Critical Appraisal of "Healthcare utilization and mortality after overdose prevention site closure: A linked cohort analysis using segmented difference-in-differences time series"

1.0 Purpose

This brief critical appraisal is intended to support interpretation and outline key limitations of a study published in the journal *Addiction* on March 10th, 2026[1]. It summarizes the study findings and also examines key methodological and interpretive limitations and contextual factors that should be taken into account to ensure appropriate application of the research findings. In particular, we summarize key limitations of the presented analyses with respect to the poor accounting for confounding service changes, model misspecifications, and undisclosed conflicts of interest.

2.0 Overview of the Study Findings Reported

The study used a retrospective linked cohort design to examine whether the announcement (on September 24, 2024) and closure (on March 31, 2025) of the Red Deer overdose prevention site (OPS) in Alberta was associated with weekly changes in the following outcomes among people who had previously used the site: opioid agonist therapy (OAT) dispensing, emergency department visits, inpatient hospital admissions, suspected opioid-related EMS events, and all-cause mortality. **Notably, opioid-related mortality was not reported as an outcome.** The cohort included OPS clients with a linked personal health number (PHN) who had at least one consumption event at the Red Deer site **(N=381)** at any point from June 1, 2024 to March 31, 2025, with outcomes compared with a cohort of linked clients who used the Lethbridge OPS **(N=300)** from June 1, 2024 to September, 302025, a site that remained open. Weekly outcomes were analyzed using **interrupted time-series (ITS)** for Red Deer only and a segmented **difference-in-differences (DID) time-series model** comparing Red Deer with Lethbridge.

The main reported finding was an immediate increase (i.e., level change) in OAT dispensing (level +6.42 OAT clients, 95% confidence interval [CI] 0.08 to 12.76) among identifiable Red Deer OPS site users **after the announcement of site closure**, with a gradual increase (i.e., slope change) in OAT dispensing (+1.23 OAT clients weekly, 95% CI 0.56 to 1.89) continuing in the weeks after announcement but prior to the actual closure of sites. Subsequently, OAT dispensing gradually decreased over time following the actual closure of the site (i.e., slope -1.06 OAT clients weekly, 95% CI -1.63 to -0.49). In the DID-ITS comparison, relative to Lethbridge, Red Deer showed no statistically significant change in the weekly proportion of clients dispensed OAT **during the announcement to closure period** (level p-value =0.906; slope p-value=0.076). Immediately after closure, there was a small but statistically significant level difference in Red Deer (+1.73 absolute change; p = 0.021) but without evidence of a sustained difference in trends between sites over the post-closure period (slope p-value = 0.687).

There was also a statistically significant post-closure gradual increase (i.e., slope change) over time in OPS site users with inpatient hospital admissions within Red Deer in the ITS model (+0.14 clients weekly, 95%CI 0.01 to 0.26), as well as relative to Lethbridge in the DID-ITS comparison (+0.02 absolute change weekly, 95% CI 0.002 to 0.03) during the follow-up period. In contrast, the analyses did not detect a statistically significant difference in ED visits and suspected opioid-related EMS events in either the Red Deer ITS

models or the DID-ITS comparisons. All-cause mortality events were rare over the follow-up period with limited power to report a statistically significant change in this outcome.

3.0 Key concerns and considerations for interpretation

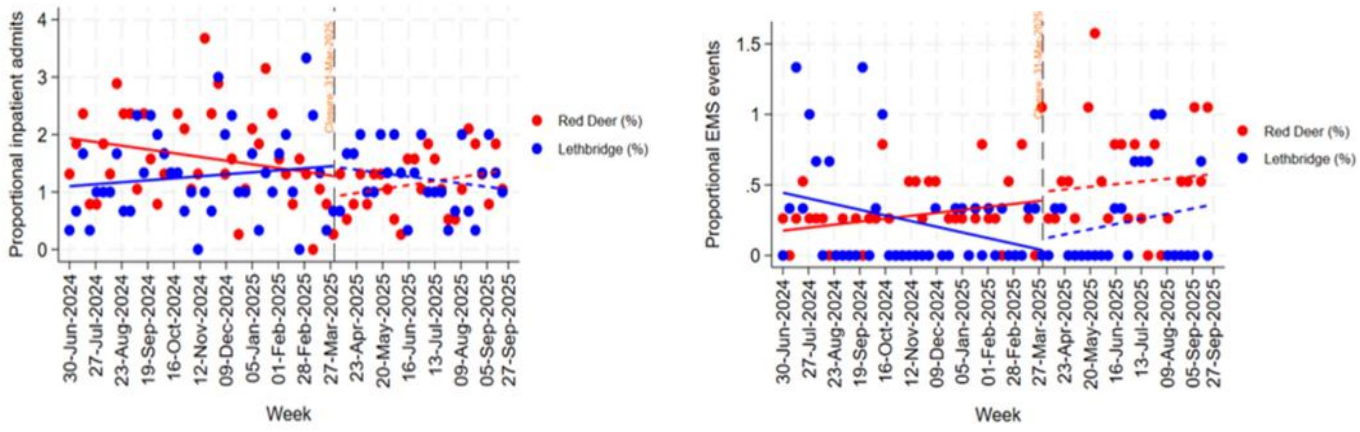
3.1 Undisclosed Service Changes Coinciding with OPS Announcement and Closure Periods Which Directly Confound Primary Findings

- Interpretation of the Red Deer findings does not consider the introduction of new addiction and overdose-response services implemented **uniquely in Red Deer** following the OPS closure announcement. These new services were not introduced in the comparator city Lethbridge:
    1. **A 24/7 Dynamic Overdose Response Team (ORT; comprised of outreach nurses and other healthcare providers) was launched in Red Deer on April 1, 2025** (immediately following the SCS closure) with the specific goal of identifying and assisting individuals who experienced an overdose in the surrounding area of the closed OPS.
    2. **A Mobile Rapid Access to Addiction Medicine (M-RAAM**) clinic was established and operated in the same parking lot as the Red Deer OPS site shortly before closure (December 2024) that provided direct linkage and transportation to the nearby OAT clinic and other addiction supports.
- Limitations introduced by the study's failure to account for the implementation of these services in Red Deer include:
    - **Impacts on OAT dispensing**: The study's main statistically significant finding - an increase in OAT dispensing in the ITS model - begins after the announcement of closure rather than the closure itself, which is consistent with the timing of implementation of the mobile RAAM clinic (December 2024) and would have directly impacted accessibility of OAT. However, this increase was not sustained. OAT dispensing rose in the short-term before the site closure, but did not continue to grow after closure and began to decline over time. As such, the findings may not demonstrate lasting increases in treatment engagement, and without sustained engagement, short-lived initiation is unlikely to confer meaningful protection against overdose.
    - **Overdoses reversed by the patrolling community Overdose Response Team (ORT)**: The deployment of an ORT patrolling the community around the OPS outside conventional hospital or ambulance transfer pathways is likely not reflected in ED or EMS measures used in the study. This may have led to undercounting of overdoses occurring in Red Deer following the SCS closure, which could have biased the findings. This should be further contextualized within the study's exclusion of individuals with missing PHNs (representing ~3%–6% of site users) who generally are more marginalized (e.g., experiencing homelessness, racialized, less connected to healthcare). This would again bias the study towards more stable outcomes. Importantly, Red Deer firefighters have reported a notable increase in overdose-related EMS call volume after the site closure (i.e., comparatively higher than during the same period in the previous year)[2] which is in direct contrast to the trends described in this study.

3.2 Methodological Issues that Raise Serious Concerns with the Interpretation of Reported Results

- **Poor Study Power:** The study is critically underpowered for several of its policy-relevant outcomes. Its reported minimum detectable effects were: 11% for ED visits, 23% for hospitalizations, and nearly a doubling (96%) for EMS events. This means that increases smaller than these thresholds would likely appear as "no change" in the results, even if they occurred. The all-cause mortality analysis is particularly uninformative, with only 11 total deaths in the 26 weeks before and after site closure, providing effectively no statistical power to assess changes in this outcome. As a result, reporting of "no significant change" or apparent stability in these outcomes should be interpreted as inconclusive rather than evidence of no effect within this design.
- **Parallel Trends Assumption Appears Not to Hold:** The validity of the DID methodology depends on the parallel trends assumption. In practice, this means Red Deer and Lethbridge must have had similar underlying outcome trajectories before closure, aside from random fluctuation. In the methods section, the authors mention that the "parallel trends were assessed during the pre-announcement interval using visual inspection and formal site-by-time interaction testing". However, the published figures visually suggest that this assumption does not hold across most outcomes (notably hospitalizations and EMS calls; see figures A & B embedded below). This is not discussed in the main paper and further reinforces that Lethbridge does not represent a valid comparator for Red Deer, due to pre-existing differences. A re-analysis of the study's data (using digitized data) also suggests that the parallel-trend assumption may be violated for multiple outcomes.

(A) Inpatient Hospitalizations **(B) Suspected Opioid-Related EMS Events**



Adapted from Day et al. (2026). Weekly proportions of identifiable overdose prevention site OPS clients with (a) in-patient (IP) admissions and (b) suspected opioid-related emergency medical services (EMS) events in Red Deer (intervention site) and Lethbridge (comparison site), June 2024–September 2025.** Vertical dashed lines mark the closure announcement (24 September 2024) and operational cessation (31 March 2025). Solid lines indicate site-specific trends fitted using DID–ITS models.

- **Comparator Validity and Time-varying Risk Environments:** Lethbridge OPS also does not represent a clean comparator for Red Deer due to several reasons:
    1. Substantial divergence in local overdose risk environments over the study period, which complicates any causal inference. As pointed out in the paper,[1] carfentanil was detected through post-mortem toxicology testing among 4% of Red Deer decedents in 2024 and 36% in 2025, compared with 0% in Lethbridge in 2024 and 6% in 2025. Rapidly diverging potency of the underlying unregulated drug supply would bias findings and undermine the validity of a difference-in-difference analysis.
    2. The aforementioned new services (i.e., an M-RAAM clinic and ORT outreach) were introduced to the Red Deer site only. This violates assumptions of ITS and DID analyses, as there are multiple competing co-interventions occurring in only one site.
    3. The accrual periods for the Red Deer differ from Lethbridge, continuing to accrue clients 6 months after the Red Deer closure. This creates a selection bias as the comparator cohort in Lethbridge includes new OPS clients following the Red Deer closure. While the specific impacts of this on the validity of the study's findings cannot be assessed, this study design decision could introduce bias. Importantly, the rationale for this choice and the associated limitations have not been acknowledged by the authors.
- **Model Misspecification:** Other aspects of the modelling approach warrant clarification. First, there are inconsistencies in the reported DID–ITS specification and the number of coefficients presented. Specifically, the paper does not report a number of DID-ITS model estimates for the control group, particularly in the period post-OPS closure, despite these being required parameters in these models. Further, differences exist between the methods described (Poisson models for ITS) and the results reported (which appear to reflect linear trend models), and the analysis failed to account for seasonal variations in outcomes. In a re-analysis of digitized data from the journal article — addressing many of these limitations — we have observed that some of the findings are sensitive to the specifications of the model. This brings into question the reliability of the findings, given the modelling concerns outlined.

3.3 Multiple Undisclosed Conflicts of Interest (COIs) and Misleading Institutional Description

Several relevant relationships and institutional details appear not to have been clearly disclosed or fully contextualized in the publication:

- The study describes the **Canadian Centre of Recovery Excellence (CoRE)** as a research institution that "receives public funding from the Government of Alberta." However, CoRE is a provincial crown agency that reports to Alberta's Minister of Mental Health and Addiction. As the lead institution involved in conducting this study, CoRE is actually a key part of the provincial government's addiction policy structure, and not an independent body.[3,4]
- The lead and second authors (N. Day & K. Kaufmann) currently hold the positions of CEO and Scientific Director at CoRE and were appointed by the Minister of Mental Health and Addiction.[3]

- The journal requires disclosure of relevant conflicts of interest. Lead author (N. Day) received payment for expert testimony on behalf of the Government of Ontario in litigation concerning its decision to close supervised consumption services, which was undisclosed.[5]
- Lead author (N. Day) held a previous role as vice-chair of the Recovery Expert Advisory Committee to the Government of Alberta (until 2024). Co-author (R. Tanguay) was also a participant on the committee. These conflicts were also undisclosed.
- During the study period, the lead author (N. Day) held a professional role as a provincial Medical Director of Addiction for Recovery Alberta, which has a mandate to advance the provincial government's current drug policy approach that excludes harm reduction. Co-author R. Tanguay currently holds a similar leadership role within Recovery Alberta. These conflicts were also undisclosed.

This incomplete disclosure of several highly relevant conflicts of interest is concerning when weighing how the findings from this study are being framed by the authors in news releases announcing the findings. It is important to note the article's stated findings and conclusions diverge significantly from the subsequent communication of findings by the authors of this study. For example, the CoRE news release states in the title that "closing Alberta Overdose Prevention Site led to no increase in overdose deaths",[6] which extends far beyond the statistical findings of the study since opioid-related mortality was not even reported in the peer-reviewed article. This news release only mentions stability in EMS events and ED visits while neglecting to mention the increase in inpatient hospitalizations, despite this being statistically significant.

4.0 Conclusion

The study cannot establish any link or causal relationship between OPS closure and the observed changes in outcomes, particularly given concurrent service changes introduced at the time of the Red Deer OPS closure and significant methodological issues in the reported study, including limited study power, model misspecification, and parallel trend assumption violations. Further, the study's report of an absence of statistically significant changes in all-cause mortality, ED or EMS measures should not be interpreted as evidence that closure was safe or without harm, given that the study was underpowered to detect meaningful differences and given the considerable concerns regarding the appropriateness of the Lethbridge cohort as a comparator in the analysis. Importantly, the study does not report on opioid-related mortality (i.e. "overdose deaths"); however, many public and media interpretations have framed the results as evidence that OPS closure did not increase harm.[6,7] Such interpretations extend beyond what the study's own published findings can support and are not consistent with its design, data, or stated limitations.

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5.0 References

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