Female genital mutilation/cutting (FGM/C) coding capacities in Swiss university hospitals using the International Classification of Diseases (ICD)

S. Cottler-Casanova, M. Horowicz, A. Gayet-Ageron and J. Abdulcadir

Abstract

Background: The real prevalence and incidence of women living with or at risk of female genital mutilation/cutting (FGM/C) is unknown in Switzerland and many parts of Europe, as there are no representative surveys similar to DHS or MICS for European countries. Indirect estimates are commonly used to estimate the number of women with FGM/C in high-income countries, but may not reflect the actual FGM/C prevalence among migrants. Direct measures may provide more accurate estimates that could guide policy- and clinical decision-making. Swiss hospital data may provide a sample of patients that can be used to describe the prevalence of FGM/C in Swiss hospitals. Our study assesses the number of inpatient women and girls in Swiss university hospitals from countries with high FGM/C prevalence, and of inpatients with a coded diagnosis of FGM/C.

Methods: We conducted an exploratory descriptive study in Switzerland to assess the number of women and girls admitted to Swiss university hospitals between 2016 and 2018 from 30 FGM/C practicing countries, as well as inpatients with a coded diagnosis of FGM/C using anonymized data. We calculated indirect estimates for inpatient women and girls living with or at risk of FGM/C and compared them with the number of inpatients with a coded diagnosis of FGM/C.

Results: 8720 women and girls from FGM/C practicing countries were admitted. 207 patients had a coded diagnosis of FGM/C, including 7 with a nationality outside the 30 targeted countries, corresponding to an overall prevalence of 2.3% (95%CI, 2.0–2.6). The number of FGM/C cases by hospital was significantly different across years (P < 0.001), with a higher proportion of cases collected in Geneva, Switzerland.

Conclusions: The comparison between indirect estimates of inpatients with or at risk of FGM/C and the low number of FGM/C cases coded, suggests low recording and coding capacities of FGM/C.

Tweetable abstract: The capacity of coding primary and secondary diagnosis of FGM/C in Swiss university hospitals seems low.

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Introduction

Female genital mutilation/cutting (FGM/C) is the partial or total removal of the external female genitalia for non-medical reasons [1]. The World Health Organization describes four FGM/C types [Table 1]. Approximately 200 million women and girls have undergone the practice according to UNICEF [2]. The Demographic Health Survey (DHS) developed by ICF International or the Multiple Indicator Cluster Surveys (MICS) directed by UNICEF, conducted in 27 African and three Asian countries practicing FGM/C provide FGM/C prevalence estimates based on nationally representative data [4]. These estimates do not include women and girls living with FGM/C who emigrated from FGM/C practicing countries [4]. In the European Union (EU), there were an estimated 578,068 women and girls living with FGM/C in 2011 [5], and 21,706 in Switzerland in 2018 [6] based on indirect measures, where the number of migrant women from a FGM/C practicing country is multiplied by the FGM/C prevalence rate from the same country. The European Institute for Gender Equality estimated the number of migrant girls (0–18) from FGM/C practicing countries at risk of FGM/C as 44,106 in France (2014); 18,339 in Italy (2016); 6122 in Belgium (2016), and a few hundred in Greece, Cyprus, Malta, Ireland, Portugal and Sweden [7, 8].

Indirect estimation is a systematic and affordable method for estimating the number of women with FGM/C in high-income countries, in the assumption that the prevalence of FGM/C among migrants does not significantly differ from prevalence among non-migrants [9–11]. However, due to several reasons, including cultural change and varying socioeconomic, and ethnic origins of migrants, it may not reflect the actual FGM/C prevalence in migrants’ country of residence or community [12, 13]. The real prevalence and incidence of FGM/C and the number of minors at risk remains unknown in many countries.

Direct measures may provide more accurate estimates that could guide policy- and clinical decision-making. Surveying samples of migrants to estimate FGM/C prevalence also has limitations, as they might not know whether they experienced FGM/C or be unaware of the type [14]. Swiss hospital data may provide a sample of patients that can be used to describe the prevalence of FGM/C in Swiss hospitals. Furthermore, hospital data represents an opportunity to study access and quality of care for patients who underwent FGM/C, providing guidance for health interventions [15–17].

No data are available on the number of women and girls with FGM/C in Swiss hospitals. No accurate information is available on Swiss healthcare professionals’ capacities to record FGM/C and deal with its complications and prevention. Weak capacities in diagnosis, recording and coding represent the major obstacle to studying hospital data on FGM/C. Studies from Switzerland and other high- and low-income countries, among midwives, gynecologists and obstetricians,

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**Table 1** Classification of FGM/C according to WHO [3]. When WHO refers to “glans of the clitoris”, part of the body of the clitoris can also be affected.

| Type    | Description                                                                 |
|---------|-----------------------------------------------------------------------------|
| Type I  | Partial or total removal of the clitoral glans (the external and visible part of the clitoris, which is a sensitive part of the female genitals, with the function of providing sexual pleasure to the woman), and/or the prepuce/clitoral hood (the fold of skin surrounding the clitoral glans). |
| Type Ia | Removal of the prepuce/clitoral hood only                                   |
| Type Ib | Removal of the clitoral glans with the prepuce/clitoral hood                |
| Type II | Partial or total removal of the clitoral glans and the labia minora, with or without removal of the labia majora. |
| Type IIa| Removal of the labia minora only                                            |
| Type IIb| Partial or total removal of the glans of the clitoris and the labia minora  |
| Type IIc| Partial or total removal of the glans of the clitoris, the labia minora and the labia majora |
| Type III (Infibulation) | Narrowing of the vaginal opening with the creation of a covering seal. The seal is formed by cutting and repositioning the labia minora, or labia majora. The covering of the vaginal opening is done with or without removal of the clitoral prepuce/clitoral hood and glans. |
| Type IIIa| Removal and apposition of the labia minora                                  |
| Type IIIb| Removal and apposition of the labia majora                                  |
| Type IV | All other harmful procedures to the female genitalia for non-medical purposes, for example, pricking, piercing, incising, scraping and cauterization. |
general and travel medicine practitioners have shown difficulties in screening, diagnosing, classifying and recording FGM/C [18–23]. Pediatricians also lack training on FGM/C and rarely perform external genital examinations [24, 25].

In this manuscript, we aim to:

1. Assess the number of women and girls from FGM/C practicing countries admitted to Swiss university hospitals.
2. Estimate, using indirect measures, the potential number of inpatients who are possibly living with FGM/C.
3. Measure the number of inpatients with a coded primary or secondary diagnosis of FGM/C. The comparison between indirect estimates of inpatients with FGM/C and the number of FGM/C cases coded in the same hospitals, can inform the diagnostic, recording and coding capacities of FGM/C in Swiss university hospitals.

Methods
This cross-sectional study was part of a larger research study approved in December, 2018: protocol number 2018–01851 by the Swiss Ethics Committees (Swiss Ethics) and conducted according to the protocol, the Swiss legal requirements, and the World Medical Association Declaration of Helsinki. An exemption of informed consent was granted by the state of Geneva Swiss Ethics committee for the use of anonymized data extracted from the university hospitals databases. We first calculated the indirect estimates of women and girls living with FGM/C in Switzerland between 2010 and 2018 [6]. We used a similar methodology to Yoder and Van Baelen [5, 26], applying the most recent FGM/C DHS and MICS prevalence figures for each year (for girls and women aged 15–49) from FGM/C practicing countries to the number of migrant women and girls living in Switzerland. We applied the total country prevalence estimates of women aged 15–49 to all migrant women and girls living in Switzerland from the same countries. We also conducted a separate analysis for girls aged 0–14, where we applied the prevalence estimates of girls 0–14 to all migrant girls 0–14 living in Switzerland from the same countries. Where no prevalence estimates for girls 0–14 were available, we applied the prevalence estimates for girls 15–19. Full details are available in another paper [6] [Tables S1 & S2].

Secondly, in February 2019, we asked the five Swiss university hospitals to provide anonymized data for all inpatient women and girls with a nationality from the 30 FGM/C practicing countries [Table 2], and for all inpatients with a diagnosis of FGM/C between 2016 and 2018 [Table 3]. Swiss hospital data only provided information on patient’s nationality, and we therefore used this as a proxy for country of origin, discussed in limitations. In Swiss hospitals, healthcare professionals record diagnosis in patients’ electronic medical charts, and professional coders code this information with the tenth edition of the International Classification of Diseases (ICD) [27]. We received data from the University Hospitals of Geneva (HUG), Lausanne (CHUV), Bern (Inselspital) and Zurich (USZ). The University Hospital of Basel did not participate due to logistical difficulties in data provision. The implication is discussed in the conclusion. Analyses were carried out using STATA version 15.

The participating hospitals provided data on all inpatient women and girls from the 30 targeted countries and all primary and secondary diagnoses of FGM/C coded between January 1, 2016 and December 31, 2018. Therefore, we estimate indirect prevalence of FGM/C in Swiss hospitals as the proportion of the total number of FGM/C cases recorded on the total number of women and girls from the targeted countries in four Swiss university hospitals between 2016 and 2018. Using the country prevalence estimates of FGM/C among women and girls with a nationality from FGM/C practicing countries in 2016, 2017, and 2018, we then multiplied this prevalence estimates to the total number of inpatient women and girls registered with the same nationality in the hospital database during the same period and obtained an indirect estimation of the number of inpatients with FGM/C in our Swiss hospitals [Table 5]. Inpatients with an FGM/C diagnosis that had a nationality from other countries than the ones targeted were not considered in this estimation.

We provided descriptive statistics with mean, standard deviation (SD), and median for continuous variables; number and proportions by categories for qualitative variables. We compared all categorical variables by year and FGM/C type by region (West Africa vs. East Africa) using Chi-2 or Fischer’s exact tests. We compared mean ages by year using non-parametric Kruskal-Wallis test. We estimated FGM/C prevalence within the Swiss university hospital population between 2016 and 2018 and their 95% confidence intervals (95%CIs) using the binomial exact method (Clopper-Pearson method).

Results
8720 women and girls from countries with high FGM/C prevalence were admitted between 2016 and 2018: 4388 in Bern, 2372 in Geneva, 1218 in Lausanne and 742 in Zurich [Table 2]. Most of them came from Eritrea (31.0%), followed by Somalia in Geneva, Zurich and Bern (11.6%), and Cameroon in Lausanne (9.7%).

207 inpatient women and girls had a coded diagnosis of FGM/C [Table 3]. The number of FGM/C cases by
center significantly changed over the years ($P < 0.001$) with more cases in Geneva overall, and it was significantly different by department ($P < 0.001$) with most cases coded in obstetrics. Patients with an FGM/C diagnosis mostly originated from Eritrea ($n = 85$) and Somalia ($n = 54$).

The FGM/C type differed significantly depending on the region of origin ($P = 0.004$): types II and III were significantly more frequent among patients from West Africa and from East Africa, respectively [Table S3].

For all years combined, the calculated FGM/C prevalence was 2.29% (95%CI: 1.98–2.62). We excluded seven patients from CHUV who had a coded diagnosis of FGM/C and were registered as Swiss ($n = 4$), Ecuadorian ($n = 1$), Turkish ($n = 1$) and French ($n = 1$). Thus, outside the 30 targeted countries. FGM/C prevalence significantly increased over time in participating centers: 1.24% in 2016, 2.32% in 2017, and 3.32% in 2018 ($P < 0.001$).

FGM/C prevalence in Swiss hospitals was 3.53% among inpatients from countries with the highest FGM/C prevalence ($\geq 81$%), and thus higher than among inpatients from countries with lower FGM/C prevalence ($P < 0.001$). [Table S3]. FGM/C prevalence was significantly higher in women from East Africa ($P < 0.001$).

### Table 2 Total number of women and girls in Swiss university hospitals between 2016 and 2018 from 30 FGM/C practicing countries

| Country of origin          | Zürich Total | Lausanne Total | Geneva Total | Bern Total | Total |
|----------------------------|--------------|----------------|--------------|------------|-------|
| Benin                      | 2            | 12             | 18           | 5          | 37    |
| Burkina Faso              | 3            | 12             | 54           | 21         | 90    |
| Cameroon                  | 52           | 256            | 261          | 274        | 843   |
| Central African Republic  | 1            | 1              | 3            | 3          | 8     |
| Chad                      | 2            | 1              | 2            | 13         | 18    |
| Djibouti                  | 0            | 4              | 3            | 0          | 7     |
| Egypt                     | 20           | 15             | 107          | 101        | 243   |
| Eritrea                   | 167          | 295            | 362          | 1881       | 2705  |
| Ethiopia                  | 59           | 100            | 123          | 287        | 579   |
| Gambia                    | 7            | 3              | 8            | 16         | 34    |
| Ghana                     | 42           | 6              | 53           | 79         | 180   |
| Guinea                    | 8            | 41             | 101          | 31         | 181   |
| Guinea-Bissau             | 0            | 14             | 9            | 2          | 25    |
| Indonesia                 | 20           | 12             | 33           | 64         | 129   |
| Iraq                      | 66           | 74             | 164          | 481        | 785   |
| Ivory Coast               | 41           | 47             | 146          | 72         | 306   |
| Kenya                     | 41           | 6              | 63           | 125        | 235   |
| Liberia                   | 2            | 3              | 5            | 5          | 15    |
| Mali                      | 2            | 1              | 32           | 6          | 41    |
| Mauritania                | 0            | 1              | 27           | 1          | 29    |
| Niger                     | 0            | 4              | 23           | 11         | 38    |
| Nigeria                   | 42           | 36             | 88           | 169        | 335   |
| Senegal                   | 5            | 42             | 195          | 29         | 271   |
| Sierra Leone              | 4            | 3              | 20           | 23         | 50    |
| Somalia                   | 101          | 157            | 233          | 523        | 1014  |
| Sudan and South Sudan     | 30           | 2              | 79           | 63         | 174   |
| Tanzania                  | 7            | 1              | 33           | 13         | 54    |
| Togo                      | 3            | 61             | 78           | 36         | 178   |
| Uganda                    | 3            | 1              | 28           | 24         | 56    |
| Yemen                     | 12           | 7              | 21           | 20         | 60    |
| **Grand Total**           | **742**      | **1218**       | **2372**     | **4388**   | **8720** |

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Table 3 Description of patients with a FGM/C (n = 207) as main or secondary diagnosis between 2016 and 2018 in one of four Swiss university hospitals (Geneva, Lausanne, Bern and Zurich)

| Variables                        | 2016 (n = 42) | 2017 (n = 69) | 2018 (n = 96) | P value |
|----------------------------------|---------------|---------------|---------------|---------|
| Center, n (%)                    |               |               |               | < 0.001a |
| Geneva                           | 20 (47.6)     | 24 (34.8)     | 67 (69.8)     |         |
| Lausanne                         | 13 (31.0)     | 10 (14.5)     | 19 (19.8)     |         |
| Bern                             | 3 (7.1)       | 23 (33.3)     | 6 (6.3)       |         |
| Zurich                           | 6 (14.3)      | 12 (17.4)     | 4 (4.2)       |         |
| Country of origin, n (%)         |               |               |               | 0.097a  |
| Benin                            | 0 (0)         | 0 (0)         | 1 (1.0)       |         |
| Burkina Faso                     | 1 (2.4)       | 2 (2.9)       | 0 (0)         |         |
| Cameroon                         | 1 (2.4)       | 0 (0)         | 0 (0)         |         |
| Egypt                            | 0 (0)         | 0 (0)         | 5 (5.2)       |         |
| Eritrea                          | 12 (28.6)     | 37 (53.6)     | 36 (37.5)     |         |
| Ethiopia                         | 2 (4.8)       | 3 (4.4)       | 2 (2.1)       |         |
| Guinea                           | 0 (0)         | 0 (0)         | 6 (6.2)       |         |
| Guinea-Bissau                    | 0 (0)         | 0 (0)         | 2 (2.1)       |         |
| Ivory Coast                      | 1 (2.4)       | 1 (1.5)       | 1 (1.0)       |         |
| Mali                             | 0 (0)         | 0 (0)         | 1 (1.0)       |         |
| Mauritania                       | 0 (0)         | 0 (0)         | 1 (1.0)       |         |
| Nigeria                          | 1 (2.4)       | 1 (1.5)       | 3 (3.1)       |         |
| Senegal                          | 0 (0)         | 0 (0)         | 3 (3.1)       |         |
| Somalia                          | 14 (33.3)     | 18 (26.1)     | 22 (22.9)     |         |
| Sudan and South Sudan            | 1 (2.4)       | 1 (1.5)       | 3 (3.1)       |         |
| Unknown or other                 | 9 (21.4)      | 6 (8.7)       | 10 (10.4)     |         |
| Service, n (%)                   |               |               |               | < 0.001a |
| Gynecology                       | 13 (31.0)     | 12 (17.4)     | 9 (9.4)       |         |
| Gynecology or Obstetrics*        | 1 (2.4)       | 23 (33.3)     | 6 (6.3)       |         |
| Obstetrics                       | 23 (54.8)     | 33 (47.8)     | 79 (82.3)     |         |
| Others                           | 5 (11.9)      | 1 (1.5)       | 2 (2.1)       |         |
| Mean age at first visit (±SD, median) | 30.7 (±12.0, 27) | 27.7 (±6.1, 27.4) | 29.8 (±6.7, 30) | 0.162b |
| FGM/C type, n (%)                |               |               |               | 0.116b  |
| Type I                           | 3 (7.1)       | 13 (18.8)     | 10 (10.4)     |         |
| Type II                          | 8 (19.1)      | 16 (23.2)     | 33 (34.4)     |         |
| Type III                         | 21 (50.0)     | 33 (47.8)     | 39 (40.6)     |         |
| Type IV                          | 0 (0)         | 1 (1.5)       | 2 (2.1)       |         |
| Unspecified or other             | 10 (23.8)     | 6 (8.7)       | 12 (12.5)     |         |

FGM/C type, n (%)

|                      | 2016     | 2017     | 2018     | P value |
|----------------------|---------|---------|---------|---------|
| N90.80 (Female genital mutilation, type unspecified) | 3 (7.1) | 0 (0)   | 0 (0)   |         |
| N90.81 (FGM, Type I) | 3 (7.1) | 0 (0)   | 0 (0)   |         |
| N90.82 (FGM, Type II) | 8 (19.1) | 0 (0) | 0 (0)   |         |
| N90.83 (FGM, Type III) | 21 (50.0) | 0 (0) | 0 (0)   |         |
| N90.88 Other specified non-inflammatory diseases of the vulva and perineum | 7 (16.7) | 0 (0) | 0 (0)   |         |
| Z91.70 Personal history of female genital mutilation, type unspecified | 0 (0) | 6 (8.7) | 12 (12.5) |         |
| Z91.71 (FGM, Type I) | 0 (0) | 13 (18.8) | 10 (10.4) |         |
| Z91.72 (FGM, Type II) | 0 (0) | 16 (23.2) | 33 (34.4) |         |
We applied the FGM/C prevalence among inpatients from each at-risk country separately [Table 5] and indirectly estimated the number of inpatients who could have undergone or be at risk of undergoing FGM/C: 1648 in 2016, 1671 in 2017, and 1628 in 2018 (n = 4947).

FGM/C prevalence was lower among minors (0.66%), compared to women above 18 years old (2.46%) (P < 0.001) [Tables 4 and 5]. FGM/C prevalence also varied by hospital department, with higher prevalence among inpatients in gynecology and obstetrics (P < 0.001). It also varied among women and girls from at-risk countries. It was higher in Geneva, similar in Lausanne and Zürich, and lower in Bern (P < 0.001). Prevalence was higher in institutions featuring regular educational programmes about FGM/C and/or a clinic or referral physician for FGM/C.

**Discussion**

**Main findings**

Our findings show that only 207 patients (2.29%) have a coded FGM/C diagnosis, with an increase between 2016 and 2018. There is a drastic difference between FGM/C cases coded in Swiss university hospitals (n = 207) and the possible number of women and girls with FGM/C in these hospitals based on our indirect estimates (n = 4947). Our results suggest that FGM/C is not accurately diagnosed, recorded and/or coded in Swiss university hospitals. Moreover, most women and girls came from Eritrea and Somalia, where FGM/C prevalence exceeds 80%, and where type III is frequent, the latter type being easier to identify, and associated with more long-term complications [1]. Infibulation was indeed the most frequent type among inpatients from East Africa.

Seven inpatients with an FGM/C code did not have the nationality of a country where the practice is usually performed. The nationality recorded or FGM/C coding might be incorrect. Alternatively, these women come from FGM/C practicing countries but possess another nationality, and underwent FGM/C before migrating, or afterwards while visiting their country of origin. In such case, and if coding is accurate, monitoring FGM/C

| Variables                        | 2016 (n = 42) | 2017 (n = 69) | 2018 (n = 96) | P value |
|----------------------------------|--------------|--------------|--------------|---------|
| Z91.73 (FGM, Type III)           | 0 (0)        | 33 (47.8)    | 39 (40.6)    |         |
| Z91.74 (FGM, Type IV)            | 0 (0)        | 1 (1.5)      | 2 (2.1)      |         |

*Fischer’s exact test; *Kruskal-Wallis nonparametric test
* Bern’s datasets did not differentiate gynecological from obstetrical units

**Table 3** Description of patients with a FGM/C (n = 207) as main or secondary diagnosis between 2016 and 2018 in one of four Swiss university hospitals (Geneva, Lausanne, Bern and Zurich) (Continued)

**Table 4** Prevalence of FGM/C by age, hospital department, center, and educational programme attendance (n = 200 FGM/C)

| Variables                        | Number of cases, n | N   | Prevalence, % (95%CI) | P value |
|----------------------------------|--------------------|-----|-----------------------|---------|
| Category of age, n (%)           |                    |     |                       | 0.001a  |
| < 18 years                       | 5                  | 757 | 0.66 (0.21–1.53)      |         |
| >=18 years                       | 195                | 7936| 2.46 (2.13–2.82)      |         |
| Hospital department, n (%)       |                    |     |                       | < 0.001a|
| Gynecology & obstetrics          | 195                | 4163| 4.68 (4.06–5.37)      |         |
| Surgery                          | 2                  | 1266| 0.16 (0.019–0.57)     |         |
| Medical department               | 1                  | 2362| 0.042 (0.0011–0.24)   |         |
| Emergency                        | 0                  | 573 | 0 (0–0.64)            |         |
| Pediatrics                       | 2                  | 374 | 0.53 (0.065–1.92)     |         |
| Center, n (%)                    |                    |     |                       | < 0.001b|
| Geneva                           | 111                | 2390| 4.64 (3.84–5.57)      | < 0.001b|
| Lausanne                         | 35                 | 1218| 2.87 (2.01–3.97)      |         |
| Bern                             | 32                 | 4388| 0.73 (0.50–1.03)      |         |
| Zürich                           | 22                 | 742 | 2.96 (1.87–4.45)      |         |
| Educational programme organised, n (%) |      |     |                       | < 0.001b|
| Yes (Geneva, Lausanne)           | 146                | 3608| 4.05 (3.43–4.74)      |         |
| No or unknown (Bern, Zürich)     | 54                 | 5130| 1.05 (0.79–1.37)      |         |

*Fischer’s exact test; *Chi-2 test
| Variables                 | 2016 | 2017 | 2018 |
|---------------------------|------|------|------|
| Country of origin         | FGM/C country prevalence (DHS/MICS) | Inpatients, % | FGM/C codes among inpatients, n | FGM/C prevalence calculated among inpatients, % (95%CI) | FGM/C codes among inpatients, n | FGM/C prevalence calculated among inpatients, % (95%CI) | Inpatients, % | FGM/C codes among inpatients, n | FGM/C prevalence calculated among inpatients, % (95%CI) |
| Benin                     | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 |
| Burkina Faso              | 0.758 | 0.758 | 0.758 | 0.758 | 0.758 | 0.758 | 0.758 | 0.758 | 0.758 |
| Cameroon                  | 0.014 | 0.014 | 0.014 | 0.014 | 0.014 | 0.014 | 0.014 | 0.014 | 0.014 |
| Central African Republic  | 0.242 | 0.242 | 0.242 | 0.242 | 0.242 | 0.242 | 0.242 | 0.242 | 0.242 |
| Chad                      | 0.308 | 0.308 | 0.308 | 0.308 | 0.308 | 0.308 | 0.308 | 0.308 | 0.308 |
| Djibouti                  | 0.931 | 0.931 | 0.931 | 0.931 | 0.931 | 0.931 | 0.931 | 0.931 | 0.931 |
| Egypt                     | 0.872 | 0.872 | 0.872 | 0.872 | 0.872 | 0.872 | 0.872 | 0.872 | 0.872 |
| Eritrea                   | 0.83  | 0.83  | 0.83  | 0.83  | 0.83  | 0.83  | 0.83  | 0.83  | 0.83  |
| Ethiopia                  | 0.652 | 0.652 | 0.652 | 0.652 | 0.652 | 0.652 | 0.652 | 0.652 | 0.652 |
| Gabon                     | 0.749 | 0.749 | 0.749 | 0.749 | 0.749 | 0.749 | 0.749 | 0.749 | 0.749 |
| Ghana                     | 0.038 | 0.038 | 0.038 | 0.038 | 0.038 | 0.038 | 0.038 | 0.038 | 0.038 |
| Guinea                    | 0.968 | 0.968 | 0.968 | 0.968 | 0.968 | 0.968 | 0.968 | 0.968 | 0.968 |
| Guinea–Bissau             | 0.449 | 0.449 | 0.449 | 0.449 | 0.449 | 0.449 | 0.449 | 0.449 | 0.449 |
| Iraq                      | 0.367 | 0.367 | 0.367 | 0.367 | 0.367 | 0.367 | 0.367 | 0.367 | 0.367 |
| Ivory Coast               | 0.211 | 0.211 | 0.211 | 0.211 | 0.211 | 0.211 | 0.211 | 0.211 | 0.211 |
| Kenya                     | 0.498 | 0.498 | 0.498 | 0.498 | 0.498 | 0.498 | 0.498 | 0.498 | 0.498 |
| Liberia                   | 0.827 | 0.827 | 0.827 | 0.827 | 0.827 | 0.827 | 0.827 | 0.827 | 0.827 |
| Mali                      | 0.666 | 0.666 | 0.666 | 0.666 | 0.666 | 0.666 | 0.666 | 0.666 | 0.666 |
| Mauritania                | 0.02  | 0.02  | 0.02  | 0.02  | 0.02  | 0.02  | 0.02  | 0.02  | 0.02  |
| Niger                     | 0.184 | 0.184 | 0.184 | 0.184 | 0.184 | 0.184 | 0.184 | 0.184 | 0.184 |
| Nigeria                   | 0.227 | 0.227 | 0.227 | 0.227 | 0.227 | 0.227 | 0.227 | 0.227 | 0.227 |
| Senegal                   | 0.696 | 0.696 | 0.696 | 0.696 | 0.696 | 0.696 | 0.696 | 0.696 | 0.696 |
| Sierra Leone              | 0.979 | 0.979 | 0.979 | 0.979 | 0.979 | 0.979 | 0.979 | 0.979 | 0.979 |
| Somalia                   | 0.866 | 0.866 | 0.866 | 0.866 | 0.866 | 0.866 | 0.866 | 0.866 | 0.866 |
| Sudan and South Sudan     | 0.1   | 0.1   | 0.1   | 0.1   | 0.1   | 0.1   | 0.1   | 0.1   | 0.1   |
| Tanzania                  | 0.047 | 0.047 | 0.047 | 0.047 | 0.047 | 0.047 | 0.047 | 0.047 | 0.047 |
| Togo                      | 0.008 | 0.008 | 0.008 | 0.008 | 0.008 | 0.008 | 0.008 | 0.008 | 0.008 |
| Uganda                    | 0.185 | 0.185 | 0.185 | 0.185 | 0.185 | 0.185 | 0.185 | 0.185 | 0.185 |
| Yemen                     | 0.092 | 0.092 | 0.092 | 0.092 | 0.092 | 0.092 | 0.092 | 0.092 | 0.092 |
| Total                     | 0.282 | 0.282 | 0.282 | 0.282 | 0.282 | 0.282 | 0.282 | 0.282 | 0.282 |

n^2= rounded to the unit
prevalence with ICD codes might give more reliable results than indirect estimates and overcome the issue of nationality and ethnicity.

Coding was significantly higher in gynecology and obstetrics compared to other departments. Obstetricians and gynecologists routinely examine the external genitalia and might be more trained to recognize FGM/C. Furthermore, our results suggest that pregnancy and delivery are critical times for diagnosing FGM/C, because it was significantly more coded in obstetrics than in gynecology. Only two girls in pediatrics and two women in urology were coded with FGM/C.

The prevalence of FGM/C codes in minors (0.66%) was significantly lower than in adult women (2.46%). Belonging to a new generation of immigrants, length of stay, and migration in a country where FGM/C is illegal could explain why it is less frequent among minors [7, 8, 12]. However, insufficient screening and routine genital examinations among pediatricians, or absent documentation can also explain the low numbers [23]. A specific code for ”risk of FGM/C” might facilitate screening and prevention [17].

Longstanding training and protocols about FGM/C in Geneva and Lausanne could explain why FGM/C prevalence in these hospitals was higher than in Bern, even though Bern numbered more patients from FGM/C practicing countries. At HUG for instance, a retrospective review of the medical files of patients who attended the FGM/C outpatient clinic between 2010 and 2012 revealed missed and misclassification of FGM/C in more than one-third of cases [18]. Therefore, the obstetric and gynecologic divisions implemented several interventions: updating the protocols for the care of women and girls with FGM/C, learning tools with drawings, pictures and videos [28], workshops for midwives, and simulation programmes on defibulation. Since 2010, workshops were also organized in pediatrics, travel medicine, HIV clinic, infectious disease, and primary care. In 2017, the HUG hosted an International expert symposium on the care of women and girls with FGM/C and on prevention [29]. In 2012, the HUG’s division of gynecology introduced an FGM/C checkbox in electronic medical forms to record FGM/C and its type. An update in February 2018 [Figs. 1 & 2] added the description of FGM/C types and subtypes in gynecology and obstetrics. This may have facilitated screening and recording, explaining why FGM/C codes almost tripled between 2017 and 2018.

According to a survey run by the Swiss Network against Female Circumcision in 2017 (unpublished, data obtained from the authors), FGM/C was taught at the medical faculties of the Universities of Geneva, Lausanne and Fribourg but not in Bern, whose university hospital admitted 4388 women and girls from FGM/C practicing countries between 2016 and 2018. This might partially explain the higher FGM/C prevalence in Geneva and Lausanne. Zürich’s medical faculty did not reply to this survey.

**Strengths and limitations**

One strength of the study was the use of ICD-10 codes for estimating FGM/C prevalence, making it easily reproducible to allow comparison of data over time, and after specific interventions [17].

The main weakness is that we could only collect data of patients, for whom FGM/C had been coded, and undercoding is evident. FGM/C is probably not recorded/coded when the reason for hospitalization and FGM/C are not related. However, even when they are related, FGM/C recording/coding is probably missing:
the calculated prevalence of FGM/C among 4163 inpatient women in obstetrics and gynecology is only 4.68%.

We included inpatients registered with the nationality from one of 30 FGM/C practicing countries, irrespective of whether they were first- or second- (or third-) generation migrants. This may exclude women who might originally come from one of these countries but have now a different nationality.

We did not have the information regarding the age of all inpatient women in the anonymized data. However, the aim of our study was not to assess the prevalence by 5-year age groupings as is often done in high FGM/C prevalence countries to assess the evolution of the practice. Even though FGM/C is age-dependent, it is generally performed before menarche [30] and before migrating [31, 32]. Furthermore, in Swiss university hospitals, inpatients that are less than 16 years old are generally hospitalized in the pediatric division. We can hypothesize that all inpatients except for those from pediatric departments are more than 16 years old, and are therefore likely over the age of cutting. Future research reproducing our methodology might analyze the age of the women and girls included. We can hypothesize that a considerable number of inpatient women in Swiss university hospitals are mainly women of childbearing age as they were mostly attended in gynecology or obstetrics units.

We limited our study to four Swiss university hospitals. Basel’s University Hospital could not provide the data requested, but we hypothesize that we would have found equally low FGM/C prevalence. We did not study regions without university hospitals, such as Tessin, on the Italian border, where hospitals could admit migrant women and girls with or at risk of FGM/C [9].

We included hospitalized patients only. It would be interesting to analyze data of outpatient women and girls in pediatrics, travel medicine, infectious disease, primary care services, and migrants’ physical and mental health programmes.

**Interpretation**

The number of inpatients with an FGM/C diagnosis out of all women and girls potentially living with FGM/C is low in all hospitals and specialties, including gynecology and obstetrics. We believe that FGM/C coding indirectly reflects awareness of the phenomenon. If FGM/C is not recognized or discussed, women and girls living with FGM/C cannot access specific care, health and legal information and prevention.

Our study suggests that training healthcare professionals and medical students increases the number of patients coded with FGM/C. A study conducted in Belgium showed that more patients were coded with FGM/C after delivering information on FGM/C and its management [33]. The introduction of an FGM/C checkbox in electronic medical charts also seems to facilitate the diagnosis. Similar use of electronic tools facilitated identification of intimate partner violence, together with routine protocols on appropriate screening and counseling [34]. Since November 2019, at HUG, the FGM/C checkbox is linked to a standardized form where physicians, nurses and midwives can record the type, subtype and complications identified, and access an illustrated description from a learning tool for each item [28].
Conclusion
The present study shows that assessing FGM/C coding through ICD-10 is feasible but FGM/C coding capacities among inpatients in Swiss university hospitals are low. Future policies should include training on appropriate screening, diagnosis, management and referral in case of FGM/C. Training should be organized in different specialties such as urology, obstetrics and gynecology, infectious diseases, general practice, pediatrics and psychiatry [35], and stress the importance of recording and coding. Certified interpreters and coders should also receive training. Finally, professionals in obstetrics, pediatrics, primary care, and travel medicine should be able to identify children at risk and discuss prevention, national laws on FGM/C and child’s rights [22–25, 36]. Sensitizing and teaching about FGM/C in existing pre-graduate classes, such as anatomy, gynecology and obstetrics, urology, infectious disease, pediatrics, psychiatry and primary care could improve standard training.

Our next step is to assess knowledge, attitudes and practice of healthcare professionals in the same hospitals to tailor training programmes and tools that can improve screening, prevention, diagnosis and management of FGM/C. We will also analyze our data according to the belonging of the included institutions to Swiss Hospitals for equity, a network aiming at improving healthcare access for underprivileged groups, regardless of their origin, language and socioeconomic situation. Routine availability of certified interpreters, like in Geneva and Lausanne, might facilitate diagnosis, recording and coding of FGM/C.

Supplementary Information
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Additional file 1.

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Authors' contributions
JA designed and directed the project. SCC collected the data, together with JA and MH. SCC and AGA did the data analysis. MH, SCC and JA wrote the manuscript in collaboration with AGA. All the authors reviewed and approved the manuscript.

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Availability of data and materials
The datasets used and/or analysed during the current study available from the corresponding author on reasonable request.

Declarations

Details of ethics approval
This cross-sectional study was part of a larger research study approved in December, 2018: protocol number 2018–01851 by the Swiss Ethics Committee (SwissEthics) and conducted according to the protocol, the Swiss legal requirements, the World Medical Association Declaration of Helsinki. An exemption of informed consent was granted by the state of Geneva Swiss Ethics committee for the use of anonymized data extracted from the university hospitals databases.

Consent for publication
All authors have approved the manuscript for submission.

Competing interests
No competing interests to declare.

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References
1. World Health Organization. Care of women and girls living with female genital mutilation: a clinical handbook. 2018. Available from: https://www.who.int/reproductivehealth/publications/health-care-girls-women-living-with-FGM/en/. Accessed 18 Jan 2019.
2. UNICEF. Female Genital Mutilation/Cutting: a global concern New York: Unicef; 2016. [Available from: https://www.unicef.org/media/files/FGMC_2016_brochure_final_UNICEF_SPREAD(2).pdf] Accessed 8 Apr 2019.
3. World Health Organization. Types of female genital mutilation. 2020. Available from: https://www.who.int/teams/sexual-and-reproductive-health-and-research/areas-of-work/female-genital-mutilation/types-of-female-genital-mutilation. Accessed 18 Apr 2020.
4. UNICEF. Female Genital Mutilation/Cutting: a global concern. 2016. Available from: http://www.unicef.org/media/files/FGMC_2016_brochure_final_UNICEF_SPREAD.pdf. Accessed 18 Jan 2019.
5. Van Baelen L, Ortensi L, Leyé E. Estimates of first-generation women and girls with female genital mutilation in the European Union, Norway and Switzerland. Eur J Contracept Reprod Health Care. 2016;21(6):474–82. https://doi.org/10.1080/13625187.2016.1234597.
6. Cottler-Casanova S, Abdulcadir J. Estimating the indirect prevalence of Female genital mutilation/cutting in Switzerland. BMC Public Health. 2021; 21:1011. https://doi.org/10.1186/s12889-021-10875-w.
7. European Institute for Gender Equality. Female genital mutilation. Estimating the number of girls at risk in the European Union: Belgium, Greece, France, Italy, Cyprus and Malta - Report. 2018. Available from: https://eige.europa.eu/publications/estimation-girls-risk-female-genital-mutilation-european-union-report-0. Accessed 7 Aug 2019.
8. European Institute for Gender Equality. Female genital mutilation. Estimating the number of girls at risk in the European Union: Report. 2015. Available from: https://eige.europa.eu/publications/estimation-girls-risk-female-genital-mutilation-european-union-report. Accessed 7 Aug 2019.
9. Ortensi LE, Farina P, Leyé E. Female genital mutilation/cutting in Italy: an enhanced estimation for first generation migrant women based on 2016 survey data. BMC Public Health. 2018;18(1):129. https://doi.org/10.1186/s12889-017-5000-6.
10. Equality Now. City University London. London Institute for Women’s Health, and FORWARD: Research methodological workshop report: estimating the prevalence of FGM in England and Wales. 2012. Available from: https://www.equalitynow.org/research/methodological_workshop_report_estimating_the_prevalence_of_fgm_in_england_and_wales. Accessed 20 Mar 2020.
