naloxone with those receiving transdermal buprenorphine and oral naltrexone is problematic. The Methods section states the 2 medications were used as "active comparator groups (used for opioid use disorder)."[1] However, transdermal buprenorphine is typically prescribed for pain management and explicitly not recommended for opioid use disorder treatment, and oral naltrexone is more commonly recommended for alcohol use disorder treatment.[3,4] Therefore, it is possible that less than one-fourth of patients in this study[1] had prior or current opioid use disorder.

The stated limitation regarding the inability of the researchers to "ascertain the indication for the medications" understates the problem. This is because there are a host of other factors associated with opioid use disorder that can affect oral health,[5] and these factors might have explained the study's results if comparator groups did not have similar histories of opioid misuse.

There is a need for comparative research with different formulations of medications that are recommended and more often used for opioid use disorder treatment (ie, injectable naltrexone and methadone). However, the comparator medications used in this study[1] greatly limit their conclusions. We are especially concerned about potential negative public health effects if these results were to be misinterpreted in a way that could deter patient use or prescribing of sublingual buprenorphine-naloxone. Indeed, even the FDA warning encourages clinicians to be aware that the benefits of buprenorphine medications for opioid use disorder outweigh potential risks.

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1. Etminan M, Rezaeianzadeh R, Kezouh A, Aminzadeh K. Association between sublingual buprenorphine-naloxone exposure and dental disease. *JAMA*. 2022;328(22):2269-2271. doi:10.1001/jama.2022.17485

2. US Food and Drug Administration. FDA warns about dental problems with buprenorphine medicines dissolved in the mouth to treat opioid use disorder and pain. Published January 21, 2022. Accessed November 16, 2022. https://www.fda.gov/drugs/drug-safety-and-availability/fda-warns-about-dental-problems-buprenorphine-medicines-dissolved-mouth-treat-opioid-use-disorder

3. Morgan JR, Schackman BR, Leff JA, Linas BP, Walley AY. Injectable naltrexone, oral naltrexone, and buprenorphine utilization and discontinuation among individuals treated for opioid use disorder in a United States commercially insured population. *J Subst Abuse Treat*. 2018;85:90-96. doi:10.1016/j.jsat.2017.07.001

4. Arms L, Johl H, DeMartini J. Improving the utilisation of medication-assisted treatment for alcohol use disorder at discharge. *BMJ Open Qual*. 2022;11(4):e001899. doi:10.1136/bmjoq-2022-001899

5. Baghaie H, Kisely S, Forbes M, Sawyer E, Siskind DJ. A systematic review and meta-analysis of the association between poor oral health and substance abuse. *Addiction*. 2017;112(5):765-779. doi:10.1111/add.13754

To the Editor Patients and clinicians must consider potential adverse effects when choosing a medication for opioid use disorder.[1] One potential adverse effect of all opioid medications is dental disease due to xerostomia (dry mouth). People who use unregulated opioids, such as heroin or fentanyl, have additional risks of dental disease due to other common factors including tobacco smoking, lack of insurance, and other barriers to adequate health care.[2]

We believe that the study reported in the recent Research Letter by Dr Etminan and colleagues[3] does not help patients and clinicians understand the risks of buprenorphine-naloxone on dental disease because it compared buprenorphine-naloxone with treatments for unrelated health conditions.

Using insurance data, the investigators observed higher rates of dental disease among people receiving sublingual buprenorphine-naloxone (a treatment for opioid use disorder) compared with people receiving transdermal buprenorphine (a treatment for chronic pain) or oral naltrexone (a treatment for alcohol use disorder). In this study, use of buprenorphine-naloxone identified people with opioid use disorder, while the other medications identified people much less likely to have opioid use disorder. These groups differ in multiple ways not captured by administrative data, including experiences of stigma, poverty, and access to health care.[4] Therefore, the higher rate of dental disease cannot be attributed specifically to the medication. It is possible that sublingual buprenorphine-naloxone causes dental problems, but this cannot be concluded from this study.

Although the authors suggested that "[c]linicians might consider drugs other than sublingual buprenorphine/naloxone in patients with previous dental problems," this study did not compare different treatments for opioid use disorder. There is little research comparing risks of dental disease among medications for opioid use disorder, which also includes buprenorphine monoproducts, methadone, and slow-release oral morphine.[1] Individuals taking methadone commonly report xerostomia, and some attribute dental disease to their medication.[2] It is also not known whether switching to injectable formulations that avoid direct contact with the mouth (eg, long-acting injectable buprenorphine or short-acting injectable hydromorphone or diacetylmorphine opioid agonist treatment) reduces risks of dental disease. Comparisons among medications for opioid use disorder, or between people with treated and untreated opioid use disorder, would be useful in future research.

In addition to regular oral health examinations (for people who can afford them), strategies to promote the oral health of patients taking opioids include regular flossing and teeth brushing and stimulating saliva flow with sugar-free gum or lozenges.[5] Clinics providing treatment for opioid use disorder should also consider incorporating access to dental care for their patients.

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1. Bruneau J, Ahamad K, Goyer MÈ, et al; CIHR Canadian Research Initiative in Substance Misuse. Management of opioid use disorders: a national clinical practice guideline. *CMAJ*. 2018;190(9):E247-E257. doi:10.1503/cmaj.170958

2. Rossow I. Illicit drug use and oral health. *Addiction*. 2021;116(11):3235-3242. doi:10.1111/add.15360

3. Etminan M, Rezaeianzadeh R, Kezouh A, Aminzadeh K. Association between sublingual buprenorphine-naloxone exposure and dental disease. *JAMA*. 2022;328(22):2269-2271. doi:10.1001/jama.2022.17485

4. Psaty BM, Siscovick DS. Minimizing bias due to confounding by indication in comparative effectiveness research: the importance of restriction. *JAMA*. 2010;304(8):897-898. doi:10.1001/jama.2010.1205

5. Ontario Dental Hygienists' Association. Dental hygiene facts: methadone. Accessed December 21, 2022. https://odha.on.ca/wp-content/uploads/2016/08/Methadone-Fact-Sheet-FINAL.pdf

In Reply In response to our Research Letter,[1] Dr Watson and colleagues state that transdermal buprenorphine, used as an active comparator in our study, is typically used for pain management and not explicitly for opioid use and that oral naltrexone is more commonly used for alcohol use disorder. We agree that these agents, as with many drugs used for opioid use disorder, including methadone (as suggested by Watson and colleagues), might also be used for multiple indications. In fact, studies have shown that users of methadone and buprenorphine can also differ with respect to a number of variables, including employment status, education status, and type of drug dependence, because buprenorphine users are more likely to be dependent on prescription opioids than heroin.[2]

As such, in our Research Letter,[1] we performed a number of sensitivity analyses to address these challenges. We ran 2 separate analyses restricting the data to participants with history of chronic pain as well as a separate analysis in participants with history of opioid use (Table 2 in the Research Letter). To further control for measured confounders, we also restricted our analyses to only participants without a history of the following potential confounders: opioid use, alcohol use, diabetes, smoking, and illicit drug use (Table 2). Although we agree that the possibility of confounding by indication in our study still exists, the results of our study did not change despite these additional analyses. In fact, these results are consistent with the FDA's analysis[3] and other case-series evidence.[4]

We also agree with Dr Watson and colleagues that buprenorphine-naloxone has an important role in the treatment of opioid use disorder. However, important adverse events, including dental adverse events, must be clearly conveyed to patients who might benefit from these drugs.

Moreover, we concur with Dr Brothers and colleagues that there were potential confounders, such as stigma, poverty, and access to health care, that could not be controlled for in our study and that future studies that capture this information can better control for these variables. That said, the absence of these variables in our study does not automatically indicate presence of bias. The ability of an unmeasured confounder to introduce bias in a study depends on a number of factors,[5] including (1) the prevalence of that confounder and its distribution in the specific population, (2) the strength of the association of that confounder with the outcome and exposure, (3) the association of the unmeasured confounder with measured confounders, and (4) the possibility of potential cancellation of the bias as a result of the unmeasured confounder due to its interaction with other unmeasured confounders.

We also agree with Brothers and colleagues that our study did not compare the dental safety of some other drugs commonly prescribed for opioid use disorders, and that promotion of mitigation strategies by dental health professionals might reduce the risk of dental adverse events with buprenorphine-naloxone.

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1. Etminan M, Rezaeianzadeh R, Kezouh A, Aminzadeh K. Association between sublingual buprenorphine-naloxone exposure and dental disease. *JAMA*. 2022;328(22):2269-2271. doi:10.1001/jama.2022.17485

2. Hansen HB, Siegel CE, Case BG, Bertollo DN, DiRocco D, Galanter M. Variation in use of buprenorphine and methadone treatment by racial, ethnic, and income characteristics of residential social areas in New York City. *J Behav Health Serv Res*. 2013;40(3):367-377. doi:10.1007/s11414-013-9341-3

3. US Food and Drug Administration. Buprenorphine: Drug Safety Communication: FDA warns about dental problems with buprenorphine medicines dissolved in the mouth to treat opioid use disorder and pain. Published January 12, 2022. Accessed August 1, 2022. https://www.fda.gov/safety/medical-product-safety-information/buprenorphine-drug-safety-communication-fda-warns-about-dental-problems-buprenorphine-medicines

4. Suzuki J, Mittal L, Woo SB. Sublingual buprenorphine and dental problems: a case series. *Prim Care Companion CNS Disord*. 2013;15(5):PCC.13l01533. doi:10.4088/PCC.13l01533

5. Greenland S. Commentary: an argument against E-values for assessing the plausibility that an association could be explained away by residual confounding. *Int J Epidemiol*. 2020;49(5):1501-1503. doi:10.1093/ije/dyaa095

Over-the-counter Hearing Aids

To the Editor A recent Viewpoint[1] described over-the-counter (OTC) hearing aids as an opportunity to improve the health of millions of Americans with hearing loss. As a pharmacist and an audiologist, we believe that pharmacists will play an important role in ensuring the safe and effective use of OTC hearing aids.

Community pharmacies are accessible to most people living in the US, as nearly 90% live within a 5-mile driving distance of a pharmacy.[2] In addition, pharmacies are located in areas that are medically underserved and have shortages of primary care clinicians.[3] Community pharmacies are ideal locations to provide patient-centered, clinical services that are important to public health. Examples include point-of-care testing and vaccinations, both of which were essential to the US response to the COVID-19 pandemic.[4]

Pharmacists collaborate with other members of the health care team to provide care in local communities and greatly outnumber audiologists in the US. A collaborative working relationship between pharmacists and audiologists will be needed to care for the estimated 28.8 million US adults who may benefit from hearing aid use.[5] Although the US Food and Drug Administration does not require involvement of a licensed professional in the sale of OTC hearing aids, the proximity of these devices to the pharmacy counter will create opportunities for pharmacists to collaborate in hearing care using their expertise in self-care, nonprescription medical devices, and interprofessional practice.

We believe that with collaboration and support from the professions of audiology and pharmacy, pharmacists can widely promote the safe and effective use of OTC hearing aids for persons with hearing loss and make referrals to audiologists and physicians when appropriate.

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