Peer Review File

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Reviewer A

Comment 1:
This is a well-written manuscript on a fascinating topic, and I appreciate the opportunity to review it. The authors presented their arguments logically, and most of the questions that were arising in my mind as I was reading were all anticipated and addressed.
I still found myself wondering about the logistics of the pain lottery. Specifically, who/how many would oversee it? Is there any type of oversight process to ensure the lottery is implemented as intended and that those in charge of the lottery aren't behaving unethically (e.g., giving unfair information/advantage to friends and family members)?

Presumably this is a process that would have to be constantly ongoing. I find myself thinking about the logistics of patient turnover, and how that plays out in the lottery on a day-to-day basis. For example, maybe today the physicians implementing the pain lottery provided opioids for pain relief to patients receiving surgical procedures that would be intolerable otherwise. Then the physicians implementing the lottery move on to the second category of all patients experiencing pain—presumably a large list. It seems likely that not all patients in pain will receive opioid pain relief on one single day, and that the process would start over again the following day where the highest priority patients are enrolled first.

I realize my comments are outside the scope of the article, but the authors did get me thinking through actual implementation of this process and the points at which things might go wrong. Thank you for an excellent read.

Reply 1: Thank you for pushing us to add mention of who would run the pain lottery. We have added that the lottery will be administered by members of a hospital triage team (*not* the treating clinicians) with a frequency that is dependent upon the effective duration of the administered opioid. We have also made some important adjustments to how the lottery will be administered (and revised the accompanying graphic) that we believe further clarify the logistical questions raised by the reviewer.

Changes in text: See page 2: "A triage team should be used to run the lottery at a frequency that is responsive to the effective duration of the administered analgesic as well as the severity and duration of the expected shortage." Additional changes in text regarding the logistics of the pain lottery are further elaborated on p3.

Reviewer B

Comment 1:

The paper proposes to discuss and argue for a unique ethical framework to consider lottery under conditions of opioid shortage, including the use of lottery and the potential value of deception in lottery. The core idea is interesting and yet it doesn't come through in an optimally clear way. Crucially, the piece could be strengthened by explaining others' prior arguments for and against lottery before the authors land on their point of view (and this reviewer solemnly attests: "I have not written any lottery papers and I don't wish to be cited for them!") Of course people may disagree with ethical arguments but the challenges for the article are more properly focused on the set-up for the problem under study and putting the ethics issue in context

Reply 1: Thank you very much for pushing us to include some prior discussion of the advantages and disadvantages of lotteries. We have added an entire paragraph to the manuscript discussing these points with several recent citations. We believe this was a very big improvement on the previous draft!

Changes in text: Please see the paragraph and citations added on p2.

Comment 2:

1. Clarity of the hypothetical situation. Across lines 43-62, the scenario (inpatient, outpatient?) for a potential shortage should be delineated with far greater precisions and narrowness. Initially I was confused about the span of "shortage" situations of interest to the article. I think that this article is about the somewhat simpler scenario of inpatient hospital parenteral opioids as happens in some years and not others (if so, then affirm that)? However, hypothetically it could pertain to outpatient access to opioids in the USA right now, which is a FAR more complicated situation? The situation of an in-hospital shortage of parenteral opioids has happened in some years, and it's simpler to consider as a true problem of scarcity, and it is cited by the authors in citation #1. It reflecting a combination of supplier factory shortages and regulatory limitations from DEA. It is actually a cleaner set-up for what follows. If the authors want to keep readers focused on that, say it repeatedly and declare that constraint.

2. The outpatient "inability to access" opioids in outpatient care is more common for most patients, recognized in the media and the latest 2022 does Guideline update, and it reflects a series of deliberate choices by multiple parties either out of mistaken genuine belief (ie the refusing coverage and forcing opioid reduction makes a patient safer) or more typically, active choices to constrain legal liability (for distributors, pharmacies, insurers) by reducing medication accessibility and/or professional liability for prescribers. For example: https://www.cbsnews.com/sacramento/news/call-kurtis-investigates-kaiser-cuts-pain-prescriptions-impacting-patients/). These are further aggravated by DEA imposed constraints, which reflect primarily Congressional pressure. (https://www.painnewsnetwork.org/stories/2022/11/11/dea-plans-further-cuts-in-rx-opioid-supply-nbsp). The situation of a diverse array of outpatient-influencing agencies jointly choosing to make something scarce, for the benefit of those agencies, even if it involves risk to patients, is

rather different from the inpatient hospital situation. Where pharmacies, distributors, health systems and payors have all elected to make more scarce for their own legal or professional benefit, while agreeing that it may well harm patients, then the imposition of a lottery AFTER self-serving actions by the parties causing the scarcity is VERY different as an ethical matter. In essence, if I judge it in my personal interest to advance my access to food over that of my dependents, and then I set up a lottery for the last few scraps that my dependents might obtain, I am in an ethically problematic situation that's rather different from my dependents and I both operating in a famine. Therefore if the authors wish, they could disclaim any interest in the outpatient situation. However, if they wish to address it, then they will need to engage in a fundamentally deeper level of analysis.

Reply 2:

Thank you very much for pushing us on clarifying that we are writing for the *inpatient setting*, which the reviewer rightly points out was not clear in the original submission.

Changes in text: Please see the multiple additions to the text clarifying the inpatient context throughout, as well as the new concluding line on p5 that is a nod to the reviewer's excellent point that a policy-induced outpatient shortage would raise very different ethical concerns.

Comment 3:

3. Lines 98-100 indicate a supposition that "all non-opioid treatments for pain are being used and focuses on how to allocate opioids to patients whose pain nevertheless persists". I think it's potentially helpful here just to underscore that there are inpatient conditions where doctors may not know there is a non-opioid treatment, and they could skip that step. The best to consider would be kidney stones where certain NSAIDS appear to be equally effective.

Reply 3: We take the reviewer to be pointing out that some physicians may not be aware of non-opioid treatments for pain of some conditions and have clarified that our schema presumes that all treating physicians are aware of and have exhausted all non-opioid treatments for pain.

Changes in text: Please see p 2 for this modification.

Comment 4:

4. Lines 94-132 introduce a lottery without much introduction, explanation or citations of the robust literature on ethics of lottery in health care resource allocation. To my view, for a medical journal, when making a proposal to utilize lottery, the readers are best served if there is a section explaining the traditional case for and against, with citation of others. I did a quick Google Scholar search (medical resource allocation by lottery ethics) and there is a lot of good work there. It would be a stronger approach to offer some brief on the typical arguments for and against. I also just checked to see if JAMA Bioethics had anything and they did too (https://jamanetwork.com/journals/jama/fullarticle/2767751).

Reply 4: Thank you very much for pushing us to include some prior discussion of the advantages and disadvantages of lotteries. As noted above, we have added an entire section on p2 with recent pro/con arguments of lotteries, as well as drawing the distinction between simple

vs weighted lotteries, and how our "tiered lottery" attempts to overcome these limitations. We have also added a paragraph defending why our tiered approach based on severity serves beneficence and justice, with a supporting citation.

Changes in text: Please see the paragraph and citations added on p2 and 3.

Comment 5:

5. Similar point, line 150 appears to cite "documents meant to guide allocation decision-making" and doesn't offer citations. I would urge adding citations and perhaps quoting one the claims (even if the authors find it unpersuasvie). It makes the work more clear to readers.

Reply 5: Thank you, we have added a citation here to the Michigan State HHS dept that explicitly the point about transparency we are referencing.

Changes in text: Please see the new Endnote 11 on p 4.