A systematic review of the use of health services by immigrants and native populations

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Abstract

Background: Changes in migration patterns that have occurred in recent decades, both quantitative, with an increase in the number of immigrants, and qualitative, due to different causes of migration (work, family reunification, asylum seekers and refugees) require constant updating of the analysis of how immigrants access health services. Understanding of the existence of changes in use patterns is necessary to adapt health services to the new socio-demographic reality. The aim of this study is to describe the scientific evidence that assess the differences in the use of health services between immigrant and native populations.

Methods: A systematic review of the electronic database MEDLINE (PubMed) was conducted with a search of studies published between June 2013 and February 2016 that addressed the use of health services and compared immigrants with native populations. MeSH terms and key words comprised Health Services Needs and Demands/Accessibility/Disparities/Emigrants and Immigrants/Native/Ethnic Groups. The electronic search was supplemented by a manual search of grey literature. The following information was extracted from each publication: context of the study (place and year), characteristics of the included population (definition of immigrants and their sub-groups), methodological domains (design of the study, source of information, statistical analysis, variables of health care use assessed, measures of need, socio-economic indicators) and main results.

Results: Thirty-six publications were included, 28 from Europe and 8 from other countries. Twenty-four papers analysed the use of primary care, 17 the use of specialist services (including hospitalizations or emergency care), 18 considered several levels of care and 11 assessed mental health services. The characteristics of immigrants included country of origin, legal status, reasons for migration, length of stay, different generations and socio-demographic variables and need. In general, use of health services by the immigrants was less than or equal to the native population, although some differences between immigrants were also identified.

Conclusions: This review has identified that immigrants show a general tendency towards a lower use of health services than native populations and that there are significant differences within immigrant sub-groups in terms of their patterns of utilization. Further studies should include information categorizing and evaluating the diversity within the immigrant population.

Keywords: Access to health care, Immigrants and native born
Background
The number of international migrants continues to grow each year. According to the United Nations Migration Report, the number of migrants has reached 244 million in 2015 up from 191 million in 2005, representing an increase of 28% over the decade in comparison with an increase of 13% during the period 1990–2000 [1, 2].

Between 2000 and 2015, Europe has absorbed the second largest number of international migrants following Asia [1, 3]. Despite the global economic crisis which started in 2007–2008, Europe and Northern America have recorded an annual growth rate in the international migrant stock of 2% per year [1].

These transformations have both quantitative (i.e. an increasing number of migrants) and qualitative (i.e. evolving reasons for migration) aspects. There is a trend towards permanent migration and reunification of families with immigrant setting in the host country in a more definitive way [4]. And most recently, we have seen an increasing number of asylum seekers and refugees, which is reaching the highest levels seen since World War II [1].

This situation has generated various responses in the host countries, as immigration is acquiring a significant social and political dimension. Immigration is influencing public opinion and triggering a debate, often improperly informed, regarding the pressure on public services—including health services [3]. This has even led to the adoption of new legislation [5–7] limiting access to health care for migrants, that may pose, as a result, a risk to public health.

The dramatic changes in demographics, socio-economics and politics require an update of the analysis of health service utilization by immigrants in order to properly determine the breadth and scope of the current situation. Consequently, research on migrant access and utilization of health services has proliferated in recent decades [8, 9]. Results from a previous review point to a lower utilization rate of general and specialist medical services by immigrants compared to native-born populations [10]. However, and since patterns of healthcare utilization depend on factors that may have evolved in recent years, such as age, sex, socio-economic level, time of stay in the host country or origin of the immigrants, and the specific features of healthcare services of the host countries, it seems necessary to revisit the state of knowledge on this subject.

The objective of this study is to describe the available scientific evidence that has investigated the differences in healthcare service utilization between immigrant and native populations in the last 3 years (June 2013 through February 2016), and to explore the possible effect on the differential use of variables associated with health needs, socio-economic status or other factors.

Methods
A systematic literature review was performed to identify the available empirical evidence comparing immigrant’s healthcare utilization with native populations using a predefined protocol [10]. Inclusion criteria for articles to be considered were original studies with quantitative data that compared the use of healthcare services between native and immigrant populations. Service use was defined as the interaction between health professionals and patients [11]. Only studies with both population groups properly defined, i.e. immigrant and native, were included. For the purposes of this review, we used the European Union definition of immigrant status based on foreign country of birth including up to the second generation [12].
Papers that considered undocumented immigrants, asylum seekers and/or refugees were also included. The indigenous majority population served as the native reference group. No limitation in gender or ethnic characteristics was stipulated.

Articles were excluded if they (1) exclusively evaluated healthcare utilization for children or adolescents younger than 18 years of age, (2) were editorials, letters or reviews and (3) were qualitative studies.

Search strategy and study selection

Two strategies were utilized in the search for relevant articles on this review.

Firstly, in February 2016, a librarian conducted a systematic review of the electronic database MEDLINE (PubMed) in search of the literature published between June 2013 and February 2016. No language restrictions were applied; no authors were contacted for additional information. MeSH terms and key words used, as well as search strategies performed, are shown in Table 1.

The initial screening of the articles was based on abstracts. Two researchers reviewed all abstracts independently. Selection of relevant articles was based on the information obtained from the abstracts and was agreed upon in discussion. If the abstract was not available, the full text was examined. In the case of discrepancies between the two researchers, the original paper was obtained and an agreement was achieved after it was read.

Secondly, a researcher (AIHG) conducted a manual search of grey literature through Google Scholar, including published papers from 2013 through February 2016 taking into account the terms (Health care use; Comparison; Immigrants; Natives) and (Needs, demands and barriers; Coverage; Primary care; Emergency services; Utilization patterns; Native; Foreign; Autochthonous; Immigrant). Both English and Spanish web pages were included in the search results. Appropriateness for inclusion was based on titles; in the event of doubt, abstracts were retrieved. Studies without electronic abstracts were not included.

Subsequently, two researchers examined the full text of all papers that satisfied the inclusion criteria (AIHG, ASS).

Data extraction

The following information were extracted from each publication: context of the study (country and year), characteristics of the included population (definition of native and immigrants groups, sample size for each group), methodological components (design of the study, statistical analysis, source of information), area of healthcare services assessed, confounders affecting healthcare utilization (individual determinants, measures of need, socio-economic indicators, cultural factors), objective of the study and main results.

Results

Characteristics of the studies

Thirty-six papers met the inclusion criteria in this study. The process followed to include those papers is shown in Fig. 1. Table 2 shows the information extracted from the included publications. Of the 36 studies included, 8 were duplicated in both the manual and electronic search [13–20], 12 were included after the manual search [21–32] and 16 through the electronic search [33–48]. Among them, at least 9 partly describe the
Table 1 | Search strategy for healthcare service utilization’s comparative studies

**General practitioner use (electronic search):**

1. Health Services Needs and Demand/ 12. health services [Title] 23. 18–22 / OR
2. Health Status/ 13. Primary care [Title] 24. immigrant* [Title]
3. Health Services Accessibility/ 14. Emergency services [Title] 25. migrant* [Title]
4. Coverage [Title] 15. Utilization patterns [Title] 26. Ethnic Groups [Title]
5. 1–4 / OR 16. 6–15/ OR 27. 24–26 / OR
6. health care [Title] 17. 5 and 16 28. 23 and 27
7. health disparities [Title] 18. Emigration and Immigration/ 29. Health AND utilization AND immigrant* [Title]
8. access to care [Title] 19. Emigrants and Immigrants/ 30. 17 AND 28
9. health resources [Title] 20. Native [Title] 31. 29 or 30 (GPs precise search)
10. health profiles [Title] 21. Foreign [Title] 32. (16 AND 27) OR 29
11. health status [Title] 22. Autochthonous [Title]

**Specialist use (electronic search):**

1. Health Services/utilization/ 7. Emigrants and Immigrants/ 13. Specialization/
2. Health Services Accessibility/ 8. Ethnic Groups 14. special* [TI]
3. Health Status/ 9. Native [Title] 15. 13 OR 14
4. Coverage [Title] 10. Foreign [Title] 16. 5 AND 12 AND 15
5. 1–4 / OR 11. Autochthonous [Title]
6. Emigration and Immigration/ 12. 6–11 / OR

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Fig. 1 | Study flowchart for the selection process of the final included studies
| Reference | Country | Year | Sample | Objectives | Information sources | Dependent variable | Independent variable (migrant definition) | Need indicators | Socio-economic indicators | Results |
|-----------|---------|------|--------|------------|---------------------|-------------------|------------------------------------------|----------------|--------------------------|---------|
| Almeida LM et al. [33] 2014 | Portugal | 2012 | 277 women Migrants \( n=89 \) Portuguese \( n=188 \) | To evaluate differences in obstetric care between immigrant and native women in a country with free access to health care | Register and survey-based study (1) Administrative databases of the four public maternity hospitals (February 1 and December 31, 2012) (2) Telephone survey | (1) First appointment at >12 weeks (2) Number of prenatal visits | (1) Native-born in Portugal (2) Immigrant: born outside Portugal with both parents born outside Portugal | Age Parity | Family income Education level Marital status | Migrants were more prone to late prenatal care (first pregnancy appointment after 12 weeks of pregnancy, to have fewer than three prenatal visits) |
| Beiser M et al. [21] 2014 | Canada | 2009–2010 | 98,346 individuals Native born \( n=83,949 \) Established migrants \( n=10,810 \) Recent immigrants \( n=3587 \) 20–74 years | To examine the effects of chronic health conditions, as well as personal resources and regional context on labour force participation, receipt of government transfer payments and use of health services by short- and long-stay immigrants compared with native-born Canadians | Survey-based study Canada Community Health Survey (CCHS) | (1) GP visits in the past 12 months (2) Labour force participation (3) Use of government transfer payments | (1) Native-born Canadians (2) Recent immigrants (resident in Canada for 10 years or less) (3) Established immigrants (present in Canada for more than 10 years) | Age & gender Chronic physical conditions (last 6 months or more) Chronic mental conditions Education level Marital status Official-language ability (English or French) Geographic region | Recent immigrants healthy or with chronic health problems made fewer GP visits Established immigrants with chronic conditions did not differ in their use of GP |
| Berchet C [22] 2013 | France | 2006–08 | 12,999 individuals French \( n=11,934 \) Immigrants \( n=1065 \) ≥18 years | To highlight factors generating healthcare use inequalities relating to immigration | Survey-based study Health Survey (Enquête sur la santé et la protection sociale-ESPS) | (1) GP visits (last year) (2) Specialist medical visits (last year) | Nationality and country of birth (subject and parents) | Age & gender Self-rated health Chronic disease and functional limitations Health behaviour (smoke, overweight) Health insurance Education level Employment status Family composition Isolation and social support Place of residence GP’s and specialist’s patient load | Immigrants present a lower demand for GP and specialist care |
| Study Authors          | Country | Year | Sample Size | Methodology | Data Collection | Referral/Utilization Measures | Country of Birth | Age & Gender | Socio-Economic Status | Place of Residence | Other Notes |
|------------------------|---------|------|-------------|-------------|----------------|-------------------------------|-------------------|--------------|----------------------|-------------------|-------------|
| Carmona-Alférez MR     | Spain   | 2013 | 835,401     | Register-based study | Medical records of PHC (OMI-AP) | (1) Referral to specialists (2) Number of referrals | Age & gender | Health problems | –                   | –               | –           |
|                        |         |      | (n = 694,716) |             |                 |                               | 2006–2007 835,401 individuals Natives (n = 694,716) Immigrants (n = 140,685) 25–64 years | To evaluate the relationship between birthplace of users of PHC in the Community of Madrid (CM) and the referrals to specialists | –             | –                   | –               | –               | –           |
| De Back TR et al. [34] | Netherlands | 2015 | 60,852     | Register-based study | Registry data from the Achmea Health Insurance Company (Achmea) | (1) Number of GP visits (2) Number of specialist (cardiologist and neurologist) visits | Moluccan and Dutch surnames | Age & gender | Socio-economic status (SES) Area-level SES scores were composed by the Netherlands Institute for Social Research | Place of residence | Cardiovascular healthcare use of ethnic minority groups may converge towards that of the majority population |
| De Luca G et al. [24]  | Italy   | 2013 | 102,857     | Survey-based study | Italian Health Conditions survey (ISTAT-Condizioni di salute e ricorso ai servizi sanitari) | (1) GP visits (last 4 weeks) (2) Specialist medical visits (last 4 weeks) (3) Phone consultations (last 4 weeks) (4) ED care visits (last 4 weeks) | Country of birth and citizenship criteria (1) Native (Italian citizens born in Italy) (2) First-generation immigrants (individuals born outside of Italy without Italian citizenship) (3) | Age & gender | Self-assessed family wealth Self-assessed health status Chronic diseases and disability conditions Health behaviour | Education level Marital status Employment status Number of children in the household | Area of residence | Immigrants tend to use specialist services and have telephone consultations less frequently, whereas they use ED services more often |
| Study | Year | Country | Sample Size | Characteristics | Methods | Outcomes | Findings |
|-------|------|---------|-------------|----------------|---------|----------|---------|
| Díaz E et al. [13] 2015 | Norway | 2008 | 25,915 patients diagnosed with dementia or memory impairment (in PHC) - Natives (n = 25,117) - Immigrants (n = 788) ≥ 50 years | To study utilization of primary healthcare services of Norwegians and immigrants with either a diagnosis of dementia or memory impairment | Register-based study (1) National Population Register- NPR (2) Norwegian Health Economics Administration database-HELFO (3) Norwegian Prescription Database-NorPD | (1) Number of GP visits (2) ED visits (3) Home consultations | Country of birth. (Born abroad with both parents from abroad) Age & gender Marital status Length of stay in Norway Place of residence | No differences in the use of PHC were found |
| Díaz E et al. [14] 2014 | Norway | 2008 | 3,739,244 individuals - Natives (n = 3,349,721) - Immigrants (n = 389,523) ≥ 15 years | To describe and compare the use and frequency of use of PHC services between immigrants and natives in Norway. To investigate the importance of morbidity burden, socio-economic status and length of stay in Norway for immigrants’ use of PHC services | Register-based study (1) National Population Register (2) Norwegian Health Economics Administration database-HELFO | (1) Percentage of each population who had used the PHC system (GPs, EPC and both) in 2008 (2) Frequency of use among PHC users | Country of birth (1) Natives (born in Norway with both parents born in Norway) (2) Immigrants (born abroad with both parents from abroad) staying at least 6 months, divided according to the World Bank income categories of their country of origin Age & gender Morbidity groups (Johns Hopkins University Adjusted Clinical Groups) Education level Marital status Place of residence | Significantly fewer immigrants from all but LIC used their GP and all PHC services, but a higher share of immigrants except those from HIC used the EPC. This higher use did not compensate for less use of GPs in terms of overall use of PHC. Among GP users, however, immigrants used the GP at a statistically
Table 2 Descriptive summary of the studies included in the review (Continued)

| Study | Country | Year | Sample Size | Methods |
|-------|---------|------|-------------|---------|
| Díaz E et al. [15] 2014 | Norway | 2008 | 1,605,873 individuals (Natives n = 1,516,012) Immigrants (n = 89,861) ≥50 years | To describe the utilization of PHC in Norway in terms of number of consultations, diagnoses given and procedures undertaken. To compare native Norwegians’ use of PHC services with that of different immigrant groups. Register-based study (1) National Population Register (2) Norwegian Health Economics Administration database-HELFO (1) Frequency of use of PHC system (GP, EPC) in 2008 (2) Diagnoses received at GP and EPC consultations. Country of birth (1) Natives (born in Norway with both parents born in Norway) (2) Immigrants (born abroad with both parents from abroad) staying at least 6 months, divided according to the World Bank income categories of their country of origin. Age & gender Morbidity groups (Johns Hopkins University Adjusted Clinical Groups). Education level Marital status Income level Length of stay in Norway Place of residence Reason for migration Age at migration. |
| Durbin A et al. [23] | Canada (Ontario) | 1993–2012 | 1,820,443 individuals Long-term residents | Examine the use of primary care and Register-based study 1) Visits to PHC physicians 2) Visits. Country of birth (1) Long-term OIC immigrants (2) OIC immigrants (3) OIC immigrants (born abroad with both parents from abroad) staying at least 6 months, divided according to the World Bank income categories of their country of origin. Age & gender Education level Marital status. Immigration status and length of stay in Canada. Reason for migration Age at migration. |
| Year | Study | Sample Size | Language | Location | Methods | Results |
|------|-------|-------------|----------|----------|---------|---------|
| 2015 | Durbin A et al. [16] | (n = 908,329) Immigrants (n = 912,114) 18–105 years | English | Canada (Ontario) | (1) OHIP claims data (2) Canadian Institute for Health Information’s Discharge Abstract Database (3) Ontario Mental Health Reporting System (4) National Ambulatory Care Reporting System (April 1, 1993 – March 31, 2012) | Specialty services for non-psychotic mental health disorders by immigrants to Ontario Canada during their first 5 years after arrival to psychiatrists | Income level Length of stay Official language speaking ability Immigrant admission category Neighbourhood |
| 2014 | Durbin A et al. [16] | (n = 359,673) LT-Residents (n = 163,263) Immigrants (n = 163,298) 18–105 years | English | Canada (Ontario) | (1) OHIP claims data (2) Canadian Institute for Health Information’s Discharge Abstract Database (3) Ontario Mental Health Reporting System (4) National Ambulatory Care Reporting System | To compare service use (primary care visits, visits for psychiatric care, and hospital use) for non-psychotic mental disorders by recent immigrants by matched long-term residents | Income level Length of stay Official language speaking ability Immigrant admission category Neighbourhood |

Regarding specialty mental health care (psychiatry and hospital care), immigrants used it less. Across the 3 mental health services, estimates of use by immigrant region groups were among the lowest for newcomers from East Asian and Pacific and among the highest for persons from Middle East and North Africa.
| Study | Country | Year | Sample Size | Group 1 | Group 2 | Objective | Study Design | Data Sources |
|-------|---------|------|-------------|---------|---------|-----------|-------------|--------------|
| Esscher et al. [35] | Sweden | 1988-2010 | 74 individuals | Natives (n=48) | Immigrants (n=26) | To identify suboptimal factors of maternity care related to maternal death as it occurred in Sweden over a period of increased migration of childbearing women from LIC and MIC | Register-based study | (1) Swedish official and national registries (1988-2007) (2) Swedish Society of Obstetrics and Gynaecology (SFOG) Maternal Mortality Group (2008-2010) |
| Fosse-Edorh et al. [36] | France | 2002-2007 | 13,959 individuals | Born in France (n=12,711) | Born in North Africa (n=327) | The objective of the present study was to determine DT2 prevalence and management in immigrants from North Africa | Survey-based study | (1) GP visits last year (2) ≥ 1 private specialist visit (ophthalmologist or endocrinologist) last year (3) Country of birth (1) Born in France (2) Born in North Africa |

### Table 2: Descriptive summary of the studies included in the review (Continued)

| Study | Country | Year | Sample Size | Group 1 | Group 2 | Objective | Study Design | Data Sources |
|-------|---------|------|-------------|---------|---------|-----------|-------------|--------------|
| Sarría-Santamera et al. | | | | | | | | |
Table 2 Descriptive summary of the studies included in the review (Continued)

| Study | Country | Year | Sample Size (N) | Age & Gender | Study Design | Study Population | Country of Birth | Age & Gender | Private Health Insurance |
|-------|---------|------|-----------------|--------------|--------------|------------------|------------------|--------------|-------------------------|
| Franchi C et al. [37] | Italy (Lombardy region) | 2010 | 51,016 individuals | | Register-based study | To compare healthcare resource utilization (drug prescriptions, hospital admissions and healthcare services) in regular immigrants living in the Lombardy Region of Northern Italy at least 10 years versus native elderly people (65 years or older) | | | |
| Garcia-Subirats I et al. [38] | Spain | 2006–2007 & 2011–2012 | 21,818 individuals | | Survey-based study | To analyse the changes in access to health care and the determinants of access among the immigrant and autochthonous populations in Spain between 2006 and 2012 | | | |
| | | | 2006–2007 & 2011–2012 | 21,818 individuals | | | | | |
| | | | Natives (n = 18,504) Immigrants (n = 2893) | | | | | | |
| | | | 2011–2012 | 15,200 individuals | | | | | |
| | | | Immigrants (n = 2390) 16–59 years | | | | | | |
Table 2 Descriptive summary of the studies included in the review (Continued)

| Study | Country | Populations | Year | Sample Size | Design | Data Collection | Outcomes | Results |
|-------|---------|-------------|------|-------------|--------|----------------|----------|---------|
| Gazard B et al. [26] 2015 | United Kingdom, UK (Southeast London, Lambeth and Southwark) | 1698 individuals | 2008–2010 | 1,698 | Survey-based study | South East London Community Health (SELCoH) survey | Length of stay (Immigrants in the SNHS 2011–2012) | Visiting the specialist both in 2006 and 2012 The difference in use of ED decreased slightly for both groups and the difference between them was maintained from 2006 to 2012; the immigrant population showed a higher prevalence of use of this care level No significant differences were found between both populations in terms of hospitalizations |

(1) To describe the socio-demographic and socio-economic differences between migrants and non-migrants as broad groupings and by ethnicity, as well as within migrant groups by length of residence in the UK (2) To investigate the associations between migration status and health-related outcomes, including health behaviours, functional limitations, 

Educational level Employment status Household income Migrant status Length of residence 

Migrants who had been in the UK for < 5 years, white migrants and those who migrated for education or work had increased odds of not being currently registered with a GP Migrants who had been in the UK for 5–10 years had increased odds of seeing a GP for an emotional problem Those who had resided
Table 2 Descriptive summary of the studies included in the review (Continued)

| Study | Country of birth | Drug prescription | Age & gender | Method | Findings |
|-------|------------------|------------------|--------------|--------|----------|
| Gimeno-Feliu LA et al. [27] 2016 | Poland, China, Colombia & Morocco | Register-based study (1) Pharmaceutical Billing Database in Aragon (2) Norwegian Prescription Database-NorPD | – | Analyse all registered pharmacological treatments for immigrants from Poland, China, Morocco and Colombia compared to natives, aiming to identify patterns of drug use for each immigrant group compared to host countries. In the two countries studied, the proportion of immigrants that purchased drugs was significantly lower than that of the corresponding native population. Immigrants from Morocco showed the highest drug purchase rates in relation to natives, especially for antidepressants, pain killers and drugs for peptic ulcer. Immigrants from China and Poland showed lowest purchasing rates, while Colombians were more similar to host countries. | |
| Study                          | Country          | Year  | Study Population | Methodology   | Study Details                                                                 | Outcomes                                                                 |
|-------------------------------|------------------|-------|------------------|---------------|-------------------------------------------------------------------------------|--------------------------------------------------------------------------|
| Gimeno-Feliu LA et al. [39]   | Spain (Aragón)   | 2013  | 594,145 individuals | Register-based study | To analyse the use of primary care services by immigrants compared to Spanish nationals, adjusted by age and sex. To analyse the differences in frequency of visits to primary care in relation to geographic origin. | The immigrant population makes less use of PHC services. This is evident for all age groups and regardless of immigrants’ countries of origin. |
| Klaufus L et al. [40]         | Netherlands      | 2014  | 14,131 individuals | Survey-based study | To investigate ethnic differences as a factor in mental healthcare consumption in patients with medium & high risk of CMD (common mental disorders) and to identify determinants that may explain possible ethnic differences. | Ethnic minority groups contacted the GP significantly more often than native Dutch people, with the exception of Antillean/Aruban immigrants. First-generation immigrants tended to contact the GP more often than second-generation immigrants. The four ethnic minority groups visited a mental healthcare specialist more often than the Dutch; this was significantly higher among the Turks. |
Table 2  Descriptive summary of the studies included in the review (Continued)

| Study | Country | Year | Sample Size | Participants | To study: | Survey-based study | Country of birth and country of birth of fathers | Age & gender | Education level | No significant difference was found in the utilization of healthcare services associated with dysphoric disorders, except for a higher utilization of secondary/tertiary care by female migrants with a dysphoric disorder. Immigrant males without dysphoric disorders had a lower utilization rate.

Kerkenaar M et al. [41] 2013 Austria October 2010–September 2011 3448 individuals Natives (n = 2930) Immigrants (n = 518) ≥15 years To study: (1) the prevalence of dysphoric disorders among different groups of migrants (first and second generation from different regions) in comparison to the native Austrian population using a validated questionnaire (2) The influence of gender, socio-economic factors, fluency of host language and length of stay in Austria on this prevalence (3) The utilization of healthcare services of migrants and Austrians with and without a dysphoric disorder.

Survey-based study (Telephone survey ad hoc and PHQ-4) (1) Visits to a GP in the last 4 weeks (2) Visits to specialists in their own practices in the last 4 weeks (3) Out or inpatient hospital care in the last 4 weeks (4) Prevalence of dysphoric disorders.

Koopmans GT et al. [17] 2013 Netherlands 2001–2003 9077 individuals Native Dutch (n = 7772) Immigrants (n = 1305) ≥18 years To investigate ethnic-related differences in utilization in outpatient mental health care.

Survey-based study Dutch Second National Survey of General Practice (A representative sample of 104 GP practices) Contact with any mental health service during the last 12 months.

Place of birth (subject and parents) Surinamese, Dutch, Antilleans, Moroccans and Turks.

Age & gender Self-reported mental health

Education level Marital status Proficiency in Dutch language Orientation towards modern western values Lay views on illness and treatment

Migrant group’s utilization is about half the level of the native Dutch.
### Table 2 Descriptive summary of the studies included in the review (Continued)

| Study Authors | Country/Region | Study Period | Study Design | Objective | Data Source | Cardiovascular Risk Factor Profile | Education Level | Occupation | Average Monthly Household Income | Findings |
|---------------|----------------|--------------|--------------|------------|-------------|-----------------------------------|----------------|------------|----------------------------------|----------|
| Lee CH et al. [42] | Singapore | 2008–2010 | Survey-based study | To study disparities in accessibility to high quality health care, and if patients’ psychosocial condition after discharge was associated with their immigration status | Survey at university-affiliated hospital in Singapore | Singapore-born citizens (1) Foreign-born citizens (2) | There were no major disparities in access to high quality health care for patients with different immigration status |
| Marchesini G et al. [43] | Italy | 2010 | Register-based study | To assess whether prevalence, treatment and direct costs of drug-treated diabetes were similar in migrants and in people of Italian citizenship | Administrative data sources of all Italian residents in 30 health districts (ARNO observatory) | Place of birth & Age & gender | Migrants show a higher risk of diabetes but less intense treatment |
| Pourat N et al. [44] | USA (California) | 2009–2010 | Survey-based study | Test the validity of the assertion that undocumented immigrants are more frequent users of health care | California Health Interview Survey (CHIS) | Place of birth | | |

Note: Details on study design, objective, data source, education level, occupation, average monthly household income, and findings are provided.
| Study Authors | Country (City) | Year | Sample Size | Study Description | Unit of Analysis | Age & Gender | Diagnosis at Discharge | Destination at Discharge | Length of Stay | Other Variables |
|---------------|----------------|------|-------------|--------------------|-----------------|-------------|----------------------|------------------------|--------------|----------------|
| Ramos JM et al. [28] | Spain (Alicante) | 2011 | 42,839 individuals Natives (n = 38,620) Immigrants (n = 4219) ≥15 years | To compare hospital admission rates, diagnoses at hospital discharge, service of admission at hospital discharge, and mortality between FCs and autochthonous citizens (ACs) | Hospital admissions | Foreign citizen (FC) (people without Spanish citizenship) (1) FCs from high income countries (born in 25 European Union countries, Switzerland, Iceland, Norway, the USA, Canada, Japan, and Australia) (2) FCs from low income countries (born elsewhere: North Africa and the Middle East, Latin America, Eastern Europe, Sub-Saharan Africa, and Asia) | Age & gender | The utilization rate was lower in foreign citizens |
| Rucci P et al. [18] | Italia (Bologna) | 2010–2011 | 8990 individuals Natives (n = 8602) Immigrants (n = 388) All ages | To determine whether disparities exist in mental healthcare provision to immigrants and natives with severe mental illness | Register-base study Information system of the Departments of Mental Health (DMH), Emilia-Romagna | (1) Receiving psychosocial rehabilitation the following year (2) Days admitted to hospital wards or to residential facilities the following year | Citizenship (immigrants comprise regular immigrants, non-documented immigrants, no Italian citizenship) | Age & gender Mental illness diagnosis Age at first contact Duration of episode | Education level Marital status Working status Living arrangement CMHC area | Although the probability of receiving any mental health intervention is similar between immigrants and Italians, the number of interventions and the duration of admissions are lower for immigrants. Immigrants spend less days of residential care in licensed psychiatric facilities or other facilities |
| Study Authors        | Country | Year       | Sample Size | Methods                                                                 | Use of Psychiatrist or Psychologist last year | Citizenship:                                                                 | Age & gender | Marital status | Immigrants from RGC, have similar or higher use of psychiatrists and psychologists in private practice when taking mental health into account Labour immigrants in general, except for women using psychiatrists, have lower use of psychiatrists and psychologists |
|----------------------|---------|------------|-------------|--------------------------------------------------------------------------|-----------------------------------------------|--------------------------------------------------------------------------------|-------------|---------------|----------------------------------------------------------|
| Smith-Nielsen et al. | Denmark | June–August 2007 | 3,573 individuals | Register and survey-based study Survey and registry study on health and health behaviour of individuals registered at the Danish Civil Registration System (CPR number) | To investigate whether potential differences exist in the use of private practicing psychiatrists and psychologists | (1) Ethnic Danes (at least one parent born in Denmark with Danish citizenship) (2) Immigrant (people residing in Denmark for a minimum of 3 years and born in a foreign country to parents without Danish citizenship) (RGC: Refugee Generating Countries: Turkey, Pakistan, Iraq, Iran, Lebanon, Syria, Somalia and Yugoslavia) | Nordic      |              |                                                          |
| Spinogatti et al.    | Italy   | 2001–2010  | 139,775 individuals | Register-base study Regional mental health information system Departments of Mental Health (DHM), Lombardy | To analyse the differences in mental health service utilization by immigrant and native populations | Country of birth | Age & gender | Marital status | Education level |
| Straiton et al.      | Norway  | 2008       | 2,712,974 individuals | Register-base study National registries (1) National Population Register (2) Norwegian Health Economics Administration database-HELFO (3) Norwegian Prescription Database-NoPD PHC services (1) GP psychological consultations (2) EPC psychological consultation | To explore treatment options in primary care for immigrant women with mental health problems compared with non-immigrant women | Country of birth (1) Natives (born in Norway with both parents born in Norway) (2) Immigrants (born abroad with both parents born in Norway) staying at least 6 months | Age & gender | Marital status | Employment status |
|                     |         |            |             |                                                                          |                                               | Income level Length of stay Reason for migration Place of residence            | Age & gender | Marital status | Employment status                                      |
| Sarría-Santamera et al. | Spain  | 2016       | 28,000 individuals | Register-base study Regional mental health information system Departments of Mental Health (DHM), Lombardy | To analyse the differences in mental health service utilization by immigrant and native populations | Country of birth | Age & gender | Marital status | Education level |
|                     |         |            |             |                                                                          |                                               | Income level Length of stay Reason for migration Place of residence            | Age & gender | Marital status | Employment status                                      |
| Table 2 Descriptive summary of the studies included in the review (Continued) |
|-------------------------------------------------|
| Straiton ML et al. [20] 2016 Norway 2008–2016 1,283,437 individuals |
| (1) To identify in which forms of treatment immigrant women are over or under represented compared with native Norwegians, and if this varied by country of origin (2) To determine whether use of an interpreter increases the likelihood of accessing different treatment types |
| Register-based study National registries (1) National Population Register (2) Norwegian Health Economics Administration database-HELFO (3) Norwegian Prescription Database-NorPD Mental health services (1) Conversational therapy (2) Psychiatric referrals (3) Psychotropic medication (4) Certificates for sickness leave and disability applications |
| Country of birth (1) Natives (born in Norway with both parents born in Norway) (2) Immigrants (born abroad with both parents from abroad) staying at least 6 months, divided according to the World Bank income categories of their country of origin Age Diagnosis Use of interpreter Marital status Income level Length of stay Place of residence |
| Women are somewhat underrepresented in PHC services for mental health problems A higher percentage of Norwegian women had had a Psychiatric consultation than any of the 6 immigrant groups Psychiatric referral rates did not differ by country of origin |
| Tarraf W et al. [30] 2014 USA 2000–2008 167,889 individuals US-born (n = 133,102) Naturalized FB-citizens (n = 14,338) Non-citizens (n = 20,449) ≥18 years |
| (1) Provide a detailed accounting of ED use with policy-relevant immigrant classifications (2) Examine associations between ED use and citizenship status using a Behavioural Model of healthcare access and utilization (3) Determine the most important factors associated with differences in immigrants’ ED services use |
| Survey-based study (1) Medical Expenditures Panel Survey (MEPS) (2) National Health Interview Survey Self-reported past-year ED use |
| Immigration status and place of birth (1) US-born citizens (2) Naturalized foreign-born (FB) citizens (immigrants who have obtained US citizenship) (3) FB non-citizens (legal permanent residents, as well as undocumented and “other” immigrants) Age & gender Self-reported ethnicity/race Self-rated health Medical conditions Past-year healthcare provider visits Past-year hospital discharges Insurance status Usual source of care availability Education level Household income-to-poverty Place of residence (urbanity) Region |
| Immigrants, and particularly non-citizens, were less likely to use ED services and showed that they are also less likely to be repeat users |
| Study | Country | Year | Main Findings |
|-------|---------|------|---------------|
| Tormo MJ et al. [31] 2015 | Spain (Murcia) | 2006–2008 | 2453 individuals: Natives (n = 1303) & Immigrants (n = 1303)
| | | 18–64 years | To describe the utilization of health services among immigrant and male and female native populations
| | | | Survey-based study
| | | | (1) Spanish National Health Survey (SNHS)
| | | | (2) Health and Culture Survey (SyC)
| | | | (1) Unmet healthcare need in the last 12 months (2) Visit to a GP in the last year (3) Visit to dentist in the last year (4) Hospitalization and ED visit in the past year (5) Drug consumption in the last 2 weeks
| | | | Immigrants with Health Insurance Card (Tarjeta Sanitaria Individual-TSI)
| | | | Age & gender
| | | | Education level
| | | | Migrants showed a lower use of PHC services specialists, but a higher use of ED
| Verhagen I et al. [32] 2014 | Netherlands | 2010 | 68,214 individuals: Natives (n = 33,725) & Immigrants (n = 34,489)
| | | ≥ 55 years | To study whether healthcare use of the four ethnic minority elderly populations in the Netherlands varies from the ethnic Dutch elderly
| | | | Register-based study
| | | | Registry data from the Achmea Health Insurance Company (Achmea)
| | | | (1) GP services (2) Receipt of prescriptions (3) Physical therapy (4) Hospital services (5) Medical aids to help with a limitation
| | | | Country of birth or surname
| | | | Turkish, Moroccan, Surinamese and Moluccan
| | | | Age & gender
| | | | Additional health insurance
| | | | Neighbourhood deprived
| | | | The use of PHC facilities (GP services and prescriptions) within most ethnic minority groups is higher; however, they generally make less use of hospital care, medical aids, and physical therapy
| Villarroel N et al. [46] 2015 | Spain | 2006 | 22,224 patients: Natives (n = 20,126) & Immigrants (n = 1998)
| | | 16–64 years | To analyse differences in patterns of healthcare use (visits to PC, hospitalizations and emergency visits) between the native Spanish population and immigrants from the seven leading countries in terms of number of immigrants
| | | | Survey-based study
| | | | Spanish National Health Survey (SNHS) 2006–2007
| | | | (1) Visit to a GP in the 4 weeks before (2) Hospitalization in the past year (3) ED visits in the past year
| | | | Country of birth
| | | | Romania
| | | | Age & gender
| | | | Marital status
| | | | Employment status
| | | | Social support (adapted from the Duke-UNC Functional Social Support Questionnaire)
| | | | Social support (adapted from the Duke-UNC)
| | | | Immigrants made less than, or about the same use of healthcare services. Among men, a lower use of healthcare services was found among those born in Romania for all healthcare levels
Table 2: Descriptive summary of the studies included in the review (Continued)

| Study | Country | Year | Sample Size | Research Design | Outcomes | Participants |
|-------|---------|------|-------------|----------------|----------|--------------|
| Wang L [47] 2014 | Canada | 2005–2010 | 94,948 (Canadian-born, n=73,806; Foreign born, n=21,142) 18–75 years | Survey-based study Canadian Community Health Survey (CCHS) | (1) Have a regular physician (2) Stay overnight in hospital (3) Number of dental visits per year (4) Number of physician visits per year | Country of birth, ethnic origin and immigrant status (1) Native born (2) Long-standing groups (Italian and Portuguese) (3) Recent groups (Chinese and South Asian) (4) Overall foreign born | Immigrants have lower rates of overnight stay in hospital and among Ecuadorians for hospitalizations. Among women a lower use of PHC was found among those born in Argentina, Bolivia and Ecuador, and a higher use among Peruvians. No differences were observed with native-born subjects. A higher utilization of healthcare services was only found among men born in Bolivia, who were more likely to use hospitalization services. |

Wang L [47] 2014 | Canada | 2005–2010 | 94,948 (Canadian-born, n=73,806; Foreign born, n=21,142) 18–75 years | Survey-based study Canadian Community Health Survey (CCHS) | (1) Have a regular physician (2) Stay overnight in hospital (3) Number of dental visits per year (4) Number of physician visits per year | Country of birth, ethnic origin and immigrant status (1) Native born (2) Long-standing groups (Italian and Portuguese) (3) Recent groups (Chinese and South Asian) (4) Overall foreign born | Immigrants have lower rates of overnight stay in hospital. All four selected immigrant groups have higher rates for having a regular physician. Immigrants report significantly more physician visits Foreign-born groups report fewer dental visits. |
Table 2 Descriptive summary of the studies included in the review (Continued)

| Study          | Country | Year | Sample Size | Methodology                                                                 | Health Services Use | Medical Conditions | Immigrant Characteristics |
|----------------|---------|------|-------------|------------------------------------------------------------------------------|----------------------|--------------------|----------------------------|
| Wang L et al.  | Canada  | 2015 | 161,981     | Survey-based study Canadian Community Health Survey (CCHS) 2005–2010          | Stay overnight in hospital; Physician visits; Dental visits | Overall foreign born ≥ 25 years | To explore healthcare-seeking behaviour of South Korean immigrants in Toronto, Canada, and how transnationalism shapes post-migration health and health-management strategies |
|                |         |      | (n = 36,684) | Country of birth: (1) Native born in Canada; (2) Overall foreign born; (3) Korean immigrant |                      |                    | Koreans use health services the least; They have the lowest rate of having a regular doctor and overnight stay in hospital, the lowest numbers for dental and physician visits in the past 12 months, and the highest rate of no doctor visit in the past 12 months |

CMHC Community Mental Health Centers, ED emergency department, EPC emergency primary care, GP general practitioner, HIC high income country, LIC low income country, MIC medium income country, OHIP Ontario Health Insurance Plan, PHC primary health care, STMI ST segment elevation myocardial infarction
same dataset [13–16, 19, 20, 25, 47, 48]. Nevertheless, as these articles focused on different aspects of healthcare use or outcome measures, all were included in this review.

Distribution of studies regarding publication year was as follows: 8 studies published in 2013 [17, 22–24, 27, 28, 41, 42], 15 in 2014 [14–16, 19, 21, 30, 32, 33, 35, 36, 38, 40, 43, 44, 47], 10 in 2015 [13, 18, 25, 26, 29, 31, 34, 45, 46, 48] and 3 in 2016 [20, 37, 39]. The majority of the publications analysed data from European countries (28; 78%), both North and Central (12) (Norway [13–15, 19, 20], Denmark [45], Sweden [35], the Netherlands [17, 32, 34, 40] and Austria [41]) and South Europe (15) (France [22, 36], Italy [18, 24, 29, 37, 43], Spain [23, 27, 28, 31, 38, 39, 46] and Portugal [33]) and 1 from the UK [26]. Seven papers (19%) explored this issue in North America (2 from USA [30, 34] and 5 from Canada [16, 21, 25, 47, 48]); and 1 (3%) in Asia (Singapore) [42] (see Fig. 2).

Geographical coverage of the studies has some variation: 21 performed at the national level [13–15, 17, 19–22, 28, 30, 32, 34–36, 38, 40, 41, 45–48], 10 at a regional level [16, 18, 23, 25–27, 29, 31, 37, 44], 3 at a local level [28, 33, 42] and 1 multi-country study [39] with data from a regional level of 1 country and the national level of the other. There were only 4 longitudinal studies (2 prospective [18, 42] and 2 retrospective [27, 43]) and 1 case-control study [35]. Sample sizes ranged from 74 [35] to 7,856,348 [43]. Multivariable regression (Poisson or logistic) was the most frequent analysis. Only 9 studies conducted univariate analysis [29, 32, 33, 35, 38, 43, 48].

Sources of information
Service utilization could be assessed from two perspectives: the physician’s perspective, based on recorded databases and volume of medical services, and the patient’s perspective, based on patient-reported use of services through healthcare surveys [49].

The largest number of papers (18) used information from administrative [13–16, 18–20, 23, 25, 29, 33, 35, 37, 39, 43] or insurance system databases [32, 34] and specific hospital
registries [28] as source of information. Among the 16 papers (44.4%) that analysed healthcare surveys, where people report their individual healthcare use, 14 studies used population-based surveys which were elaborated for other purposes [17, 21, 22, 24, 26, 30, 36, 38, 40, 44, 46–48] while 3 of the surveys were specifically designed to explore immigrants healthcare use [31, 41, 42]. Only 2 studies [33, 45] (5.6%) combined health survey and administrative information and 1 study also used a national survey for general practitioners (GPs) [17].

Subjects
There were diverse definitions of immigrants. Country of birth was the most common criteria used to define immigrants (18), or country of birth of the subject and their parents (10). In addition, name recognition (2) [32, 34], citizenship (3) [18, 24, 28] or a combination of citizenship and country of birth (3) [30, 42, 45] were also used.

The majority of papers classified the immigrant population in sub-groups usually based on country of birth (13). However, some studies considered geographic area of origin (8) or World Bank categories of income level (5). Other less frequent categories considered were legal status (3), reason of migration (1), length of stay in the country (3) and being first of second generation (1). Only 2 studies (5.6%) [18, 22] compared the use of services considering the immigrant populations as a whole, without defining specific sub-groups in those populations.

Findings
The outcome “healthcare service utilization” could be organized in seven focus areas: primary care, specialist’s services, hospitalizations, emergency services, mental health, dental care and medication prescription. Some studies reported on more than one outcome. In total, 8 papers analysed the use of primary care (including GP visits, dental care and physiotherapy) [13–15, 21, 27, 36, 44, 48], 6 evaluated the use of specialist services (including hospitalizations or emergency care) [23, 28, 30, 33, 35, 42], 5 assessed mental health services [17, 18, 20, 29, 45], 10 evaluated the use of both primary care and specialists [22, 24, 31, 32, 34, 37, 38, 43, 46, 47], 2 evaluated primary care and mental health [19, 40], 4 evaluated both primary care, mental health and hospitalizations [16, 25, 26, 41] and 1 studied pharmaceutical use and prescriptions [39]. In addition, 6 studies also reported medication consumption [20, 31, 32, 37, 42, 43].

The measurement of healthcare utilization was either continuous (number of contacts) or dichotomic (having had any contact). The period of time used to determine utilization ranged from 4 weeks through 1 year.

The more frequent outcome was that immigrants have lower [17–20, 22, 25, 27, 28, 30, 33, 35, 40, 43, 44, 48] or similar [13, 21, 34, 36, 41, 42] healthcare utilization. However, studies that included analysis by sub-groups of immigrants identified some differences across groups [14–16, 23, 26, 31, 37, 39, 40, 45, 46] as well as with the type of service assessed [14, 24, 29, 31, 32, 38, 40, 46, 47].

The immigrant population showed a similar [23, 24, 29, 31, 32, 34, 36–40, 46] or lower [17, 18, 22, 27, 28, 33, 43] use of primary care and specialized care in countries with universal access to health care—even for undocumented migrants [50]. This finding was consistent regardless of the source of information used. In other countries,
some differences were identified associated with the source of information: immigrants showed higher use of health services when estimates were based on surveys [26, 41, 45], while their rates were lower [19, 20, 35] or similar [13–15] when registries or administrative data were used.

Discussion

The main result of this review is that migrant populations appear to have a lower use of health services than native populations, with a similar level of use of primary care services. This result appears to be independent from differences in need of access. Nevertheless, the great heterogeneity of the studies included in this review, considering both the sources of information, as well as factors used for controlling health need and to classify immigrants in sub-groups, requires caution when making an overall estimation valid for all immigrants.

Different sources of heterogeneity should be mentioned. First, and probably the factor with the highest relevance, was the definition of immigrant and their characterization. This review has identified several factors that could be involved with differences in healthcare utilization among immigrants: income of the original native countries [13–15, 28, 38], the specific reasons motivating migration [15, 16, 19, 25, 26], fluency in the host country language [16, 17, 21, 25, 44, 45, 47] and length of time of stay [13, 15, 19–21, 26, 38, 45, 47, 48].

There were also differences in how medical need was determined and how to estimate factors that predispose to healthcare use. The majority of studies assessed health needs from the point of view of self-perceived health, and through commonly used socio-demographic variables, such as education, income or working status, following the model of Aday and Anderson [51, 52]. Multivariable models were adjusted by these variables to eliminate the effect they could have on utilization, but whether they had a differential influence on immigrants or native populations remains inconclusive.

Variables which could have a significant effect on healthcare service use and in particular for mental health care [53], such as health beliefs and cultural concepts on the part of the immigrants, fear of stigmatization, taboos, perceived efficacy of health interventions or use of alternative services, were usually not considered. The effect of these variables is most commonly explored through qualitative techniques, and papers that used those methods were not included in this report.

Variation in countries’ healthcare systems limits direct cross-country comparisons, although immigrants showed similar patterns of utilization in countries with significant differences in their healthcare services. Nevertheless, studies reviewed pay little attention to the structural and organizational dimensions of healthcare systems, other than reporting the specific conditions for accessing health services. One paper explored the influence of attitudes of professionals regarding immigrants [54], 2 studies assessed the reasons for unmet healthcare need [31, 38] while 2 underscored the patient workload of healthcare professionals [22, 23]. In addition, the effect that new legislation enacted in different countries could have had on access to healthcare services by immigrants has not yet been evaluated and published and therefore cannot be assessed in this review.

Attempting to expanding the scope of previous reviews, we tried not to constrain the inclusion criteria regarding areas of healthcare services assessed [10, 55, 56], context of the study (country) [54, 55], or characteristics of immigrants [54, 55].

This work adds also new information regarding the use of mental health services, both in terms of primary [19, 26] and specialized mental services [16–18, 20, 25, 29, 41, 45].
Nevertheless, and although immigrants have shown a higher susceptibility to emotional and mental health problems that could be linked to the stressors of adapting to the host country [57], those studies reported similar findings as for other health services: an overall lower use by migrants, also with differences across sub-groups and with an occasional higher use of emergency care.

This review also provides the opportunity to have an insight of the healthcare use of certain vulnerable sub-groups, as the handicapped [13], the elderly [13, 15, 32, 37] or patients with chronic conditions [21, 34, 36], but the pattern of use of those sub-groups is similar to that of the general population, even when immigrants seem to have less health problems than natives [13, 34], or a poorer health status [36]. Immigrants also showed a higher use associated with longer periods of stay in the host countries [15, 21] as well as significant differences of use among migrant sub-groups [32, 37].

The effect of gender differences was assessed most notably in papers evaluating the use of mental health services [16, 19, 20, 25, 41, 45]. Nevertheless, no conclusive evidence could be established: compared to their native counterparts, Straiton et al [19, 20] and Durbin et al [16, 25] found a lower use of mental health services for immigrant women, while Kerkenaar et al [41] and Smith-Nielsen et al. [45] found a higher use.

The possibility to analyse the use of different levels of care may help to determine the existence of gaps in utilization (less use in one area could explain an increased use in another area) or highlight the existence of different referral criteria (primary care specialists) [23]. De Luca et al. found [24] an over-utilization of emergency services associated with an under-utilization of preventive care services among the immigrant population. Tormo et al. [31] and Díaz et al. [14] obtained similar results, although they concluded that the higher use of emergency services did not compensate the lower use of GPs. The identification of differences in pharmaceutical consumption could also lead to identify particular health problems or economic barriers accentuated by the development of restrictive health policies.

Lastly, the large number of European studies, particularly from western and central Europe, has to be highlighted, probably depicting the interest about the migratory pressure these countries have faced in the last years—migration from Eastern Europe after the fall of the Iron Curtain; from Latin America, North and sub-Saharan Africa; from internal migration flows south-north after the economic crisis; or most recently, the refugee crisis.

Study limitations
The literature search was conducted only in one database (MEDLINE), although the electronic search was manually completed using Google Scholar. There were implied limitations in the manual search, since it was not systematized and was susceptible to errors as it relied on title appropriateness (particularly for articles with ambiguous titles). Furthermore, no backward citation of the papers included in the systematic review was performed. Additionally, the systematic search only identified 50% of the papers accepted for inclusion, which raises some doubts regarding the intrinsic limitations of the system to classify and assign terms to papers that compare the use of healthcare services between native and migrants.

Finally, qualitative papers that explored the use of healthcare services were not included, as it would be difficult to draw comparisons from these studies.
Conclusions

Overall, and regardless of the changes in the immigration process, data here analysed is coincident with results obtained in previous reviews [10, 54, 56], confirming that immigrants show a general tendency to a lower use of health services than native populations. But these data also indicate the existence of differences within the immigrant populations, reinforcing the conclusion that further studies intended to compare the rate of healthcare use between native and immigrant populations should incorporate information that allows for better identification and characterization of the immigrant population. The immigrant population cannot be considered as a uniform whole. Their diversity has to be taking into account when describing and analysing their healthcare utilization. This will also require improvement and standardization of the information collected [55, 58].

In this sense, the limitations of health surveys have to be emphasized. Surveys are not just subjected to memory bias, but they are less suited to be representative of all relevant sub-groups of the immigrant population, as their samples usually do not include enough participants to reflect the wide variability of the diverse immigrant population to estimate their differential use. For instance, only one paper includes immigrants in irregular status [44]. Therefore, the use of data that overcome these limitations has to be encouraged. Further studies should be based on other information, such as registers, administrative or insurance data, or data from non-governmental organizations [59].

Abbreviations
CMHC: Community Mental Health Centers; ED: Emergency department; EPC: Emergency primary care; GP: General practitioner; HIC: High income country; LIC: Low income country; MIC: Medium income country; OHIP: Ontario Health Insurance Plan; PHC: Primary health care; STMI: ST segment elevation myocardial infarction

Acknowledgements
Not applicable.

Funding
The study was funded by the Institute of Health Carlos III and REDISSEC Thematic Network.

Availability of data and materials
Not applicable.

Authors’ contributions
ASS was the principal investigator who contributed to the conception and design of the study; collected, entered, analysed and interpreted the data; led the paper and acted as corresponding author. AIHG collected, entered, analysed and interpreted the data and prepared the manuscript. LAGF contributed to data analysis and interpretation and drafted the manuscript; and RC participated in the conception and design of the study and helped to draft the paper. All authors read and approved the final manuscript.

Competing interests
The authors declare that they have no competing interests.

Consent for publication
Not applicable.

Ethics approval and consent to participate
Not applicable.

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Received: 29 April 2016 Accepted: 9 November 2016
Published online: 03 December 2016
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