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action

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**SAFER TATTOOING INTERVENTIONS
IN PRISON:
A SYSTEMATIC REVIEW AND CALL TO ACTION**

Thesis submitted to the Faculty of Medicine of
the University of Geneva

for the degree of Privat Docent

by

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Geneva

2018

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Summary

Background: Worldwide more than ten million people are incarcerated at any given time. Between 5 and 60% of people experiencing incarceration report receipt of a tattoo in prison – mostly clandestine, which is associated with risks of blood-borne infections. Although safer tattooing techniques are effective in preventing the transmission of blood-borne infections and available to the general population, there is limited knowledge about the impact of safer tattooing strategies in prison settings in terms of health outcomes, changes in knowledge and behaviors, and best practice models for implementation. The objective of this research was to identify and review safer tattooing interventions in prison settings.

Methods: We conducted a systematic review of the literature using search strings which combined terms related to safer tattooing with terms related to detention. Forward and backward snowballing was used to capture additional studies. Studies of all design types were included if they were published until 27 June 2018, the population was incarcerated adults, they reported quantitative outcomes, and were published in English, French, or Spanish. The authors identified during an international conference an unpublished safer tattooing project, for which in-depth interviews with key actors were conducted to capture their current practice.

Results: Of 55 papers retrieved from the initial search, no peer-reviewed article was identified. One paper from the grey literature described a multi-site pilot project in Canada. Its evaluation suggested that the project was effective in enhancing knowledge of incarcerated people and prison staff on standard precautions, had the potential to reduce harm, provided vocational opportunities, and was feasible although enhancements were needed to improve implementation issues and efficiency.

Conclusions: Although access to preventive services, including to safer tattooing interventions, is a human right and recommended by United Nations agencies as part of a comprehensive package of harm reduction interventions in prisons and other closed settings, this review identified only a few promising strategies for safer tattooing interventions in detention settings. We call upon governments, criminal justice authorities, non-governmental organizations, and academic institutions to implement safer tattooing projects in prisons. These interventions should adhere to the following guiding principles: i) integration of methodologically-rigorous implementation research; ii) involvement in the project design, implementation, and research of key stakeholders, including people who are incarcerated,

criminal justice and prison authorities, and research partners; iii) integration into a comprehensive package of blood-borne infection prevention, treatment, and care, using a stepwise approach that considers local resources and acceptability; and iv) publication and dissemination of findings, and scaling up efforts.

Background

Worldwide more than ten million people are held in criminal justice institutions [1]. Getting tattoos while in detention is reported to be a common practice among both men and women: 19% of men and nearly 9% of women surveyed in 17 State prisons in Illinois (USA) [2]; 37% of men and 4% of women in seven detention centers in Quebec province, Canada [3]; and in Australia, 28% of men and 27% of women in the five largest State facilities in Victoria, and 25% of men and 13% of women in Queensland [4, 5]. Sex-aggregated results from other studies in carceral settings showed a prevalence of nearly 60% in Puerto Rico [6], 25% in Fiji [7], 26% in Russia [8], 14% in Hungary [9], 11% in England and Wales [10], and 10 to 28% in Scotland [11]. Results in men-only facilities indicated a prevalence of 5% in Iran [12], 11 to 18% in Bosnia and Herzegovina [13, 14], and 28% in Lesotho [15]. In a cross-sectional survey in six prisons in Europe (France, Germany, Italy, the Netherlands, Scotland, and Sweden), the prevalence of in-prison tattooing ranged from 6 to 43%, with a total prevalence of 18% [16]. People who were tattooed in prison reported infrequent single use of tattoo equipment (8-37%). If cleaning took place, it was reportedly done with water and/or heat. In a large survey involving 4,425 participants across Canadian prisons, 13% had a tattoo done in prison and were unsure about equipment safety [17].

For public health and programmatic considerations, it is important to note that both women and men who experience incarceration reported having been tattooed prior to incarceration. With regard to sex-aggregated results, highest levels of tattooing before detention were reported by people who were incarcerated in Australia: 86% [18] and 73% in several prisons of New South Wales [19]. These high levels are followed by other countries, including: 67% in the United States [2], 62% in Scotland (2015 prisoner survey [20]), 56% in Brazil [21], 54% in Moldova [22], 46% in Bosnia and Herzegovina [13], 43% in France [23], and 27% in Azerbaijan [24]. Sex-disaggregated results showed some of the following results of pre-incarceration tattooing among men: between 44 and 79% across eight carceral facilities in

Brazil [25], 60% in Australia [5], 60% in Finland [26], 42% in Croatia [27], and 42% in Lesotho [15]. As for women, their prevalence of tattooing before imprisonment were reported to be as follows: 58% in Finland (similar to men's prevalence) [26], between 48 and 72% across four carceral facilities in Brazil [25], 57% in Australia [5], and 36% in Iran [28].

Tattooing involves skin piercing and potential blood contact. Unsafe tattooing carries an increased risk of poor health outcomes. In addition to adverse skin problems (e.g., bacterial, viral, and mycotic skin infections, allergic skin reactions or lichenoid formations), unsafe tattooing enhances the transmission risk of blood-borne infections, such as hepatitis C (HCV), hepatitis B (HBV), and HIV [29]. This is due to the fact that tattooing is largely prohibited or unregulated in prison settings and to the higher prevalence of blood-borne infections among incarcerated people when compared to the general population (which we will call '*reservoir*' of blood-borne infections for the purpose of this paper, although we fully acknowledge that individuals cannot be reduced to just being a disease or a risk factor). Therefore, tattooing is often done in a clandestine and unsafe way by using inappropriate equipment, undertaking ineffective sterilization procedures, and sharing tattoo devices (which constitute the *transmission mode* of blood-borne infections). With regard to the *transmission mode*, tattooing materials that are improvised in prison can be made by transforming a mechanical pencil or electric toothbrush or shaver into a tattoo gun (or even using hearing aid batteries as a power source [30]), sharpening metallic guitar strings into tattoo needles, making tattoo ink out of soot (e.g., from burning cooking oil in a tin), and so called "sterilization" can be done by flaming needles or cleaning them with hot water [11]. Illicit tattooing can also pose health and safety risks to prison staff and to the public at large. Contraband of tattoo-related paraphernalia and staff injuries resulting from puncture with sharp objects directly related to tattooing have been reported [31]. In terms of *reservoir*, prisons worldwide are known to be important sites for the transmission of blood-borne infections, especially where there is a convergence of a high prevalence of blood-borne infections with ongoing injecting drug use [32-34]. People who ever injected drug were found to be twice more likely to get tattooed in prison than those who never injected drug [16]. Unsafe tattooing is a known risk factor for blood-borne infections [35-39], and there have been reports of HCV, HBV, and HIV acquisition through unsafe tattooing in prison [3, 6, 40-45]. As individuals leave prison, blood-borne infections acquired in detention can cause ill health and impact their reintegration in the community, while transmission risks are extended to their partners, friends, families, and the public in general [29, 46].

Against this background, United Nations agencies included in 2013 the *prevention of [HIV] transmission through tattooing, piercing and other forms of skin penetration* into the 15 key interventions that form the comprehensive package of HIV prevention, treatment, and care in prisons and other closed settings. The intervention recommends authorities to *implement initiatives aimed at reducing the sharing and reuse of equipment used for tattooing, piercing and other forms of skin penetration, and the related infections* [47].

There is however limited knowledge about safer tattooing strategies in carceral settings and their impact on health outcomes, changes in people's knowledge and behaviors, and best practice models for implementation. The prevalence of tattooing among people who are incarcerated was recently synthesized in a systematic [48]. With this study, we had the objective to systematically review the literature on safer tattooing interventions in prisons and their impact on individuals' knowledge and behaviours. The results could help inform policies and programs related to safer tattooing interventions as recommended by the United Nations guidance.

Methods

PRISMA guidelines were followed for this review which was registered on PROSPERO (protocol number CRD42017072502) [49, 50].

Search protocol

A Population, Interventions, Comparators, Outcomes, Study design (PICOS) question was established to guide the review [51]. The PICOS question was: for people experiencing incarceration, have safer tattooing interventions in prison led to improved health outcomes? Summon, a metasearch engine to access multiple search systems, was first used. Such federated engine is a useful tool to initially map the literature as it provides a unified access to extensive search databases, including MEDLINE, CINAHL, SCOPUS and Web of Science [52]. Results from Summon were then triangulated with a search on MEDLINE and Web of Sciences. The search extended to studies published until 27 June 2018 included. The search strings for the different databases focused on the study population and interventions and did not include comparative populations, outcome, geographic location, or study design (see

Table 1). The search was limited to title and abstract and focused in primary intention on online journal articles.

Table 1. Search strings and records retrieved from databases

	Search terms	Retrieved
Databases		
Summon	((Abstract:(tattooing)) OR (Abstract:(tattoo))) AND ((Abstract:(safe)) OR (Abstract:(legal))) AND ((Abstract:(prison)) OR (Abstract:(jail)) OR (Abstract:(incarcerat)) OR (Abstract:(inmate)) OR (Abstract:(detaine)) OR (Abstract:(custod)) OR (Abstract:(detention)) OR (Abstract:(crim)) OR (Abstract:(offend)) OR (Abstract:(correctional)) OR (Abstract:(forensic)) OR (Abstract:(penal institution)))	28
MEDLINE	(((((tattoo[Title/Abstract]) OR tattooing[MeSH Terms])) AND ((legal[Title/Abstract]) OR safe[Title/Abstract]))) AND (((((((((((prison[MeSH Terms]) OR jail[Title/Abstract]) OR incarcerat[Title/Abstract]) OR inmate[Title/Abstract]) OR detaine[Title/Abstract]) OR custod[Title/Abstract]) OR detention[Title/Abstract]) OR crim[Title/Abstract]) OR offend[Title/Abstract]) OR correctional[Title/Abstract]) OR forensic[Title/Abstract]) OR penal institution[Title/Abstract])	6
Web of Science	(tattooing OR tattoo) AND (safe OR legal) AND (prison OR jail OR incarcerat OR inmate OR detaine OR custod OR detention OR crim OR forensic OR offend OR correctional OR penal institution)	19
Hand searching of references (snowballing)		2
Subtotal		55
Minus duplicates		40
Identified for appraisal		1

Backward snowballing was used to find additional papers by searching the reference lists of retrieved articles, and forward snowballing to identify new articles by searching those that cited the retrieved papers.

Inclusion and exclusion criteria

Inclusion and exclusion criteria are listed in table 2.

Table 2. Inclusion and exclusion criteria

	Included	Excluded
Topic	Safe, legal tattooing program or initiatives in prison	Prevalence studies on tattoo or associated risk factors
Types of paper / data	Quantitative health evaluations of tattooing programs, including experimental and non-experimental designs that report outcome data	Descriptive quantitative papers with no specific interventions or outcomes; purely qualitative data
Settings	Pre-trial detention settings, prisons (post-trial)	Non-detention settings
Types of publications	Papers in peer-reviewed journals, grey literature reporting on project implementation	Letters, editorials, commentaries
Language	English, French, Spanish	Papers published in other languages than English, French or Spanish
Publication date	Until 27 June 2018	

Quality assessment

To assess the methodological quality of studies, the Effective Public Health Practice Project's (EPHPP) Quality Assessment Tool for quantitative studies was used because it is a thoroughly validated tool that is appropriate for a variety of research designs, including nonrandomized studies [53]. The studies were rated as strong, moderate, or weak in relation to the following criteria: selection bias, study design, confounders, blinding, data collection method, and withdrawals. Each study received an overall rating. Studies without any weak rating for any criterion were overall rated as 'strong', those with one weak rating as 'moderate', those with two or more weak rating as 'weak'. Two researchers independently assessed the quality of the studies and resolved any discrepancies through discussion.

Synthesis

Data from the papers were systematically extracted into standardized tables regarding the context, method, characteristics, quality, and findings. We anticipated a heterogeneous nature of the retrieved papers and planned a textual narrative approach to the analysis as described by Lucas et al [51]. This involved a commentary approach to the description and comparison of data that was grouped into various categories. These categories (e.g., carceral-led, medical-led interventions) were informed by the literature and examined in relation to health outcomes. Data was then synthesized by combining studies with similar types of interventions and patterns identified across and within articles. However, a single study was identified for appraisal and, therefore, limited comparative categorization and no quantitative meta-analysis were undertaken.

Unpublished projects

An unpublished safer tattooing project, which was presented during a European conference on health promotion in prisons (Vienna, 2017) [54], currently exists in Luxemburg since April 2017. In 2017, we conducted in-depth interviews with two nurses working there with the aim to gain insight into their current practice. The interview guide was articulated around the five dimensions of accessibility as defined by Levesque et al.: availability, acceptability, appropriateness, affordability, and approachability [55]. This framework was also applied to structure the research agenda presented in the *Discussion*. Written notes were taken by a researcher during the interviews (face-to-face and by telephone), for which informed consent was obtained, and transcribed into Word (see English translation from French in Supplementary Files). We report key findings in the results.

Another safer tattooing project was piloted in 2010-2011 in Catalonia (Spain) before it was discontinued. We received no answer from the project team and therefore could not conduct in-depth interviews.

Results

Search results

The search retrieved 53 publications through database searching of online journal articles, and a further two through forward and backward snowballing. Of the 40 remaining after

duplicates were removed, we excluded 34 based on the title and abstract of the publications as they did not address our specific topic (e.g., not about tattooing or reported on tattoo prevalence or risk factors,) or were in another language. Of the remaining six, five publications were deemed ineligible as they were just commentaries on safer tattooing projects, leaving one publication for a full-text review and qualitative synthesis. The publication retrieval process is detailed in Figure 1 and the summary of reviewed studies in Table 3.

Figure 1. PRISMA 2008 Flow Diagram

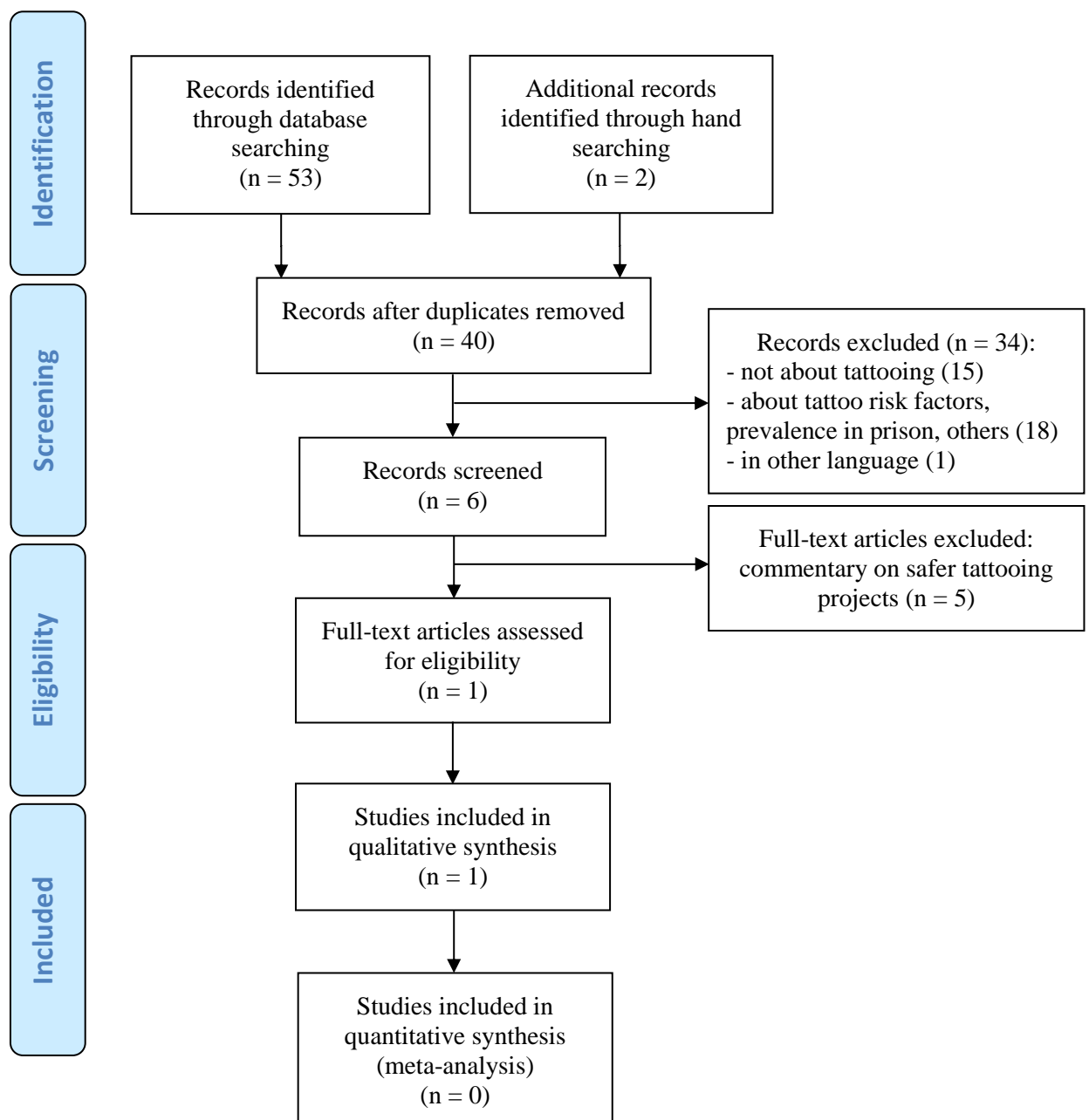


Table 3. Summary of studies included in the review

Study & context	Method or design	Sample or participants	Interventions	Health outcomes	Other outcomes	Study quality assessment
Nafekh et al (2009) Correctional Services Canada 5 men's & 1 women's detention centers	Mixed-method: crossed-sectional survey/questionnaire, interview with institutional staff members and inmates	Men and women detainees	- 2-pronged: ➔ <i>Operational</i> : a tattoo room in each center attended by trained detainee-tattooists. ➔ <i>Educational</i> : information about the risks of unsafe tattooing for detainees arriving at regional reception centers; guideline documents and pamphlets on the safer tattooing program for detainees from the pilot sites. - Supervision: by prison staff. - Duration: 7 months start-up, 12 months implementation, from August 2005 to August 2006. - Total costs: CAD 960'690. - Cost to client: CAD 5.00/2-hour session. - Beneficiaries: 1043 tattooing sessions for 324 requests out of 384.	- <i>Enhanced level of knowledge and awareness amongst staff and inmates regarding blood-borne infectious disease prevention and control practices.</i> - <i>Potential to reduce harm, reduce exposure to health risk, and enhance the health and safety of staff members (decreased injury from seizing illicit tattooing materials), inmates and the general public with higher risk groups.</i> - <i>87% of interviewed detainees would prefer to receive safer tattooing services.</i>	- <i>Additional employment opportunities for inmates in the institution, and work skills that are transferable to the community.</i> - <i>Low cost respective to the benefit.</i> - <i>Perceived increase in the demand for tattoos.</i>	Weak

Interventions

The included paper assessed a safer tattooing intervention in Canada in five men's and a women's detention centers [31]. The intervention started in 2005 and included an operational and an educational component. The operational component consisted of setting up a tattoo room in each of the six pilot centers. The tattoo room was designated as a controlled environment in meeting the standards for infection prevention and control. Safer tattooing was provided by detained individuals who became tattooists and after they had successfully completed training on blood-borne infections and infection prevention and control practices. Supervision by prison staff ensured ongoing quality control of the services, as well as safety and security. In the educational component, all new individuals admitted to the regional reception centers received information about the risks of unsafe tattooing practices through educational materials, and the people already incarcerated received in the pilot sites a guidelines document and pamphlet on the safer tattooing program. Peer education and counseling was also integrated into the educational component.

Methodological quality

The selected study was given a weak methodological rating. Although designed as a cross-sectional mixed-method evaluation at the end of the project, limitations that reduced the study quality included selection bias (moderate), study design (weak), confounders (weak), blinding (weak), and data collection (moderate).

Health outcomes

The evaluation of the Canadian project suggests that their initiative resulted in increased knowledge and awareness among both incarcerated people and staff in relation to blood-borne infection prevention and control practices. It appeared to demonstrate a potential to reduce harm, decrease exposure to health risk, and enhance the health and safety of staff members (decreased injury from seizing illicit tattooing materials), incarcerated people, and the general population. There was a reduction in illicit tattooing at medium security institutions, which was supported by the decrease in level of tattooing materials seized. Safer tattooing services was reportedly preferred by 87% of the interviewed detainees.

Other outcomes

The Canadian project reportedly provided for participants additional employment opportunities and work skills, which could be transferable to the community. Beneficiaries and prison staff reported a perceived increase in the demand for tattoos. This may have been due to the low cost of tattooing. The project evaluators demonstrated that, as a harm reduction initiative, the project was overall of low cost when compared to the potential benefits, which included avoiding the direct costs of HCV treatment, HIV treatment, or liver transplant.

Unpublished projects

The Luxemburg project started in April 2017 at the initiative of the prison health team who received the support from the carceral authorities. Based on evidence of clandestine tattooing in the prison, the project has the objective of providing a safer alternative to clandestine tattooing. Through a consultative process with the syndicate of people in prison, interventions were designed and consist of providing a tattoo parlor for trained tattooists to offer free-of-charge tattoos using safe tattooing materials and standards. A nurse (who is independent from the prison authorities) coordinates tattooing requests, manages tattooing materials, supervises tattooing sessions, and ensures that tattoo designs are acceptable (i.e., unrelated to violence, hate, gang, or radicalization). Privacy and confidentiality are ensured but prison staff knows the names of the individuals attending the tattooing sessions. There is no information, education, or counseling on tattooing risks for people who are incarcerated, except for tattooists. The program is available only to men who have been sentenced. The project is funded by the European Commission's Erasmus+ program and reportedly running smoothly. There has been no published evaluation on its impact.

The project in Catalonia was not published and is only very briefly mentioned in an article overviewing harm-reduction strategies in detention centers in seven European countries [56]. Due to its focus on harm-reduction, the article was not identified in our search. However, the article was known by one of our co-authors. The tattoo-related harm-reduction intervention started in 2010 and consisted of providing safer tattooing information and making a professional tattooist available to people in prison. Tattoo restrictions, including of gang symbols, made the project unattractive – it was stopped within a year. There were no other details on intervention and outcomes.

Discussion

Despite the evidence that tattooing is prevalent in prison settings, that blood-borne infections are transmitted through unsafe tattooing, and safer tattooing practices are available to the general population and effective in preventing negative health consequences, this systematic review identified only one published research on safer tattooing from the grey literature. We found no peer-reviewed articles. Results from the Canadian project evaluation suggest that it was effective in enhancing knowledge of incarcerated people and prison staff on standard precautions, had the potential to reduce harm, provided vocational opportunities, and was feasible although enhancements were needed to improve implementation issues and efficiency. The project was halted due to the perceived low priority by the Government (“...taxpayer’s money should be put where it counts most. That means tackling crime, keeping drugs off our streets.”) [57]. The medical team of the Luxemburg prison is currently implementing a pilot project (still ongoing as of June 2018). Little is known about the closed Catalonian project.

The limited implementation of and research and publication on safer tattooing in prisons may be due to the clandestine and unregulated nature of tattooing in most closed settings. Illegal or stigmatizing behaviors are susceptible to underreporting, which may be compounded in carceral settings by consequential disciplinary measures for such activities. Therefore, underreporting and other reasons, including real differences between settings or variability due to sampling bias, may explain the large variation in tattooing prevalence estimates both within and between regions (see *Background*). Making tattooing licit and safer may receive limited support from criminal justice authorities, policymakers, and the public. In addition, policymakers may rely on the fact that there is no definitive evidence for a reduced risk of blood-borne infection transmission, especially HCV infection, when tattoos and piercings are done in professional parlors [36], although further evidence confirms that tattooing is an independent risk factor for HCV [39]. The public health importance of unsafe tattooing may be understandably overshadowed by injecting drug use in prisons, although there may be a higher proportion of people practicing unsafe tattooing than unsafe drug injection in prison settings [16, 17]. When comparing the risks involved, the current literature does not allow to state whether unsafe tattooing is a larger public health problem in prison despite an overall higher prevalence in prison settings. To this end, prospective research and modelling studies based on unsafe tattooing and injecting drug use prevalence and transmission risks are needed.

Call to action for policy, practice, and research

Even though safer tattooing has been recommended by United Nations agencies as part of a comprehensive package for harm reduction in prisons, there is currently a dearth of evidence to inform the implementation of such practices. We call upon governments, criminal justice authorities, non-governmental organizations, and academic institutions to implement and evaluate safer tattooing projects. There is sufficient sound evidence to underpin the public health need for safer tattooing strategies. In addition, not offering such harm reduction intervention violates human rights law and international obligations to safeguard individuals who are sentenced to prison – they are not sentenced to be exposed to greater risk of blood-borne infections while getting tattooed. People who experience incarceration keep their right to the highest standard of health while in detention, which includes the right to access preventive health and harm reduction services [58].

Implementation research is helpful to explore strategies to promote the systematic uptake of evidence-based practices, such as professional and safer tattooing services, which are available in the community [59]. Considering the scarce evidence regarding the implementation science on safer tattooing approaches, we call for more pilot initiatives on this neglected and understudied issue. These initiatives should adhere to the following guiding principles, which we propose based upon the results of our systematic review (principles 1, 2, and 4), feasibility and sustainability considerations combined with participatory action research tenets (principle 2) [60], and implementation recommendations for harm reduction strategies in closed settings (principle 3) [47].

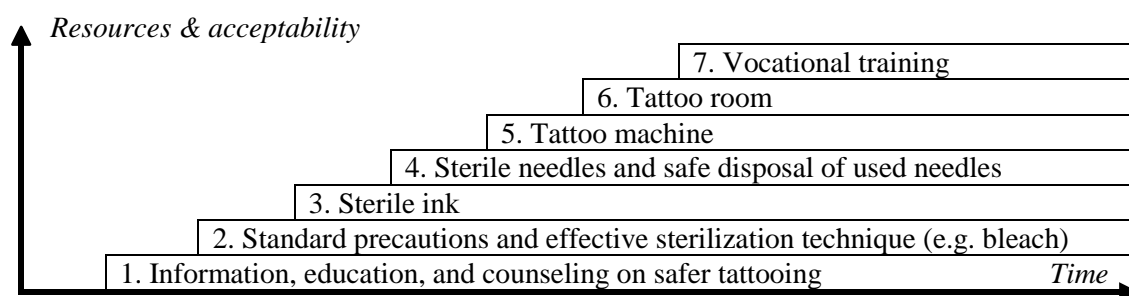
Guiding principles

First, integration of methodologically-rigorous implementation research to help inform the decision-making of public health and custodial policymakers, managers, and practitioners. Safer tattooing techniques are available in the general population; how can they be implemented in carceral settings? Novel projects should therefore include robust implementation research to systematically document how proposed models are implemented and what operational barriers and enablers they encounter [61]. In the next section (*Recommendations for further research*), we will expand on potential implementation research questions and provide examples of study design.

Second, involvement in the project design, implementation, and research of key stakeholders, including people who are incarcerated, public health and criminal justice authorities, prison and health staff, and research partners. This multi-stakeholder engagement is critical to conducting a participatory assessment of needs and resources, and to designing a project that is safe, acceptable, feasible, sustainable for all parties concerned, and potentially effective in demonstrating positive health outcomes. Sufficient time should be allocated to achieve the specific objectives of such project. For instance, demonstrating a reduction in the transmission of blood-borne infections, such as in the Canadian project, would require a long-term study with intervention and control groups – well beyond a year of implementation as it was done in that project.

Third, safer tattooing strategies in prisons should not operate in silos but be prioritized according to the public health needs and available resources in each detention setting and integrated within a comprehensive package of harm reduction strategies and blood-borne infection prevention, treatment, and care in prisons as defined by United Nations agencies [47]. In relation to safer tattooing, key interventions, drawn from the United Nations comprehensive package of harm reduction strategies combined with the promising practices reported in Canada and Luxemburg, could for instance include the following: information, education, and communication (IEC) on safer tattooing not only for tattoo recipients or tattooists but also for all incarcerated people and prison staff; voluntary confidential counseling and testing for blood-borne infections, including for HIV, HCV, and HBV, and, if indicated, treatment, care, and support; standard precautions and effective sterilization techniques, such as bleach; sterile ink; single-use needles and safe disposal of used needles; tattoo machines; dedicated and supervised tattoo room; and vocational training. These interventions can be implemented in a stepwise approach according to available resources and acceptability thresholds from authorities (see Figure 2). To have an impact on the *reservoir* and *modes of transmission* of blood-borne infections, the other recommended interventions of the package should also be given prime importance, including the more contentious but effective needle and syringe exchange harm-reduction programs [62]. When designing safer tattooing projects, stakeholders should not miss the opportunity of integrating other forms of skin penetration, such as body piercing, which is a known risk factor for blood-borne infection transmission and which may be more prevalent among women [63].

Figure 2. Model of a stepwise approach to safer tattooing in prison settings, according to time (x axis) and resources and acceptability from authorities (y axis)



Fourth, publication and dissemination of findings and, in case of positive outcomes, scaling up efforts must be a priority to help strengthen the body of evidence on safer tattooing in prisons and increase the alarmingly limited access to these harm-reduction practices for people who are incarcerated.

Recommendations for further research

The lack of high quality evidence found in this review has led to the identification of several knowledge gaps. These gaps represent research opportunities to look at how to best implement and improve access to safer tattooing in prisons. Table 4 outlines recommendations for further research according to the five dimensions of accessibility as mentioned under *Methods* [55]. These recommendations will offer decision-makers much needed evidence on how to design, implement, and evaluate strategies to increase access to safer tattooing in detention settings. In terms of implementation research, the choice of study design will depend on the research question [61]. For instance, quantitative approaches may be considered to assess the extent to which information, education, and counseling materials influence knowledge, attitudes, and practices related to blood-borne infections (e.g., pre- and post-intervention questionnaires); or to focus on the effectiveness of a selected harm reduction intervention for safer tattooing (e.g., pragmatic trial, or effectiveness-implementation hybrid trials [64], which have the advantage of assessing the effectiveness of both intervention and implementation strategy, and may be more relevant in prison settings and richer in information for decision-makers and program managers). The sensitivity around safer tattooing interventions and potential difficulties in conducting research in carceral settings (e.g., access to and communication with participants which is controlled by prison authorities, prioritization of security measures, integration of research into the daily work and routine in prison) may benefit from approaches that engage all key partners,

including people who are incarcerated, in iterative processes of reflection, negotiation, and action. As such, participatory action research could be a suitable method as interventions would be implemented by concerned individuals for themselves rather than done upon them – participant empowerment being an integral part of the process [60]. To further support, understand with nuances, and integrate multiple perspectives (e.g., insights into the willingness-to-pay for tattooing services) and multiple types of outcomes (e.g., acceptability, appropriateness, feasibility, or effectiveness – especially for multiple harm reduction interventions bundled into a comprehensive package), mixed methods research may be considered as an approach to address a variety of implementation questions [65].

Limitations

An incomplete retrieval of studies may have limited our research. However, efforts were made to hand search additional articles through backward and forward snowballing, include French and Spanish results in addition to English, and integrate grey literature. In addition, we asked stakeholders in Canada and Luxemburg to share their knowledge on other past or present projects around the world. The application of a narrative synthesis to the results of the reviewed study may have led to a loss of details, particularly of contextual factors that are important to the outcomes of the various interventions.

Conclusions

While safer tattooing techniques are effective in preventing the transmission of blood-borne infections and available to the general population, this review identified only a few promising strategies to ensure access to safer tattooing interventions in detention settings. The guiding principles and research questions outlined in this article will help stakeholders take informed decision and action to avail safer tattooing interventions for people who experience incarceration. Such harm reduction and preventive measures will not only benefit people who receive and give tattoos in prisons but also the population at large.

Table 4. Links between key areas of safer tattooing interventions, review findings, gaps in knowledge, and recommended focus for research

Key areas of safer tattooing interventions	Promising strategies based on findings	Gaps in knowledge	Areas for further research
Approachability (information provision)	Information and education materials given to all incarcerated people vs. only to tattooists and tattoo recipients.	Effect of information strategies over time on populations, including prison staff.	What information programs best increase awareness of both people in prison and prison staff and increase demand for safer tattooing services?
		Information on safer tattooing as part of an information package on blood-borne infection prevention, treatment, and care.	How to best integrate safer tattooing into a comprehensive infectious disease information package to increase demand for testing and counseling on HIV, HBV, HCV and other key infections?
			Are stand-alone information programs on unsafe tattooing risks as effective as providing information combined with safe tattoo room in reducing risks of blood-borne infection transmission through tattooing?
Acceptability	Supervision of a tattoo room by prison staff or by health staff.	Implementation of a tattoo room in prison health clinics (where such clinics are available) vs. in prison workshops.	Which implementation setting and supervision strategy are the most acceptable to people in prison, in addition to being cost-effective and feasible for the detention facility and the health services?
		Implementation of a stepwise model to safer tattooing that considers available resources and acceptability thresholds.	What is the effectiveness, feasibility, acceptability, and sustainability of each of the interventions outlined in a stepwise approach to safer tattooing (information, education and communication; standard precautions and effective sterilization techniques, such as bleach; sterile ink; single-use needles and safe disposal of used needles; tattoo machines; dedicated and supervised tattoo room; and vocational training)?
Availability of safer tattooing services	During non-working hours.	Limitations in the availability of a tattoo room when managed by health staff vs. prison staff	How to best professionalize safer tattooing services into an official prison vocational workshop (thus guaranteeing quality services that are available during business hours)?
Affordability	Below-market costs or free-of-charge tattooing services.	Influence of direct costs borne by recipients on uptake of safer tattooing.	What is the willingness-to-pay of prospective recipients?
Appropriateness	Provision by people in prison trained to be tattooists.	Provision by trained detainee-tattooists vs. external professional tattooists vs. a combination of both?	What are the feasibility, sustainability, and acceptability of a private-public partnership between the detention center and private professional tattooist?
		Inclusion of other related services.	In addition to safer tattooing services, what are the other services to be offered, including non-health services (e.g. skin piercing), and health services (provision of health information on blood-borne infection prevention and screening)?

Supplementary files

Notes from in-depth interviews: tattoo room, Luxemburg detention center

(translated from French into English)

Meeting on 28 June 17 with J, nurse unit manager, Luxembourg prison. Further information obtained on 31 August 17 by telephone conversation with M, nurse in charge of the tattoo room.

This project was made possible thanks to the European Erasmus+ fund, as part of a peer education programme. In terms of chronology, enrolment in the Erasmus+ programme took place in 2015; in April 2016, nurses received their training. The room and equipment were ready in April 2017.

Theme 1: Availability

What was there before the establishment of the room?

There is a needle exchange program in the facility, as well as condom distribution.

Where did this project come from?

It was S, a nurse from the unit who, following a personal interest, had launched the idea of this tattoo project. S had subsequently made it the theme of the dissertation work for a University Diploma in Public Health in Detention Setting.

The purpose of the project was not to remove illegal tattooing equipment, but to offer detainees something safer. The topic of tattoo risk reduction has emerged as a logical next step in a prison setting where a needle exchange program and condom distribution are already in place.

Have you contacted other facilities to help you with the set up?

No, there is no other prison in Luxembourg. We read about the Canadian pilot project.

What are the access times to the room?

The room is available in the morning or afternoon and on weekends. However, the access to the room is more difficult during the weekend because of the limited availability of guards to

accompany detainees to the tattoo room. During the week, this can be difficult because the detainee-tattoo-artist have other work to do.

The tattoo artists go zealously to the tattoo parlor, there is no absenteeism at this level.

The duration is maximum 4 hours per tattoo on a day, but there is no limit in the number of tattoos, nor in the time required for them.

Where is this room located?

The room sits within the medical service. Initially it was a storage room that was little used, and whose function was changed.

What is the role of the medical service in this structure? Who maintains the premises? Who is responsible for the hygiene, and the supply of the premises?

There are two nurses in charge of this project, and they are the ones who manage the whole process and are responsible for it.

These two nurses are responsible for the tattoo room, procurement, and the supervision of tattoos in terms of hygiene. They also ensure that there is no sign of radicalization. When an inmate wishes to have a tattoo, he or she asks for it via a letter addressed to the medical service. He can mention by which tattoo-artist he wishes to be tattooed. The inmate will then be received by the detainee-tattooist-artist and by one of the responsible nurses in order to define the project.

The tattoo room is available to detainees. The nurse can intervene in case of forbidden designs, but it will not intervene in case of discontent or disagreement between the detainees, who will have to find a solution between them. The role of the nurse is essentially to provide clean material.

Theme 2: Acceptability

With regard to confidentiality, human rights and privacy, how did you organize the room? Do the guards stay with you?

One of the responsible nurses is continuously present during tattooing and monitors hygiene conditions. The room is closed during the tattoo session. It is the responsible nurses who plan

the tattooing sessions, and who are responsible for asking the prison authorities whether there are security issues between a detainee-tattooist and the inmate wishing to be tattooed.

With regard to confidentiality, the guards are not in the tattoo room, but know who comes to be tattooed because they manage the flow of patients in the medical service.

Within the medical team, how was this project received?

There was no noticeable concern. The topic of tattoo risk reduction has emerged as a logical next step in a prison setting where a needle exchange program and condom distribution are already in place.

Within the team, there are apparently two nurses who have a "problem" with the needle exchange program and also a little bit with the tattoo project, but they have been put back to their place by their superior.

As for the prison authorities, they disseminated the orders in a hierarchical way so that the project could not be debated or questioned.

Theme 3: Appropriateness

Does this project correspond to a real demand?

This project comes from an idea of the medical service, and especially from a nurse who was interested in the subject. S had met the "clandestine" tattooers before putting in place the project. It does not come from an idea / request from the management or the detainees.

Have you evaluated the program since its inception? how?

Program evaluation: completed questionnaire (by/for nurses) before and after the project started in the context of reporting to Erasmus+.

And the enabling factors?

Management was involved in the project and supported it from the start.

The two main problems reported by one of the nurses responsible for the room are:

- being "victims of their success" because they have a long waiting list. For the record, since April 2017 and the opening of the local, 60 tattoos have been made in 170 hours.

- the difficulty encountered in the accompaniment of detainees by the guards. This is all the more problematic as the time available for the tattoo room is already limited because of the working hours.

Theme 4: Affordability

Who paid for the room: the prison? the hospital? the inmates? all or part of it (only labor or material)?

This project was made possible by the European Erasmus+ fund, as part of a peer-to-peer education program. The Erasmus+ fund provided them with EUR 6000. The training of the nurses cost EUR 1000, the two tattoo machines cost EUR 400 each. Currently, they have EUR 800 left and a lot of needles and ink because it is very cheap.

Access to the tattoo room is free for inmates.

This is a room in the medical service that has been refurbished for the project. This storage room was only rarely used, and its refurbishing was not expensive. As for the nursing staff, two nurses were assigned to this project, but there was no new position created: this was done with the existing staff.

As to whether this tattoo-artist work could become a vocational workshop as such, this is not possible. Indeed, in this prison, money exchange between two prisoners is forbidden. And bringing in an external tattoo-artist to make tattoos could increase the tattoo costs and create inequality between people according to their economic resources.

Theme 5: « Approachability »

What was the mode of communication and information around this project? Have you done "advertising" for it?

There was no advertising or sign in the establishment. We met with the detainee syndicate once before starting the project, and then each syndicate representative disseminated the information to his quarter. There was no reminder from the medical service or verification of the information that had been transmitted between the detainees.

Was there a medical assessment prior to tattooing (psychiatric assessment, skin condition, serological assessment)? Did you take the opportunity to do prevention and information sessions around the risks of injections and/or tattooing?

There is no medical consultation or psychiatric evaluation before tattooing. As for the serologies, they are mandatory at the entrance, as well as a medical consultation and a chest x-ray. On the other hand, rapid tests for HIV are offered during the HIV day. Regarding the other prisoners in the prison, you should know that they all receive an information session on arrival on hepatitis and hygiene. This training is provided by the TOX (Communicable Disease Prevention) program, independent of the medical service.

In terms of information/prevention sessions, this was done for the detainee-tattoo-artists as part of their training.

Notes:

Initially, the nurses responsible for the tattoo project were accompanied by a doctor to go and to meet with the representatives of the detainee syndicate (one per quarter) to explain the project. Initially, the fear of the detainees was that this project was an attempt by the management to know who a tattooing artist is for control purposes. After clarification, they accepted because they understood that the goal was to provide them with something safer, and not to control or remove existing clandestine material.

Subsequently, those who wanted to become a tattooist had to write a letter of motivation addressed to the nurses. Once the tattoo artists had been selected, they received training on hygiene and blood-borne diseases.

In parallel, a professional tattoo artist met with the nurses, then met with the detainee-tattooist candidate to train on how to use the tattoo machine. Another private tattoo artist was contacted by the nurses and agreed to come and give half a day of training for the detainee-tattooist candidates. The main purpose of this training was to learn how the tattoo machine works, and how to handle the needles. He is not expected to return to train detainee-tattooists. Indeed, the initial goal of this project is peer-to-peer education. When there will be new tattoo artists to train, it will be the tattoo artists in place who will transfer knowledge to them.

The detainee-tattooists were trained by the nurses on hygiene and communicable diseases. There are no plans to refresh the knowledge of tattoo artists who were already trained.

In September 2017, new detainee tattooists will be trained and will receive training on hygiene and communicable diseases by nurses. The specific training for the tattoo machine

will be done by the tattooist inmates themselves, as part of the peer-to-peer education program.

The initial goal of this project was to reduce the number of illegal tattooists. In the evaluation questionnaires, it was found that tattoo artists had a strong interest in tattooing, and that their interest in reducing risk was lower. Thus, they did not transmit information on this subject to other prisoners.

This work as a tattoo artist is not recognized outside, but according to the unit nurse, this can be an advantage. On the other hand, the rewarding aspect of being a tattoo artist and being recognized within the facility seems to be an important aspect. Tattoo artists have expressed their pride in being acknowledged and in tattooing with good material.

The room is available to all detainees, regardless of their criminal status. There has been no female candidate to be a tattoo artist, which is why they do not have access to the premises yet. Women can only be tattooed by women. It also seems that they demand more a room for piercing than tattooing.

The project was evaluated by questionnaires for tattooist and those who received tattoos in the context of Erasmus+ reporting.

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