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## REVIEW

# Cardiac surgeons' perspectives and practices regarding people who use drugs: A scoping review

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## Abstract

**Background and Aim of Study:** The rising rates of drug use and associated cardiovascular complications, particularly infective endocarditis, have led to poorer health outcomes for people who use drugs (PWUD). The objectives of this scoping review were to identify (1) attitudes of cardiac surgeons toward PWUD and (2) challenges faced in the surgical treatment of drug use-related disease.

**Methods:** A comprehensive literature search of three databases was performed with this assistance of a medical librarian. Articles were screened and analyzed for common themes by two independent authors. After literature review, a scoping review was conducted according to preferred reporting items for systematic reviews and meta-analyses and Joanna Briggs Institute guidelines, summarizing existing evidence.

**Results:** Analysis of 35 qualified articles revealed eight themes regarding the perspectives and practices of cardiac surgeons toward PWUD: (1) need for multi-disciplinary care teams (45.7%); (2) insufficient resources for treatment of underlying substance use disorders (40.0%); (3) stigma toward PWUD (37.1%); (4) willingness of surgeons to operate (31.4%); (5) incomplete guidelines for surgical management of drug-use related infective endocarditis (17.1%); (6) recognizing the importance of psychosocial factors (14.3%); (7) use of drug abstinence contracts (14.3%); and (8) use of stigmatizing language to describe PWUD and/or sterile injection (40.0%).

**Conclusions:** Provision of equitable care for PWUD requires effort from multiple disciplines including cardiothoracic surgeons, infectious disease specialists, addiction medicine specialists, and social workers. Additionally, further research is needed to gather sufficient data for evidence-based guidelines in the treatment of cardiac complications in PWUD.

## KEYWORDS

cardiac surgery, people who use drugs, stigma

## 1 | INTRODUCTION

For over two decades, the ongoing epidemics of drug overdose and drug use-associated infections have been causes for public health concern. Beginning around 2010, the second wave of the opioid crisis saw a particularly sharp increase in the use of heroin, which has since been compounded by rising incidence of stimulant and high potency synthetic opioid use.<sup>1,2</sup> Along with higher rates of drug use, the incidence and prevalence of infectious diseases including hepatitis C, soft tissue infection, and infective endocarditis have also risen, primarily attributed to nonsterile injection of particulate-contaminated drug samples.<sup>3,4</sup> Moreover, people who use drugs (PWUD) are a marginalized social group who are heavily impacted by the nature of the current crisis. In terms of healthcare, PWUD have poorer health outcomes largely due to psychosocial factors like poverty and institutional barriers to equitable medical care like poor access to specialty physicians.<sup>5,6</sup> Specifically, past studies have demonstrated that PWUD have greater mortality and rates of infection reoccurrence and postprocedural complications compared to non-PWUD.<sup>7</sup> Moreover, despite proven benefits of treatment for substance use disorder (SUD) in conjunction with other medical services, access to and use of medications for treatment of SUD remains problematic for many PWUD in the United States.<sup>8</sup> Importantly, drug use stigma and negative attitudes toward PWUD among physicians are key contributors to quality of care for these patients.

The up-trending rates of cardiovascular complications of injection drug use (particularly infective endocarditis) are becoming concerning to cardiac surgeons now more than ever. Evidence-based guidelines for the management of surgical disease with concomitant drug use are fairly nonspecific. The current American Association for Thoracic Surgery guidelines, for example, recommend the same surgical treatment for drug use and nondrug use-related endocarditis, but emphasize the need for addiction medicine referral. Even though these guidelines represent a step in the right direction, the development of specific, ethical, and equitable treatment strategies for recurrent disease are recognized challenges in the specialty of cardiothoracic surgery.<sup>9–11</sup> As surgeons face difficult decision-making regarding when to offer operative and/or re-operative treatment for PWUD and how best to support patients with SUDs, the question of current attitudes and practices is becoming increasingly important. Moreover, stigma against PWUD has been documented as an important factor in decision-making and provision of adequate medical care.<sup>8,12</sup>

Although some quantitative studies investigating surgeon's views on PWUD have been conducted, to our knowledge, no review articles summarizing the literature and current developments on this topic have been published. As such, we aim to further inform the field of ethics in cardiac surgery by elucidating and describing published perspectives on, attitudes toward, and practices of, cardiac surgeons regarding PWUD.

## 2 | MATERIALS AND METHODS

### 2.1 | Study design and database search strategy

We designed and performed a scoping review according to recommendations of the Joanna Briggs Institute<sup>13</sup> and preferred reporting items for systematic reviews and meta-analyses (PRISMA) extension for scoping reviews. With the support of a medical librarian, we conducted a literature search of three databases: MEDLINE, EMBASE, and Web of Science, using a combination of title, abstract, keyword, and database-specific controlled language terms. Searches were informed by Peer Review of Electronic Search Strategies guidelines to ensure highest quality of database searching.<sup>14</sup> Full search queries are itemized in Appendix 1 (Supporting Information).

In accordance with PRISMA scoping review extension guidelines,<sup>13</sup> all article types were included in the search to ensure comprehensiveness. We selected only full-text English language articles published between January 1, 2010 and June 18, 2021, to capture any potential temporal trends during the second wave of the opioid crisis.<sup>2</sup> References were exported to EndNote X9 (Clarivate Analytics, 2013) and duplicates were removed according to previously validated methodology.<sup>15</sup> Finally, a semi-automated bibliographic review of articles' reference list using lexical keyword search in MAXQDA 2020 (VERBI Software, 2019) was used to identify other potentially relevant articles. Full keyword search query is itemized in Appendix 1 (Supporting Information).

### 2.2 | Initial screening

Two authors (BM and EKK) independently screened the titles and abstracts of each article to identify articles eligible for full-text analysis. Inclusion criteria included articles with: (1) cardiothoracic surgical patients as a cohort of interest and/or commentary, (2) cardiothoracic surgeons as a cohort of interest and/or commentary, and (3) discussion of cardiothoracic surgical care provision as it relates to the psychosocial ramifications of nonmedical drug use. In line with validated scoping review methods,<sup>13,16</sup> disagreements were settled by discussion and consensus.

### 2.3 | Themes, data charting, and synthesis

Full-text articles were read and analyzed independently by two authors (BM and EKK). After full-text review, data charting was performed according to the methods of Moran et al.<sup>16</sup> and included article type, year of publication, country as defined by the first author's affiliation, and relevant themes. Once completed, common overarching themes were identified. In line with scoping review methodology, some themes were explicitly identified *a priori* from the previous abstract review and were further refined during data charting and synthesis; other themes were identified post-hoc while reviewing full-text articles. Authors continuously refined and

modified themes as necessary during weekly meetings. Disagreements were resolved by discussion and consensus.

### 3 | RESULTS

#### 3.1 | Search results

We retrieved a total of 1604 articles from database searching and supplementary focused bibliographic review. After deduplication, the titles and abstracts of 1532 unique articles were screened for full-text review eligibility; of these, 1430 articles were deemed ineligible due to irrelevant topic. The full text of the remaining 102 articles were then used to determine eligibility for inclusion in this scoping review. Of these 102, 16 did not include cardiothoracic surgeons or cardiothoracic surgical patients as cohorts of interest and were thus excluded; furthermore, 51 articles were deemed irrelevant to our focus and were excluded as well. A total of 35 articles remained and were included in this scoping review (Figure 1). See Table 1 for complete list of included articles.

#### 3.2 | Characteristics of included articles

Of the 35 papers included in this review, 13 (37%) were either expert opinion articles, editorials, or expert commentaries; six (17%) were letters to the editor; three (9%) were survey studies, two (6%) were qualitative studies; five (14%) were review articles including one gray literature review article which was non-peer reviewed<sup>37</sup>; five (14%) were conference abstracts, and one (3%) was a case report (Figure 2). Of 35 papers, most (77%) were published after 2018 (Figure 3); 33

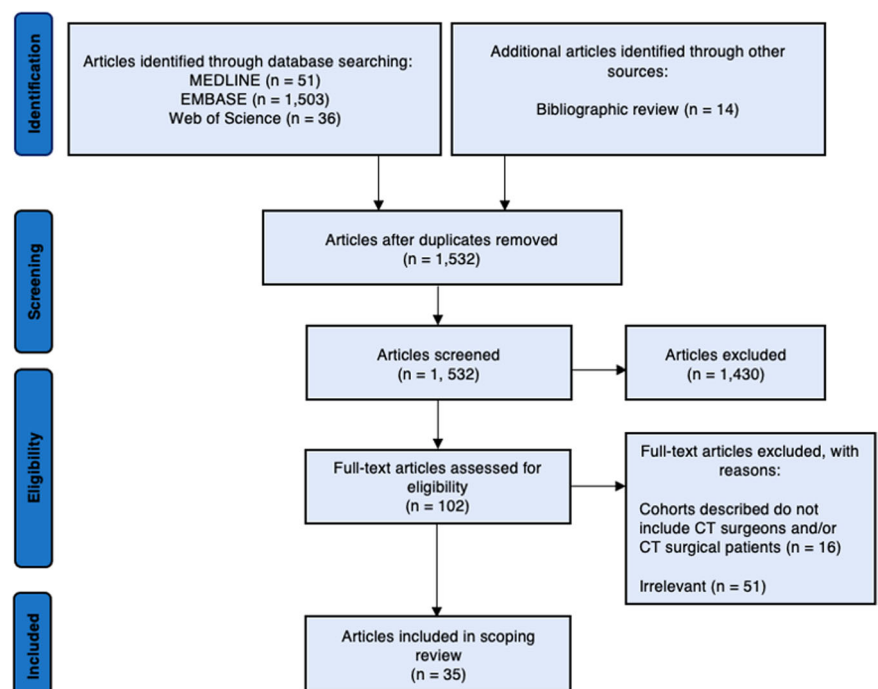
(94.3%) articles had first authors affiliated with institutions in either the United States or Canada (Table 1). The majority of papers discussed cardiothoracic surgeons' perspectives, attitudes, and behaviors regarding PWUD in the context of infective endocarditis, as this is the most common clinical entity among PWUD that necessitates cardiothoracic surgical consultation.

Eight unique, but not mutually exclusive, themes were identified across the articles (Figure 4). Sixteen papers (45.7%) identified and discussed the importance and need of multidisciplinary care teams to address surgical pathology and SUD concomitantly; 14 papers (40.0%) commented on insufficient resources for the treatment of SUD concomitantly with medical and/or surgical treatment; 13 papers (37.1%) recognized stigma toward PWUD as a barrier to equitable provision of surgical care; 11 papers (31.4%) discussed rationing of surgery and willingness of cardiothoracic surgeons to operate on PWUD with drug use-related surgical pathology; six papers (17.1%) cited vague or incomplete evidence base and/or societal guidelines for the surgical management of drug use-related infective endocarditis (DUIE); five papers (14.3%) recognized psychosocial factors as important outcome determinants for PWUD; five papers (14.3%) discussed the use of post-procedural drug abstinence agreements with PWUD. Additionally, we identified the use of stigmatizing language toward PWUD (i.e., use of terms such as "addict [s]," "abusers," "recidivist," "recidivism") in 14 (40.0%) articles. An exposition and discussion of each theme is presented below.

#### 3.3 | Multidisciplinary teams

A commonly identified theme was the role of multidisciplinary care teams in the treatment of PWUD with cardiothoracic surgical

**FIGURE 1** Preferred reporting items for systematic reviews and meta-analyses extension for scoping reviews flow diagram. One thousand six hundred and four unique articles were identified from database searching and bibliographic review of articles retrieved from those databases. After removal of duplicates, and screening for eligibility, 35 were included in the scoping review

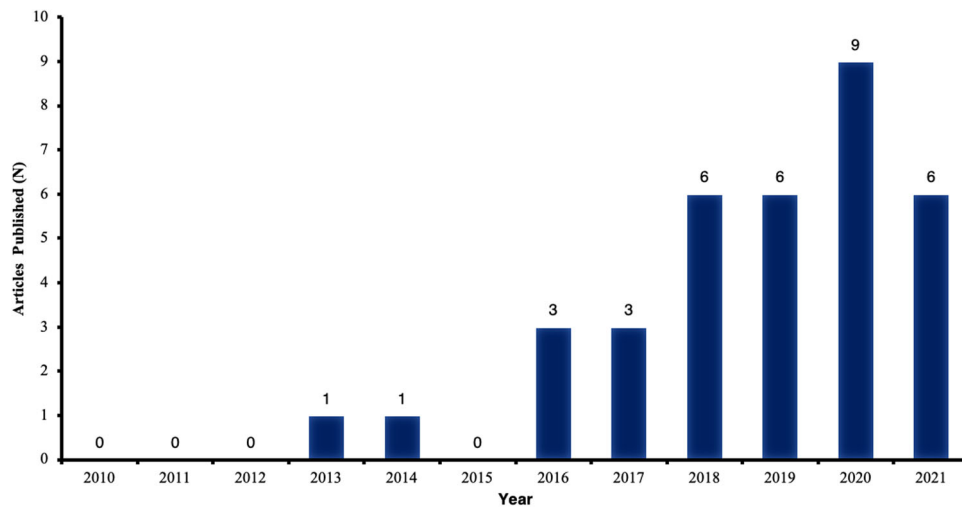
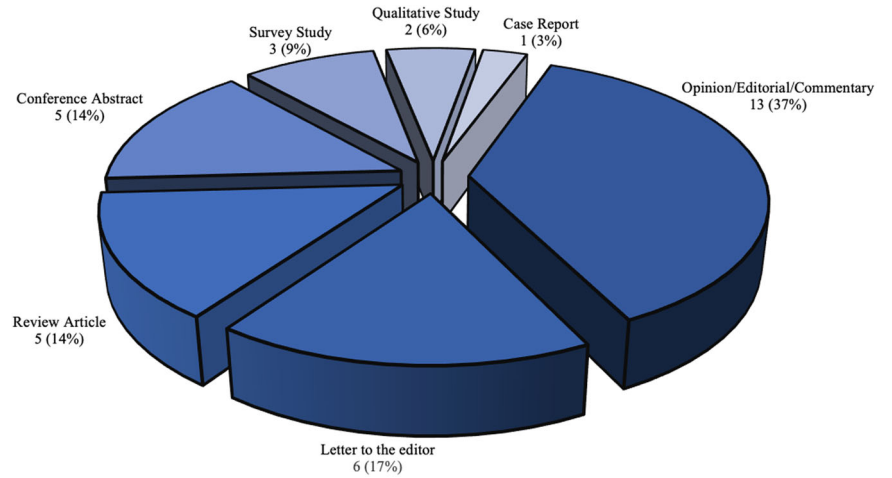


**TABLE 1** Included articles and characteristics

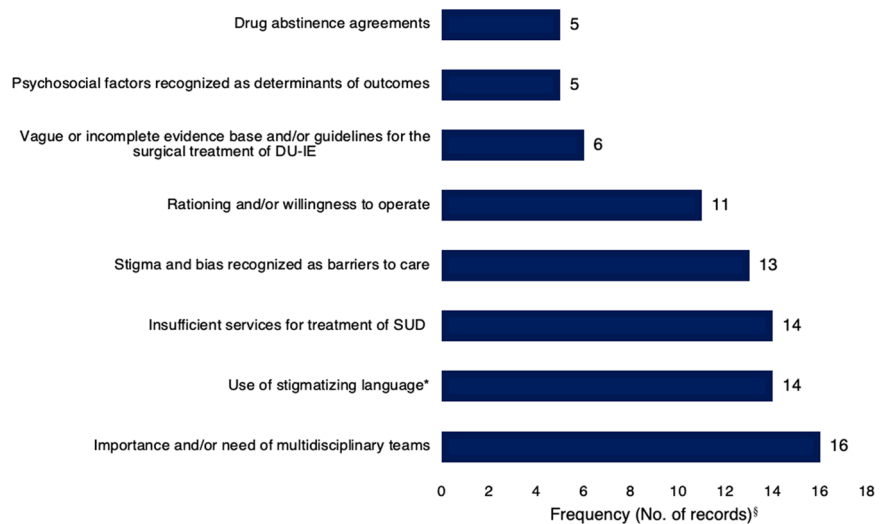
Articles	Publication type	Country <sup>a</sup>
Baldassarri and Chupp, 2013 <sup>17</sup>	Conference Abstract	United States
Hull and Jadbabaie, 2014 <sup>18</sup>	Opinion/Editorial/Commentary	United States
Badhwar et al., 2016 <sup>19</sup>	Opinion/Editorial/Commentary	United States
Ferraris et al., 2016 <sup>20</sup>	Opinion/Editorial/Commentary	United States
Gansera et al., 2016 <sup>21</sup>	Case Report	Germany
Hussain et al., 2017 <sup>22</sup>	Letter to the Editor	United States
Vlahakes, 2017 <sup>23</sup>	Opinion/Editorial/Commentary	United States
Wurcel et al., 2017 <sup>6</sup>	Letter to the Editor	United States
Englander et al., 2018 <sup>24</sup>	Qualitative Study	United States
Kirkpatrick and Smith, 2018 <sup>25</sup>	Opinion/Editorial/Commentary	United States
Serota et al., 2018 <sup>26</sup>	Letter to the Editor	United States
Wang et al., 2018a <sup>27</sup>	Letter to the Editor	United States
Wang et al., 2018b <sup>28</sup>	Review Article	United States
Yanagawa et al., 2018 <sup>29</sup>	Review Article	Canada
Allespach and Stahl, 2019 <sup>30</sup>	Opinion/Editorial/Commentary	United States
Buchanan et al., 2019 <sup>31</sup>	Review Article	Canada
Deas and Keeling, 2019 <sup>32</sup>	Opinion/Editorial/Commentary	United States
Nguemni Tiako et al., 2019a <sup>33</sup>	Conference Abstract	United States
Nguemni Tiako et al., 2019b <sup>34</sup>	Opinion/Editorial/Commentary	United States
Yanagawa et al., 2019 <sup>35</sup>	Opinion/Editorial/Commentary	Canada
Ahmed et al., 2020 <sup>36</sup>	Review Article	United States
An et al., 2021 <sup>9</sup>	Survey Study	Canada
Aultman et al., 2020 <sup>37</sup>	Review Article, Non-peer reviewed	United States
Firstenberg et al., 2020 <sup>38</sup>	Conference Abstract	United States
Hayden and Moore, 2020 <sup>10</sup>	Qualitative Study	United States
Mennander, 2020 <sup>39</sup>	Opinion/Editorial/Commentary	Finland
Mohammadi and Kalavrouziotis, 2020 <sup>40</sup>	Opinion/Editorial/Commentary	Canada
Nguemni Tiako et al., 2020 <sup>8</sup>	Conference Abstract	United States
Nguemni Tiako et al., 2021 <sup>41</sup>	Survey Study	United States
Nguemni Tiako et al., 2020 <sup>12</sup>	Conference Abstract	United States
Brothers and Bahji, 2021 <sup>42</sup>	Letter to the Editor	Canada
Lazar <sup>43</sup>	Opinion/Editorial/Commentary	United States
Lennox et al., 2021 <sup>44</sup>	Letter to the Editor	Canada
Nguemni Tiako et al. 2021 <sup>41</sup>	Survey Study	United States
Roselli et al. <sup>46</sup>	Opinion/Editorial/Commentary	United States

<sup>a</sup>Country is defined by institutional affiliation of first author as per Moran et al.<sup>16</sup> methodology.

**FIGURE 2** Included articles by publication type



**FIGURE 3** Years of article publication, by frequency



**FIGURE 4** Major themes identified in scoping review, by frequency. <sup>§</sup>Note that themes are not mutually exclusive; we identify more than one theme in the majority of articles

pathology, in particular drug use-related infective endocarditis (DUIE). Although the importance of SUD (injection drug use specifically) as a risk factor for both native valve and recurrent infective endocarditis is well-recognized, Hayden and Moore concluded that non-addiction medicine physicians may feel uncomfortable or uncertain with how to address SUD.<sup>10</sup> Multidisciplinary care teams comprised of cardiothoracic surgeons, cardiologists, infectious disease specialists, addiction medicine specialists, and social workers have been identified as critical to the comprehensive care of PWUD, particularly when continuing SUD poses a dilemma in surgical care planning. The diversified expertise of team members can help in making difficult decisions including when to reoperate,<sup>17</sup> how to best manage SUD post-operatively,<sup>29</sup> and when to recommend palliative care.<sup>19</sup>

It is important to also recognize the role of multidisciplinary care teams in the delivery of ethical and equitable care for PWUD. As Baldassarri and Chupp report, implicit and explicit biases of cardiothoracic surgeons factor into surgical decision making, and sometimes produce situations that are at odds with patients' wishes and/or recommendations of ethics committees.<sup>17</sup> As such, input from specialists in multiple fields can promote a more patient-centered approach to care, thereby establishing and solidifying a treatment approach grounded in beneficence and non-maleficence to the patient with SUD. Despite identifying multidisciplinary care teams as a best practice for PWUD who have cardiothoracic diseases, practical examples of these teams and outcomes from the involvement of these teams have not been reported in the cardiac surgical literature, representing an important research gap.

### 3.4 | Insufficient services for the treatment of SUD

Another common theme was lack of health system evaluation and treatment of SUD for PWUD with cardiothoracic diseases during hospitalization and in the postoperative period. The following were identified as barriers to SUD treatment access: lack of comprehensive inpatient addiction medicine or addiction psychiatry consult services, lack of formalized addiction medicine referral protocols post-hospitalization, and unfamiliarity of cardiothoracic surgeons with treatment options or best practices for the treatment of substance use disorder.<sup>9,43-45</sup> Importantly, in cases where resources and services were available, they were frequently called upon by cardiothoracic surgeons. As Nguemeni-Tiako et al. described, only 35% of surgeons reported having access to specialty addiction services at their institution; however, when these services were available, 93% of surgeons reported consulting them for multidisciplinary management of infective endocarditis. Moreover, uncontrolled research shows possible survival benefit of for PWUD with infective endocarditis in PWUD with access to, and utilization of, addiction medicine resources over those without it.<sup>45</sup>

### 3.5 | Recognizing stigma as a barrier to care

A third common theme was stigma toward PWUD as an important barrier to equitable cardiothoracic surgical care. Despite the frequent

use of stigmatizing language in papers, several authors describe the phenomenon of inequitable care for PWUD, which stems from stigma. A survey study of 201 cardiothoracic surgeons in the United States for example, found that 25% believed that SUD was a choice rather than a chronic illness, while 18% reported that medication assisted treatment for opioid use was merely "replacing one addiction with another."<sup>45</sup> These attitudes and beliefs have shown to play a role in enacted differential treatment for PWUD with DUIE.<sup>17</sup> For example, Lennox et al. remarked that stigma may contribute to surgeons offering operative treatment for DUIE less frequently for PWUD than for non-PWUD.<sup>44</sup>

### 3.6 | Clinical rationing and willingness to operate

A fourth common theme was rationing of surgical intervention and surgeon's willingness to operate on PWUD with drug-use related pathology (principally DUIE). In a survey study of 94 cardiothoracic surgeons, up to half reported some reservation or reluctance to operate on patients with native valve DUIE; furthermore, only 36% reported willingness to offer surgical intervention for prosthetic valve DUIE in the case of continuing injection drug use after initial surgery.<sup>9</sup> Similarly, a survey study of 208 surgeons revealed a comparable willingness to operate between PWUD with DUIE currently on methadone assisted therapy for opioid use disorder, and patients with non-DUIE native valve endocarditis; staggeringly, almost all surgeons (93.1%) reported willingness to reoperate recurrent non-DUIE, while only 24.6% reported willingness to reoperate on PWUD with recurrent disease.<sup>45</sup> In the same study, Nguemeni-Tiako et al. also found that 63.5% of surgeons had refused surgery for PWUD with DUIE in the past, commonly citing the personal choice to use drugs, "recidivism," and inappropriate spending of medical dollars as contraindications to surgical therapy.<sup>45</sup>

Moreover, futility of treatment for PWUD was also recognized as an important theme among cardiothoracic surgeons. As Hull and Jadbabaie affirm, some surgeons believe that recurrent drug use-related disease does not merit reoperation as PWUD will only continue to misuse substances.<sup>18</sup> Roselli et al. expose an opposing, but important perspective regarding rationing and willingness to operate in relation to recurrent DUIE: although continuing substance use postoperatively is indeed associated with poorer outcomes, PWUD may not have had access to adequate SUD treatment during initial treatment.<sup>46-48</sup> As such, refusal to reoperate on PWUD with recurrent DUIE on the basis of expected relapse may not be appropriate.<sup>46</sup>

Although stigma is recognized as a contributor to surgeons' decision to operate, several other factors were identified as important to surgical decision-making as well. Data on long-term outcomes for surgically treated PWUD with infective endocarditis are limited, and societal guidelines do not delineate specific protocols for PWUD.<sup>11</sup> As such, many authors have concluded that operating and/or reoperating on native or prosthetic valvular endocarditis may not provide benefit to the patient and therefore withhold surgery.<sup>46</sup> Importantly, however, this position is taken in the absence of PWUD being offered known highly effective, lifesaving treatments concomitantly with the treatment of their cardiothoracic disease.

### 3.7 | Vague and/or incomplete guidelines for surgical management of PWUD with infective endocarditis

A fifth theme was the recognition of a lack of a strong evidence base for surgical treatment of DUIE, most commonly citing lack of specific societal guidelines or scarcity of robust outcomes data to inform best practices. Both the 2016 American Association of Thoracic Surgeons consensus guidelines and the 2020 American College of Cardiology/American Heart Association guidelines for valvular heart disease make note of the importance to promote maximally aggressive treatment of SUD for PWUD; however, specific guidelines regarding surgical candidacy and re-operative eligibility are not delineated.<sup>11,49</sup> Similarly, the evidence base for long-term outcomes of surgery among PWUD are largely unknown: data are sparse, and those which do exist are heterogenous. Whereas, authors seem to agree that operative mortality among PWUD with DUIE is lower than the general population (likely due to younger age and fewer comorbidities), some authors have found poorer survival past index hospitalization for PWUD<sup>48</sup> while others have found no long-term postoperative survival difference between PWUD and non-PWUD.<sup>47</sup> Both of these factors produce dilemmas for cardiothoracic surgeons when making decisions about the surgical management of PWUD.<sup>9,10</sup>

### 3.8 | Recognizing the importance of psychosocial factors related to drug use

Some articles (14.3%) included a discussion of psychosocial variables as important risk factors for the development and management of SUD concomitant with cardiothoracic surgical disease. The role of low socioeconomic status, fewer educational opportunities, housing instability, poor access to health services, and exposure to violence are well-established associations with the development of drug use-related pathology including infections (human immunodeficiency virus [HIV], hepatitis C [HCV], sexually transmitted infections, DUIE, etc.) and psychiatric illness.<sup>50</sup> Related to heart disease, some authors acknowledge the important intersection of social determinants of health and outcomes of DUIE; in particular, Lazar described institutional barriers (i.e., lack of resources for SUD treatment), economic barriers (i.e., lack of health insurance), homelessness, and scarcity of strong social support for PWUD in recovery as critically important contributors to the cycle of continuing drug use and recurrence of endocarditis.<sup>43</sup> Lennox et al. also commented on this theme, recognizing the importance of equitable access to high quality SUD treatment for PWUD regardless of the underlying socioeconomic fabric.<sup>44</sup>

### 3.9 | Drug abstinence agreements

Similarly, 14.3% of articles discussed the use of postoperative drug abstinence agreements as a means of both addressing SUD in PWUD with surgical disease and rationing reoperations (i.e., PWUD would be refused reoperation if found to have broken the abstinence agreement and

present with prosthetic valve DUIE). Although most authors (and surgeons) use the term "contracts," we choose to use the term "agreements" as it is more patient-centered, and because the nature of the agreement is not legally binding as a contract is. Using the terminology "contracts" may dissuade PWUD from seeking additional care, particularly if they relapse, as they may fear punitive measures in line with drug criminalization. Vlahakes encourages cardiothoracic surgeons to lead multidisciplinary endocarditis teams and to use written agreements with PUWD to dissuade continued injection drug use and to warn them about not having a "second chance" with surgery if they continue to use.<sup>23</sup> An et al. found that 54% of surveyed surgeons required some form of verbal attestation to remain abstinent from drugs before surgery, while 11% require a written contract.<sup>9</sup> As Wurcel et al. very appropriately pointed out, this strategy is likely ineffective as well as discriminatory toward PWUD: SUD is a chronic medical condition that cannot simply be "signed away with a contract"; moreover, other health behaviors which negatively impact cardiovascular health (i.e., smoking, alcohol consumption, etc.) are not accompanied by abstinence agreements, nor do surgeons tend to refuse reoperation in the case of recurrent pathology for these patients.<sup>6</sup> Consequently, the expectations of such agreements for PWUD are likely impracticable and ethically questionable.

### 3.10 | Use of stigmatizing language

Last, but importantly, we identify the use of stigmatizing language toward PWUD in 14 (40%) of papers. Terms including "drug abuser," "addict," "recidivist" appeared very commonly, even in papers which identified stigma as a barrier to care. The language used to refer to PWUD informs not only the perception of the speaker or writer, but also modulates others' opinions and most importantly has an impact on patients. PWUD represent a heavily stigmatized and marginalized group, often with poor healthcare access and limited social support. Pejorative language on the part of physicians deepens mistrust and delays care-seeking, thereby leading to poorer outcomes for this already vulnerable cohort.<sup>51</sup> As some authors acknowledged, the language used in clinical settings (including on the floors and in published literature) matters.<sup>46,33</sup> Therefore, person-first language ("person who uses drugs" rather than "drug abuser"), acknowledgment of drug use as a medical entity ("SUD" rather than "drug addiction"), and avoidance of slang or idiomatic expressions ("positive urine drug screen" rather than "dirty urine"; "sterile or nonsterile" rather than "clean or dirty" to refer to injection behaviors) is recommended when referring to PWUD<sup>52</sup> both in clinical contexts and in the literature.

### 3.11 | Harm reduction

Although not explicitly discussed in the articles considered in this review, harm reduction including syringe exchange programs, safe injection sites, and infection detection and control measures (i.e. HIV/HCV/STI testing, sterile syringe and injection equipment distribution, naloxone distribution, etc.) is a vital part of reducing the



burden of drug-use related pathology, and should be highly considered in the setting of continued injection drug use.<sup>4,5,51</sup> The absence of harm reduction discussion in the cardiac surgery literature therefore, highlights an educational gap among physicians, and is an important area of improvement.

Non-sterile injection is the primary driver of drug-use related infections including DUIE; as such, it is imperative that harm reduction as prevention and, when applicable, postsurgical harm reduction be a mainstay recommendation for the comprehensive treatment of PWUD with cardiothoracic surgical disease. Multidisciplinary collaboration with outpatient syringe exchange programs may be of particular benefit, as a growing number of these sites offer services such as sterile injection supplies, HIV/HCV/STI testing, on-site SUD treatment and/or referral, and peer-counseling.<sup>53</sup> Although this proposed collaboration would be relatively novel for cardiothoracic surgeons, its impact in other medical specialities has been demonstrated<sup>54</sup> and may contribute valuable insight as a part of multidisciplinary teams which the majority of papers in this review have remarked the need for.

## 4 | CONCLUSIONS

The purpose of this scoping review was to survey and summarize the available literature on the perspectives, attitudes, and behaviors of cardiothoracic surgeons toward PWUD, with the aim of highlighting research gaps and encouraging future work in this area. Unlike systematic reviews, our methods did not include exhaustive literature searching with a rigid a priori framework, nor did we consider degrees of bias in the included articles. Despite these limitations, by conducting a nonspecific search and including several types of evidence, we provided a better understanding of the available literature and we can therefore recommend future research to focus on the underappreciated phenomenon of drug use-related stigma among cardiothoracic surgeons.

Several perspectives and attitudes of cardiothoracic surgeons toward PWUD can be identified, thus helping elucidate barriers to equitable treatment of this socially vulnerable population. Many cardiothoracic surgeons were in agreement that guidelines for treatment of drug-use specific pathology (i.e., DUIE) are underdeveloped, and resources for addiction treatment are scarce, particularly for this population. Consequently, most surgeons agreed that multidisciplinary teams for the treatment of PWUD are crucial to providing the best care possible. Importantly, several cardiothoracic surgeon reported implicit and/or explicit bias toward PWUD and felt apprehensive about offering surgery to PWUD with recurrent drug use-related disease. Last, low socioeconomic status, financial instability, poor access to healthcare, and limited knowledge of harm reduction (i.e., safe and sterile injection drug use) poses barriers for both PWUD and surgeons treating them. The treatment of cardiac complications in PWUD is an unexplored area whose existing data are heterogenous. To ensure delivery of ethical and equitable care to PWUD, further efforts are warranted in multiple disciplines to reduce

the stigma towards PWUD, increase institutional resources for SUD, and implement harm reduction programs.

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## CONFLICT OF INTERESTS

The authors declare that there are no conflict of interests.

## AUTHOR CONTRIBUTIONS

**Brandon Muncan:** Conceptualization, methodology, data curation, formal analysis, writing—original draft, review and editing. **Esther K. Kim:** Data curation, writing—original draft, review and editing. **Andrea Amabile:** Formal analysis, writing—review and editing. **Melissa B. Weimer:** Formal analysis, writing—review and editing. **Max Jordan Nguemeni Tiako:** Writing—review and editing. **Prashanth Vallabhajosyula:** Writing—review and editing. **Andreas P. Kalogeropoulos:** Project supervision, formal analysis, writing—review and editing. **Amar Geirsson:** Project supervision, formal analysis, writing—review and editing. All authors reviewed and approved the final manuscript.

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## SUPPORTING INFORMATION

Additional supporting information may be found in the online version of the article at the publisher's website.

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