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ORIGINAL REPORT

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Prescription of pain medication in prisons: A comparative analysis of younger and older male prisoners

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Abstract

Purpose: In prison populations, treating pain is particularly challenging, especially for the growing number of older prisoners. The objective was to find out about prevalence, frequency, and types of pain medications prescribed to older prisoners (≥50 years) in comparison with younger prisoners (<50 years).

Methods: Data were collected in Switzerland as part of a study on ageing prisoners' health. Fifteen prisons (out of 26 of the total eligible population) agreed to take part, and data from medical records of 190 older and 190 younger male prisoners were analysed. Descriptive statistics on pain medication prescriptions (excluding drugs used in opioid dependence) were carried out and differences between the 2 age groups tested for statistical significance.

Results: More than half of younger and older prisoners were prescribed pain medication during the past 180 days, while 10% of younger and 15% of older prisoners were prescribed pain medication on a daily basis. Nonsteroidal anti-inflammatory drugs and "other analgesics and antipyretics" were most frequently prescribed. Significantly ($P < .05$), more younger than older prisoners were prescribed NSAIDs and drugs to treat muscle skeletal pain. Tramadol was the opioid most often prescribed.

Conclusions: This is the first empirical study investigating prescriptions of pain medication in Swiss prisoners on a national level. It shows that nonopioid pain medication is an important part of health care provision inside prison, while there are only few prescriptions of strong opioids. Research is needed to investigate whether the standard set by the principle of equivalence is met regarding treatment of pain in prison.

1 | INTRODUCTION

Pain is an unpleasant sensation—comprising physical and nonphysical components—accompanying many conditions. It is one of the most common reasons patients seek help from health care professionals,[1] and the subjective nature and multidimensionality of pain make its assessment and management complex.

In prison populations, treating pain effectively is particularly challenging. Constantly growing prison populations[2] are marked by high morbidity.[3-6] Numbers of prisoners aged 50 years and over—in the literature often defined as "old" because of accelerated ageing[7,8]—are particularly on the rise, and these prisoners suffer from even higher morbidity than younger prisoners.[9] Most conditions arising with older age are accompanied by pain,[10] making adequate pain management in prison all the more pressing.

Every individual should be entitled to pain relief, which has been proposed as a human right.[11] According to the principle of equivalence of care, health care should be of the same quality in prison as

in the community.[12-14] Prisoners, however, live in an environment where the delivery of health care faces several challenges and the provision of equivalent care is difficult.[4,15-20] Notably, pharmacotherapy in prisons is complicated by concerns about in-cell accumulation, diversion, and misuse of medications.[21-24] Pain medications are among the most frequently prescribed drugs in prisons.[17,24] A Swiss comparative study reports high prescription rates of systemic analgesics—mostly nonsteroidal anti-inflammatory drugs (NSAIDs) and paracetamol—for prisoners.[25] However, there remain reports of undertreatment.[26]

Literature concerning the epidemiology of pain and pain management in prison is rather scarce, especially for older prisoners. One study found high rates of severe frequent pain in prisoners 55 years and older, of which a majority received analgesics, including opioids.[21] There are numerous recent publications on pain management at the end of life, focusing on palliative care,[27-30] and a few empirical studies focusing on specific types of pain (eg, cancer pain[31] or chronic noncancer pain[32]) among prisoners. However, attention to pain management in prison has recently gained some traction, and there have been calls for guidelines in treatment of pain in the prison setting.[33,34] In sum, a lack of empirical data on pain management among prisoners exists and possible differences between age groups still require investigation.

Consequently, the aim of our study is to fill this gap, by presenting data on the prescription of pain medication for a sample of older male prisoners in Switzerland and comparing it with a sample of younger male prisoners. Based on data of pain medication use in the Swiss general population[35] and on other studies of pain management in prison populations,[32,36] we hypothesised that older prisoners are prescribed pain medication more often and that they are prescribed different types of pain medication.

2 | METHODS

2.1 | Data collection

Switzerland consists of 26 areas ("cantons") that enjoy a high degree of autonomy. This leads to diverse prison systems and ways of providing health services in prisons.

Data were collected in Switzerland between November 2011 and April 2014 as part of the "Agequake in prisons" project. Approval from all relevant ethics committees was obtained.

First, a list of prisons that fulfilled the inclusion criteria of the study (ie, long-term imprisonments, defined as prisoners with sentences of 1.5 years or more, housing prisoners aged 50 years and above, prisons with more than 20 places, from French- or German-speaking regions of Switzerland) was created. Based on this list, 26 prisons providing space for 2879 prisoners were asked to participate in the study. Out of these, 15 prisons (holding 2198 prisoners) agreed to take part (ie, 76.3% of the eligible population). Eleven facilities declined to participate because of lack of time or other resources. Prisoners were informed about the study and had the possibility to opt out in case they did not want data to be anonymously extracted from their medical records. In total, 14 prisoners chose this option.

KEY POINTS

- More than half of male prisoners were prescribed pain medication during the past 180 days.

- On a daily basis (on average), 10% (<50 years) or 15% (≥50 years) of prisoners were prescribed pain medication.

- "Nonsteroidal anti-inflammatory drugs" (M01A) and "other analgesics and antipyretics" (N02B) were the types of pain medication most frequently prescribed to prisoners.

- More younger than older prisoners (prevalence) were prescribed "nonsteroidal anti-inflammatory drugs" (M01A), "topical products for joint and muscular pain" (M02A), and "muscle relaxants" (M03).

- Tramadol (N02AX02) was the (weak) opioid most often prescribed to prisoners.

- Strong opioids for the treatment of pain were rarely prescribed to prisoners (<3%).

Consequently, data were collected from the medical records of all (male and female) prisoners aged 50 and older (n = 203). The same number of files of younger prisoners (n = 203), aged 18 to 49 years, was randomly chosen for comparison (for more detailed information, see Wangmo et al.[37]).

Besides other health-related data, information on medication (ie, product name, type of prescription, and beginning and end date of prescription) was collected and entered into an EpiData file.[38] Subsequently, a list of prescribed pain medications was compiled, based on the anatomical therapeutic chemical classification system codes.[39]

2.2 | Medications included

All medications used to treat chronic or acute pain were relevant for the present study, including strong and weak opioids (anatomical therapeutic chemical classification system codes: N02A), "other analgesics and antipyretics" (N02B), "antimigraine preparations" (N02C), NSAIDs (M01A), "topical products for joint and muscular pain" (M02A), "muscle relaxants" (M03), "antispasmodics in combination with analgesics" (A03D), and "combinations of antispasmodics, psycholeptics, and analgesics" (A03EA). "Drugs used in opioid dependence" (N07BC) were excluded (Figures 1–3) or listed separately (Table 1).

For each prisoner and each day during the past 180 days (from the day of the first research visit in the respective prison), a list of prescribed pain medications was compiled. The list included (a) firm prescriptions, ie, medications that have to be given on a regular (mostly daily) basis, (b) pro re nata medications, for which a medical prescription from the physician is needed and the prisoner has to request the medicine from the health care service if needed (eg, medications containing mefenamic acid to treat headache), and (c) over-the-counter medications given to the prisoner on request, which can be obtained by the prisoner from the health care service without a physician's prescription (eg, topical products to treat back pain).
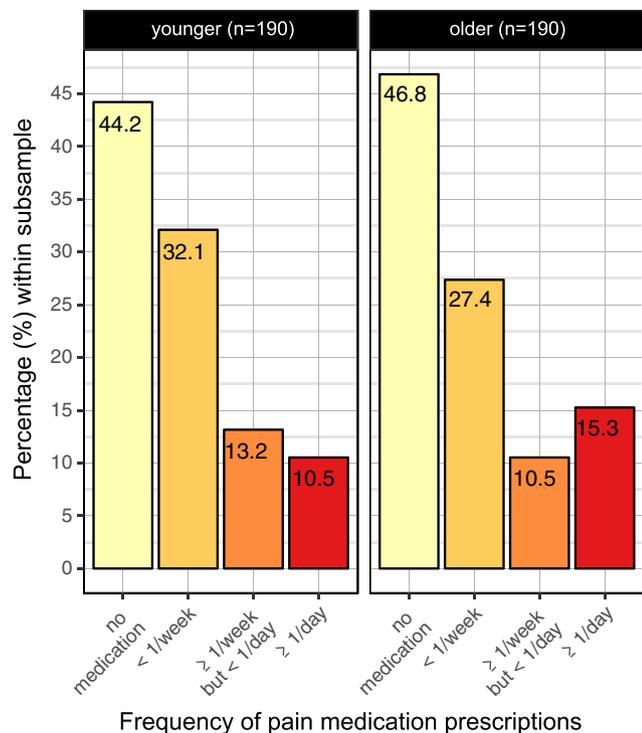
FIGURE 1 Frequency (%) of overall pain medication prescriptions to male prisoners (during past 180 days), by age group. Counted as pain medication are opioids (N02A), other analgesics and antipyretics (N02B), selective serotonin agonists (N02CC), NSAIDs (M01A), topical products for joint and muscular pain (M02A), and muscle relaxants (M03); "<1/week" = 1-25 medications, "≥1/week but <1/day" = 26-179 medications, "≥1/day" = 180 and more medications during the past 180 days. Statistical significance (GLMM): There was no significant correlation between age group and frequency of pain medication prescriptions, n = 340 [Colour figure can be viewed at wileyonlinelibrary.com]

FIGURE 2 Prevalence (%) of pain medication prescriptions to male prisoners, by ATC groups and age group. ATC = anatomical therapeutic chemical classification system; N02A = opioids, N02B = other analgesics and antipyretics, M01A = NSAIDs, "other": N02CC = selective serotonin agonists, M02A = topical products for joint and muscular pain, M03 = muscle relaxants. Younger: n = 190, older: n = 190; cumulative prevalence exceeds 100%, because of the possibility of multiple medication use per person. Statistical significance (GLMM): *the statistical models revealed significant correlations (on the $P < .05$ level) between age group and prevalence of pain medication prescriptions concerning NSAIDs ($t = -0.564$; 95% CI, -1.041 to -0.086; $P = .021$) and "other" pain medications ($t = -0.642$; 95% CI, -1.189 to -0.095; $P = .022$), but not for opioids or other analgesics and antipyretics, n = 340 [Colour figure can be viewed at wileyonlinelibrary.com]

2.3 | Data analysis

We calculated descriptive statistics (prevalence and frequency of pain medication prescriptions) and tested for statistically significant differences between the 2 age groups using regression models with a dichotomous age group variable as the predictor. We chose generalised linear mixed models (GLMMs) with a negative binomial family link function (or, in case of dichotomous outcomes, binomial with a logit link function) to account for specific characteristics of the data (non-normally distributed and overdispersed count data).[40] Because not all participants had been in prison for at least 180 days at the time of data collection, we also included an offset variable in our models, calculated from the actual time span for which data were available for each subject. To further control for the clustering of our sample into 13 prisons, we added a categorical variable for the prison as a random factor. We used R[41] (version 3.1.1 or newer, with the packages "ggplot2,"[42] "dplyr,"[43] "lme4,"[44] "optimx,"[45] "lmerTest,"[46] "MASS"[47]) for all data analyses. Reported 95% confidence intervals are approximated Wald confidence intervals as implemented in the R package lme4.

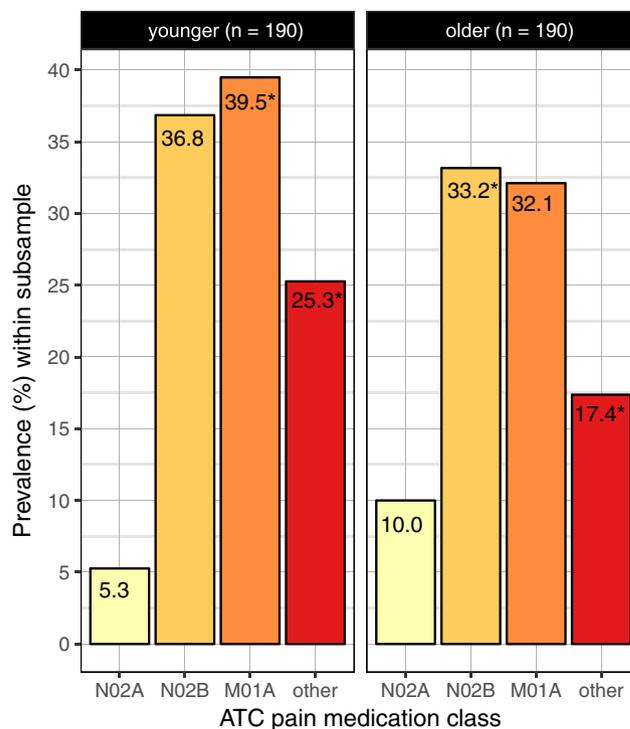We excluded data from women (n = 26, housed in 2 different prisons) for our analyses, because women show generally higher prevalence rates of pain medication use than men[35,48] and have different health problems and needs from their male counterparts.[4,36,49] Furthermore, their number was too small to carry out a representative separate analysis.

3 | RESULTS

3.1 | Sample description

In line with the study's sampling strategy, 190 prisoners were between 20 and 49 years old ("younger") and 190 prisoners were between 50 and 75 years old ("older") at the day of data recording. Mean age was 34.3 (SD, 7.4) years in the younger and 58.8 (SD, 5.8) years in the older sample. At the day of data recording, mean time already served in prison was 2.5 (SD, 2.5) years for younger and 5.2 (SD, 6.3) years for older prisoners (missing data: n = 40). All reported prisoners were male. Many were not of Swiss nationality (younger: 70.5%; older: 35.8%) (no missing data on demographic variables).
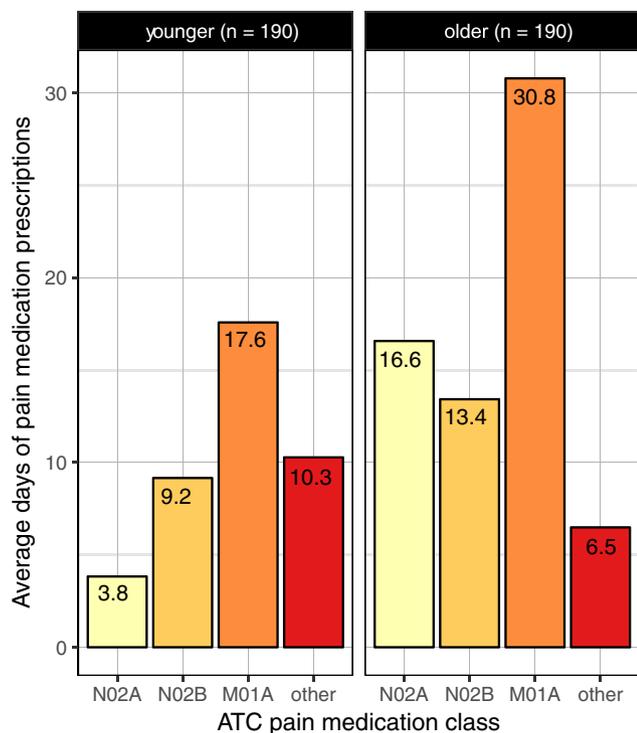
FIGURE 3 Average days of pain medication prescriptions per individual male prisoner (during past 180 days), by ATC groups and age group. ATC = anatomical therapeutic chemical classification system; N02A = opioids, N02B = other analgesics and antipyretics, M01A = NSAIDs, "other": N02CC = selective serotonin agonists, M02A = topical products for joint and muscular pain, M03 = muscle relaxants. Younger: n = 190, older: n = 190; cumulative prevalence exceeds 100%, because of the possibility of multiple medication use per person. Statistical significance (GLMM): There was no significant correlation between age group and frequency of pain medication prescriptions by ATC groups, n = 340 [Colour figure can be viewed at wileyonlinelibrary.com]

3.2 | Prescribed pain medications among younger and older prisoners

Within the measured interval of 180 days, a total of 29 individuals (7.6%) were prescribed weak or strong opioids to treat pain. Tramadol or tramadol combinations were the opioids most often prescribed (Table 1). Weak opioids other than tramadol (codeine-paracetamol combinations or dihydrocodein) were rarely prescribed (younger: n = 2; older: n = 1 individuals). Methadone was prescribed to 15 individuals. Eight patients (younger: n = 1, older: n = 7) were prescribed strong opioids other than methadone, which could either have been prescribed to treat pain or used ("off label") to treat opioid dependence (oxycodon-naloxon combinations, slow-release oral morphine, oxycodone, fentanyl, nicomorphine).

Other analgesics and antipyretics, mostly paracetamol as well as NSAIDs, were frequently prescribed: Over one-third of the sample was prescribed either other analgesics and antipyretics (35.0%) or NSAIDs (35.8%) within the measured 180 days.

Topical products for joint and muscular pain were prescribed to nearly 1 in 5 prisoners, while muscle relaxants and "selective serotonin agonists" to treat pain prescribed less often.

There were no prescriptions of antispasmodics in combination with analgesics or combinations of antispasmodics, psycholeptics, and analgesics.

3.3 | Frequency of overall pain medication prescriptions (younger versus older prisoners)

During the past 180 days, a good half of the sample was prescribed some type of pain medication at least once in both subgroups. Frequency patterns of pain medication prescriptions were similar among younger and older prisoners (Figure 1): 3 in 4 prisoners were either not prescribed any pain medication at all, or rarely—on average, less than once per week. Roughly 10% of younger and 15% of older prisoners were prescribed pain medication on average on a daily basis (180 or more prescriptions during the past 180 days).

3.4 | Prevalence of pain medication prescriptions, by medication type (younger versus older prisoners)

Around 1 in 20 younger and 1 in 10 older prisoners were prescribed opioid analgesics, mostly tramadol and combinations during the past 180 days (Figure 2). Nonopioid analgesics, or more concretely, NSAIDs and other medications, that is, topical products for joint and muscular pain and muscle relaxants, were prescribed to markedly more younger than older prisoners. Thus, in the GLMM, there is a significant correlation between younger age and the prescription of NSAIDs ($t = −0.564$; 95% CI, −1.041 to −0.086; $P = .021$) and other pain medications (N02C, M02A, and M03) ($t = −0.642$; 95% CI, −1.189 to −0.095; $P = .022$). However, there were no significant results concerning opioids.

3.5 | Frequency of pain medication prescriptions, by medication type (younger versus older prisoners)

Older prisoners were prescribed opioids on average for 16.6 days, during the past 180 days, while younger prisoners where prescribed opioids for 3.8 days (Figure 3).

Although older prisoners were prescribed nonopioid analgesics at lower rates than younger prisoners (see above, Figure 2), the former received more *intensive* prescriptions than the latter: Other analgesics and antipyretics were prescribed for 13.4 days to older versus 9.2 days to younger prisoners, while NSAIDs were prescribed for 30.8 days to older and 17.6 days to younger prisoners. The GLMMs, however, do not show significant correlations between age group and the average days of prescriptions.

4 | DISCUSSION

Analysis of 380 medical records indicates that the use of pain medication is an important part of health care provision inside prisons. More than half of both younger and older prisoners were prescribed pain medication during a period of 180 days. Ten percent of younger and 15% of older prisoners were prescribed pain medication on a daily basis.

Prevalence rates of pain medication prescriptions between the 2 age groups vary: Significantly more younger prisoners were prescribed NSAIDs and drugs to treat muscle skeletal pain. This latter finding

TABLE 1 Prescriptions of pain medication to male prisoners (during past 180 days), by ATC categories and age group[a]

ATC code	Name	Younger (<50 years) n = 190		Older (≥50 years) n = 190	
		Prevalence, % (n)	Days with prescriptions mean, SD	Prevalence, % (n)	Days with prescriptions mean, SD
N02	Analgesics	38.9 (74)	14.89 (46.68)	36.8 (70)	30.61 (89.44)
N02A	Opioids	5.3 (10)	3.83 (23.83)	10.0 (19)	16.58 (66.02)
N02AX02	Tramadol	4.2 (8)	3.05 (22.57)	6.3 (12)	5.31 (31.76)
N02AX52	Tramadol combinations	1.1 (2)	0.58 (7.70)	0.5 (1)	0.02 (0.22)
N02A (…)	Other opioids	1.6 (3)	0.19 (1.77)	4.2 (8)	11.26 (57.54)
N02B	Other analgesics and antipyretics	36.8 (70)	9.16 (33.72)	33.2 (63)	13.43 (41.48)
N02BA	Acetylsalicylic acid	4.7 (9)	1.12 (13.18)	3.2 (6)	2.34 (18.00)
N02BB	Pyrazylones	5.3 (10)	2.65 (18.05)	5.3 (10)	2.85 (17.45)
N02BE	Anilides	32.1 (61)	5.39 (23.47)	31.1 (59)	8.23 (31.60)
N02BE01	Paracetamol	28.9 (55)	5.24 (23.47)	26.3 (50)	7.55 (31.48)
N02C	Antimigraine preparations	1.1 (2)	1.89 (18.42)	1.1 (2)	0.60 (5.92)
N02CC	Selective serotonin agonists	1.1 (2)	1.89 (18.42)	1.1 (2)	0.60 (5.92)
M01A	NSAIDs	39.5 (75)	17.58 (46.80)	32.1 (61)	30.79 (88.57)
M01AB	Acetic acid derivates and related substances	18.9 (36)	4.99 (24.13)	15.8 (30)	9.56 (41.10)
M01AC	Oxicams	2.6 (5)	1.11 (12.08)	1.1 (2)	0.03 (0.30)
M01AE	Propionic acid derivates	16.3 (31)	5.11 (26.09)	15.8 (30)	13.23 (49.51)
M01AG	Fenamates	18.9 (36)	4.99 (24.94)	11.1 (21)	4.43 (24.49)
M01AH	Coxibs	0.5 (1)	0.01 (0.07)	0.0 (0)	0.00 (0.00)
M01AX	Other NSAIDs	2.1 (4)	1.38 (11.15)	4.2 (8)	3.56 (23.34)
M02A	Topical products for joint and muscular pain	20.0 (38)	6.70 (39.51)	16.3 (31)	4.52 (24.58)
M03	Muscle relaxants	5.3 (10)	1.68 (14.07)	2.6 (5)	1.37 (11.75)
N07BC	Drugs used in opioid dependence	5.8 (11)	8.92 (45.11)	2.1 (4)	3.46 (24.02)
N07BC02	Methadone	5.8 (11)	8.92 (45.11)	2.1 (4)	3.46 (24.02)

Abbreviations: ATC, anatomical therapeutic chemical classification system; NSAID, nonsteroidal anti-inflammatory drug; SD, standard deviation.

[a]Medications are counted in their main category and in all reported subcategories. For example, paracetamol with ATC code "N02BE01" is counted in the categories "N02," "N02B," "N02BE," and "N02BE01." Cumulative prevalence of the main categories exceeds the total sample sizes n = 190 or 100%, respectively, because of the possibility of multiple medication use per person.

could be explained by different daily activities of younger prisoners compared with older prisoners: Younger prisoners' lives are generally marked by more (sports) injuries that can lead to osteoarticular pain. Regarding NSAIDs, with increasing age, the human body's metabolism makes it more likely that the prescription of such medication could be contraindicated (eg, increased risk of peptic ulcer bleeding).[50]

Although prescription rates for strong opioids have sharply increased within the last years in Swiss[51] and other[52] general populations, there were very few prescriptions of strong opioids for pain treatment in our prison sample. Instead, tramadol—a weak opioid to treat moderate pain—was most frequently prescribed. The avoidance of strong opioids in prison, even when it comes to treating severe pain, is in line with current prison guidelines in the United Kingdom[23] and common practice in Switzerland.[24] It reflects a widespread fear of prescribing opioids in a context where the prevalence of drug addiction and patients in opioid substitution therapy is high.[24,53] Also, it might reflect prisons' endeavours to prevent misuse and passing on of prescribed medications, to which strong opioids are more prone than other substances. One could ask whether the limited use of strong opioids for pain treatment in prisons violates the principle of equivalence, requiring health care of the same quality as in the community. It could be especially problematic for incarcerated dying or cancer patients who might

need strong opioids. Indeed, the present situation seems to allow the prescription of weak opioids (tramadol) only. Interestingly, buprenorphine (N02AE01/N07BC01) was not prescribed at all to the prisoners of our sample during the analysed reference period of 180 days. Particularly, regarding our older sample, this is remarkable as buprenorphine has been named the "top-line choice" for opioid treatment, in the management of chronic severe pain in the elderly.[10] In conclusion, our results confirm previously expressed concerns that some correctional settings severely restrict the availability of opioids.[54] Whether this is related to insufficient pain treatment as has been described for US correctional facilities,[55] or whether prisoners whose health situation requires strong opioids are always transferred to hospital structures, cannot be decided based on the available data.

Our study's main objective was to explore types of pain medications prescribed to older and younger prisoners and not to estimate precise prevalence rates of pain medication use among prisoners. Yet cumulative prevalence rates (past 180 days) in our study seem rather high, compared with data from other studies of analgesic prescriptions to prisoners in Geneva, Switzerland, (this study covered a data collection period of 3 weeks),[25] Norway (1 week),[56] or Australia (2 weeks).[36] Furthermore, the prevalence rates in our study are higher than those from a UK prison study, using a 12-month data collection

period.[57] On the other hand, a study of older jail inmates (mean age, 59 years) in California, also collecting data for a 12-month period, finds markedly higher prevalence rates of analgesics prescriptions, including opioids, mostly to prisoners suffering from severe persistent pain.[21] Finally, according to a UK study, approximately 1 in 5 prisoners received analgesics for chronic noncancer pain, with many receiving opioids.[32] Considering the few studies that are available on analgesics prescriptions in prisons, prevalence rates vary widely. This variance, however, can be explained to a large degree by differences in study populations (eg, including males/females) and additional parameters, such as duration of data collection periods.

Is pain equally treated in and outside prison? Finding an answer to this important ethical question requires a comparison with data from nonprison populations. However, such assessments are methodologically challenging. We tried to match the results of our study with similar data from the Swiss Health Survey (SHS),[35] although study designs and measured variables are difficult to compare. When we take self-reported pain medication use in the general population (SHS) and prescriptions of pain medications from our prisoners' sample during the last 7 days as a basis, we find that the proportion of males who are prescribed pain medications on a daily basis is markedly higher in the prisoner sample. This is true for younger (20-49 years) as well as older (50-75 years) individuals (calculations based on SHS 2012 data). This finding certainly reflects the higher morbidity in prisoners compared with the general population of the same age.[3,7,58] However, it could be an indication of adequate treatment in prisoners and equivalence of care concerning the prescription of analgesics in general. The present study provides novel insights into pain medication prescriptions to prisoners over a certain period of time contrasting 2 age groups. Nonetheless, findings need to be interpreted taking into account the following limitations:

Although differences between age groups concerning opioid prescriptions seem obvious, with twice as many older than younger prisoners being prescribed opioids to treat pain, the regression model applied (GLMM) did not find statistically significant differences. This might be due to the rather small sample size and frequencies and unequally distributed data.

As mentioned above, our study focuses on prescription practice but did not measure actual pain medication use. From our own experience, it appears that medication is handled carefully by prison health care services, and therefore, prescribed medication is always distributed to prisoners if required. Nevertheless, we cannot know how often prisoners actually take the medication they are given. Considering the frequent in-cell accumulation of prescribed medications[24] and possibility of diversion (including selling and stealing) among prisoners,[21,23] we must assume a gap between prescriptions and actual use of analgesics. From studies outside prisons, it is known that patient compliance with prescriptions is far from optimal,[59] and we have no reason to believe it is higher in prisons. In particular, we did include pro re nata prescriptions, but we could not discern from our data how often those medications were actually administered to and taken by the prisoners. Moreover, because of missing information, we could not exclude pain medications prescribed for fever control. All those factors might have led to a certain degree of overestimation of prevalence rates of pain medication prescriptions as described in our study, when compared with effective pain medication use. On the other hand, we had to drop several prescriptions from our analyses because they were illegible or the start dates were not available.

In our sample, 39 prisoners (10.3%) had been in prison for less than 180 days on the day of data recording, while time spent in prison was unknown for 40 individuals (10.5%). Thus, the descriptive results could be biased if one assumes that younger prisoners on average have spent less time in prison and that their number of prescribed medications is accordingly lower than that of older prisoners. However, we can refute such bias because in our sample, the proportion of prisoners with short stays (<180 days) is similar among younger (11.8%) and older (11.1%) prisoners, while missing data on time spent in prison is also nearly equally distributed in the 2 age groups. In the statistical models (GLMMs), we controlled for time spent in prison. Consequently, 40 individuals were excluded from analysis because of missing data on the time spent in prison. Overall, since missing data on that variable is equally distributed between younger and older prisoners, the validity of the GLMMs to test for significant differences between the 2 age groups should not have been affected.

Finally, we did not control for the chronology of prescribed pain medications. We did not analyse drug combinations nor doses.

To our knowledge, this is the first empirical study investigating prescriptions of pain medication in Swiss prisoners on a national level. It permits the first available outline of prevalence, frequency, and types of pain medication prescriptions to younger and older prisoners in Switzerland.

Our results highlight the importance of adequate and consistent pain treatment in prisons (eg, by developing clinical guidelines). Future studies are needed to investigate whether prescriptions are in line with the WHO ladder for pain management[60] and to enable methodologically sound comparisons to general population data in order to check whether the principle of equivalence is met regarding treatment of pain in prison.

ETHICS STATEMENT

All procedures performed for the present study were in accordance with the ethical standards of the 1964 Declaration of Helsinki and its later amendments. Individual consent was not obtained in our study. Prisoners were informed about the study, and those who did not wish for their data to be anonymously extracted had the possibility to opt out from the study by denying access to their medico-legal files. This procedure was approved by the ethics committees of all involved Swiss "cantons" (areas).

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CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

AUTHOR CONTRIBUTIONS

B.A. contributed to the design of the study, ran statistical analyses, and wrote the final manuscript; W.B. collected data, contributed to the design of the study, to statistical analyses, and to the finalisation of the manuscript; V.H. collected data, wrote a first draft of the manuscript, and contributed to the design of the study; A.B. ran statistical analyses and designed table and figures; B.E. was responsible for the conception of the overall project and contributed to the design of the study. All authors participated in revising the manuscript and have approved the final version.

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