Title: The lower quality of preventive care among forced migrants in a country with universal healthcare coverage.

Authors: Martin Y, Collet TH, Bodenmann P, Blum MR, Zimmerli L, Gaspoz JM, Battegay E, Cornuz J, Rodondi N

Journal: Preventive medicine

Year: 2014 Feb

Issue: 59

Pages: 19-24

DOI: 10.1016/j.ypmed.2013.11.006

The lower quality of preventive care among forced migrants in a country with universal healthcare coverage

Authors

Yonas Martin, BSc[1], Tinh-Hai Collet, MD[1,2], Patrick Bodenmann, MD, MSc[1], Manuel R Blum, MD[3], Lukas Zimmerli, MD[4], Jean-Michel Gaspoz, MD[5], Edouard Battegay, MD[4], Jacques Cornuz, MD, MPH[1], Nicolas Rodondi, MD, MAS[3]

[1] Department for Ambulatory Care and Community Medicine, University of Lausanne, Lausanne, Switzerland; [2] Service of Endocrinology, Diabetes, and Metabolism, Lausanne University Hospital, Switzerland; [3] Department of General Internal Medicine, Inselspital, University of Bern, Switzerland; [4] Division of Internal Medicine, University Hospital of Zürich, Zürich, Switzerland; [5] Department of Community Medicine and Primary Care, University Hospitals of Geneva and Faculty of Medicine, Geneva, Switzerland.

Corresponding author

Nicolas Rodondi, MD, MAS
Department of General Internal Medicine
Inselspital, University of Bern, 3010 Bern, Switzerland
Email: Nicolas.Rodondi@insel.ch, Phone: +41 (31) 632 41 63, Fax: +41 (31) 382 88 85

Word count: 200 (abstract) / 2779 (text only)
Tables / Figures: 3 / 1
References: 25

Abstract

Objective

To assess the association between socio-demographic factors and the quality of preventive care and chronic care of cardiovascular (CV) risk factors in a country with universal health care coverage.

Methods

Our retrospective cohort assessed a random sample of 966 patients aged 50-80 years followed over 2 years (2005-2006) in 4 Swiss university primary care settings (Basel/Geneva/Lausanne/Zürich). We used RAND's Quality Assessment Tools indicators and examined recommended preventive care among different socio-demographic subgroups.

Results

Overall patients received 69.6% of recommended preventive care. Preventive care indicators were more likely to be met among men (72.8% vs. 65.4%; $p<0.001$), younger patients (from 71.0% at 50-59 years to 66.7% at 70-80 years, p for trend=0.03) and Swiss patients (71.1% vs. 62.7% in forced migrants; $p=0.001$). This latter difference remained in multivariate analysis adjusted for gender, age, civil status and occupation (OR 0.68; 95% CI 0.54-0.86). Forced migrants had lower scores for physical examination and breast and colon cancer screening (all $p\leq0.02$). No major differences were seen for chronic care of CV risk factors

Conclusion

Despite universal healthcare coverage, forced migrants receive less preventive care than Swiss patients in university primary care settings. Greater attention should be paid to forced migrants for preventive care.

Background

Quality of care, defined by Campbell et al as "whether individuals can access the health structures and processes of care which they need and whether the care received is effective" (Campbell et al., 2000) , is increasingly the focus of policy makers and the public. Standard indicators of quality of preventive care have been developed in the United States (US) for systematic monitoring of quality of care (Asch et al., 2006; HEDIS, 2007; McGlynn et al., 2003). Since 2004, a systematic performance monitoring has also been conducted in the United Kingdom (UK) (Roland, 2004).

Using RAND's Quality Assessment Tools (McGlynn et al., 2003), a study in 12 metropolitan areas found slightly lower quality of care associated with lower income (Asch et al., 2006). Some other studies (Gray et al., 2007; Schofield et al., 2011; Wortley, 2005) found differences in delivered care according to socio-demographic characteristics, particularly ethnicity.

However, continental Europe, and more specifically Switzerland, suffers from limited documentation about the quality of preventive care, with only few data on the quality of preventive care according to socio-demographic status. A previous Swiss study found shortfalls in pre-natal preventive care for undocumented compared to legally settled migrants (Wolff et al., 2008).

Migrants may be at particular risk of receiving less preventive care, due to numerous obstacles, such as language barriers, differences in health problems compared to the local population or inadequate knowledge of the local healthcare system ((FOPH), 2012; Barnett, 2007; Bodenmann et al., 2007; O'Donnell et al., 2007).

Among a random sample of 966 patients followed in University primary care settings in Switzerland, a country with universal health coverage, we aimed to determine which subgroups of the population received less preventive care and chronic care of cardiovascular (CV) risk factors, and to explore the socio-demographic determinants of variation in quality of care.

Methods

Study Design and Patients

We abstracted medical charts from a random sample of patients followed by primary care physicians (PCP) in four Swiss university primary care settings (Basel, Geneva, Lausanne, and Zürich) in a retrospective cohort study (Collet et al., 2011). We randomly selected 1889 patients from electronic administrative data of all patients aged 50-80 years followed in 2005-2006. We limited our sample to this age group to have a high enough prevalence of examined indicators (e.g., CV risk factors, eligibility for cancer screening). We did not include 591 patients followed for <1 year to have adequate time to assess preventive care, 125 patients without outpatient visit to a PCP, 117 patients who were followed only in specialized clinics, and 54 patients from whom medical charts could not be found (who likely left the clinical setting for another practice). We further excluded 36 patients with unknown legal status, leading to a final sample of 966 patients.

Clinical Quality Indicators

As previously described (Collet et al., 2011), we selected 33 clinical health care quality indicators from RAND's QA Tools (Asch et al., 2006; McGlynn et al., 2003) regarding preventive care and the chronic care of CV risk factors: 14 indicators aimed at preventive care (physical examination: 3; alcohol: 2; smoking cessation: 5; cancer screening: 2; influenza immunization: 2) and 19 at chronic care of three major CV risk factors (hypertension: 4; dyslipidemia: 2; diabetes: 13). Chosen indicators focused on processes of care as opposed to outcomes of care, because they represent the activities that clinicians control most directly (McGlynn et al., 2003). We did not include preventive care indicators that were not applicable to our local guidelines or PCP settings, nor indicators for conditions with likely low prevalence in our sample (e.g. asthma).

Chart Abstraction and Variables Description

Centrally trained medical students abstracted medical charts with a chart abstraction form (Collet et al., 2011). In addition to the 33 indicators, we abstracted socio-economic and socio-demographic covariates, such as gender, age, civil status, occupation, birth place, legal status and comorbidity covariates (Table 1), with a chart abstraction form derived from the TRIAD study (Translating Research into Action for Diabetes) (Kerr et al., 2004).

Legal status was grouped into 3 categories: Swiss nationality, Residence permit holders, and Forced migrants (Bartlett et al., 2004). Swiss nationals are Swiss passport holders. Residence permit holders are either foreign-born citizens who have migrated to Switzerland or offspring of non-Swiss parents living in Switzerland who have not applied for or received Swiss citizenship. Residence permits have a predefined renewable period of validity, allowing the holder to legally work on the territory. Forced migrants are defined as people who have been forced to leave their home due to various reasons such as environmental, famine or developmental ((IOM), 2004; Urquia and Gagnon, 2011). This group includes asylum seekers and undocumented immigrants who are mostly former asylum seekers with rejected requests. Asylum seekers are immigrants waiting for a decision on their asylum request. Once an asylum request is approved, the applicant receives a residence permit. This process takes on average 260 days, with no upper limit. Asylum seekers are covered for health care, while undocumented immigrants without official legal status are not covered for health by law, but may voluntarily subscribe to a health insurance. Hence, as in the US, not all undocumented immigrants are lacking health coverage in Switzerland (van Ginneken and Gray, 2013). Civil status was categorized into four groups (Married, Divorced and Separated, Single, Widow-er). Occupation was categorized into five groups: Retired, Employed, At home (defined as voluntarily unemployed or not officially registered as out-of-work, such as homemakers), Social aid and Unemployed (but not receiving social aid). To ensure adequately sized and large enough groups for statistical analyses, birth place classification was slightly adapted from the WHO Region Classification (Table 1).

Statistical Analysis

For each selected indicator of preventive care and chronic care for CV risk factors, we calculated the percentage of provided recommended care by dividing all episodes in which recommended care was delivered by the number of times patients were eligible for indicators (Reeves et al., 2007), as previously described (Collet et al., 2011). When care was refused by eligible patients, it was counted as provided care to measure physician-initiated care. The results were presented as percentages with 95% binomial exact confidence intervals (CI). To summarize the selected indicators, we calculated aggregate scores of quality of care by taking into account the number of eligible patients for each selected indicator. The same method of calculation was used to obtain the aggregate scores of chronic care for CV risk factors. To account for correlation of multiple measurements for the same patient and for different numbers of eligible patients for each recommended preventive care, we used generalized estimating equation (GEE) binomial models to compare differences in percentages of recommended preventive care and to assess the association between socio-demographic characteristics and provided care. We conducted a multivariate analysis adjusting for gender, age, civil status, occupation and legal status. Birth place was not included into the multivariate analysis due to the strong collinearity with legal status (82% of patients with Swiss nationality born in Switzerland, although Swiss nationality by birth in the territory is not applied). We further used a backward deletion with a cutoff p-value of <0.20 to determine whether another selection of potential confounders influenced results. To account for clustering by four sites, we treated each center as a fixed effect. We used Stata software (version 12.1, Stata Corp., College Station, TX) for all statistical analyses.

Results

The mean age of our sample was 63.5 years with 44.6% of women (Table 1). Fifty-eight percent of patients were Swiss, one third had a residence permit and eight percent were forced migrants. Fifty-one percent of patients were married and 23.4% divorced or separated. Nearly half of the patients (47.6%) were born in Switzerland, 36.2% in Europe or North America, and 16.1% were of other origin. The prevalence of CV risk factors was 75.1% for hypertension, 61.9% for dyslipidemia and 29.4% for diabetes. We have previously reported the prevalence of chronic conditions in this population (Collet et al., 2011).

In a multivariate analysis, patients received overall 69.6% (CI 68.5-70.6) of recommended preventive care (Table 2). Women had lower scores than men (65.4% vs. 72.8%, respectively, $p<0.001$) mostly because of shortfalls in terms of alcohol consumption counseling (63.0% vs. 71.7%, resp., $p<0.001$), and influenza immunization (28.9% vs. 35.8%, resp., $p=0.03$). Quality of preventive care decreased with age from 71.0% for patients aged 50-59 to 66.7% for 70-80 years (p for trend=0.03). Lower rates of physical examination (p for trend=0.007) and alcohol consumption counseling (p for trend=0.02) were the main reasons for lower scores in the elderly. Swiss patients had higher scores (71.1%) than resident permit holders (68.7%, $p=0.048$) and forced migrants (62.7%, $p=0.001$). The lower score of preventive care for forced migrants was mainly in the domains of physical examination ($p=0.002$) and cancer screening ($p=0.02$) (Appendix Table B). Occupation was not associated with differences in preventive care scores. After backwards deletion, occupation was the only removed socio-demographic characteristic, its exclusion leading to similar results.

Overall, patients received 83.1% of recommended chronic care of CV risk factors (Table 3). The elderly (70-80 years) had lower scores than the youngest age category (79.9% vs. 83.9%, p for trend=0.04). Divorced and separated patients were more likely to receive recommended chronic care of CV risk factors than married patients (85.4% vs. 82.4%, resp., $p=0.02$). Other categories of civil status, occupation, and legal status were not associated with differences in quality of chronic care of CV risk factors. After backwards deletion, gender, occupation and legal status were left out of the multivariate model, emphasizing the importance of age and civil status of the patients.

In post-hoc analyses, we further split the group of 81 forced migrants into 31 asylum seekers and 50 undocumented immigrants. Asylum seekers were more likely to be men (58%), married (58%), unemployed (97%), born in Europe (55%), while undocumented immigrants were more often women (78%), divorced or separated (36%), employed (72%) and from Latin America (74%, p for all comparisons ≤0.001). In multivariate analyses, asylum seekers had lower preventive care scores (57.7%, CI 48.8-66.1) than undocumented immigrants (65.4%, CI 59.6-70.9, p=0.004), although both groups had lower preventive care scores as compared to Swiss patients (asylum seekers p=0.002; undocumented immigrants p=0.051). Preventive care scores were lower among forced migrants compared to Swiss nationals or residence permit holders, regardless of their birth place (data not shown).

Discussion

Using standard indicators of preventive care developed in the US, we found that in Switzerland, a country with universal health care coverage, delivery of recommended preventive care varied according to socio-demographic characteristics. Forced migrants had lower scores of preventive care compared to Swiss patients, while men had higher scores than women and younger patients than the elderly. Aggregate scores of chronic care of CV risk factors did not differ according to socio-demographic characteristics except among the elderly where lower rates were observed.

To our knowledge, our study is one of the very first in Continental Europe assessing socio-demographic differences on such a broad range of preventive indicators. In the US, Asch *et al., 2006,* showed that ethnicity moderately determines overall quality of care: higher overall scores of quality of care were found for young patients (<31 years) than the elderly (>64 years), women than men, Blacks and Hispanics than Caucasians and those with a high income (>$50,000) than those with incomes of less than $15,000 (Asch et al., 2006). Most other US studies focused on specific indicators or conditions making a comparison with our results difficult and found moderate variation of quality of care among different ethnic groups (Gray et al., 2007; Wortley, 2005).

Gray *et al.* showed in 2007 that in the UK non-Whites were significantly less likely to meet the national treatment targets for hemoglobin A1c, blood pressure, and cholesterol (Gray et al., 2007). Studies in the UK mainly describe differences among ethnic groups for specific indicators, such as blood pressure monitoring with little evidence of any ethnic inequality (Schofield et al., 2011). Considering that immigrants are coming from all around the world, ethnicity is to some extent related to the legal status, enabling us to make some careful comparisons of our results with those from the US and the UK that are consistent with ours even though not perfectly comparable. In Switzerland, all inhabitants have healthcare coverage, even those in special circumstances such as asylum seekers through a restricted gate-keeping access to healthcare ((FOPH), 2007). The only exception is the undocumented migrants being by definition illegally settled on the territory and not compelled of subscribing any health insurance.

There are multiple potential hypotheses explaining why forced migrants receive lower preventive care scores than Swiss citizens. First, language barriers are reported as a limiting factor in access to healthcare for foreigners (Bodenmann et al., 2007; Fiscella et al., 2002; Graham et al., 2008; Hargreaves et al., 2000; Jacobs et al., 2006; Jones and Gill, 1998). Interpreters are unfortunately not always available, even in university primary care settings collaborating with an interpreter service. Second, there is probably a lack of knowledge about health promotion and health screening programmes among migrants (O'Donnell et al., 2007). Migrants suffer from different health issues than the native population. Even within the migrant population, the prevalence of different health disorders may vary according to the country of origin. A Swedish study showed differences between migrants and native citizens aged 70 years in self-reported chronic health issues, migrants suffering more often of some specific chronic symptoms such as poor vision, urinary difficulties and dizziness (Silveira et al., 2002). A Swiss survey of the migrant population health in 2007 showed variations of self-reported health between different subgroups, particularly according to the country of origin, the legal status or the socio-economic level ((FOPH), 2007, 2012). Finally, undocumented immigrants may forgo healthcare for economic reasons or fear of notification of their stay to the police (Wolff et al., 2008), even though there is possibility to subscribe a health insurance without being reported to the immigration administration. However, lower preventive care among forced migrants is not fully explained by insurance status, as asylum seekers who benefit from health care coverage did not have higher preventive care than undocumented migrants who are not covered for health care by law.

Our study has several limitations. Our results for forced migrants are likely an overestimation of preventive care among the overall group of forced migrants, as they are less likely to attend primary care than the general population (Stagg et al., 2012) and therefore to be included in our study sample. Our data were only abstracted from medical charts with potential underreporting. A previous study comparing process-based quality scores using standardized patients, clinical vignettes, and medical chart abstraction, found that differences were <10% (Peabody et al., 2000). Second, as previously reported (Collet et al., 2011), some indicators had lower inter-rater reliability between abstractors (kappa <0.6): i.e. lifestyle modifications for hypertension, annual eye exam, biannual foot exam and biannual A1c for diabetics. Third, all study patients were followed in university primary care settings.

Thus our data may not be generalizable to community-based primary care physicians. Fourth, our multivariate analyses might have been over-adjusted for occupation, because of potential collinearity between occupation and legal status (51% of forced migrants were unemployed). However, multivariate analyses not adjusted for occupation yielded similar results. Fifth, due to lack of data on residence duration in Switzerland, we could not take into account residence duration in our analyses. A longer stay might be associated with greater assimilation of local preventive health measures. Sixth, we excluded 36 patients whose legal status was not known. These patients had similar age, gender, civil status and occupation as the general sample. Finally, some subgroups were small and statistical analyses might be underpowered. However, our study pointed out some trends that could be assessed at a larger scale.

Although we found discrepancies in quality of preventive care between socio-demographic subgroups, most differences were mild. The biggest gap in preventive care scores were among the forced migrants, having significantly lower scores than Swiss citizens. Prevention targets should be met in vulnerable populations, such as forced migrants, equally well as in the general population. To improve healthcare of forced migrants, a multi-level approach is desirable, involving decision makers, researchers, clinicians and specialized medical staff (Bodenmann et al., 2007). Researchers have a key role in conducting future and larger studies to further document the variation of quality of care among subgroups and clarify possible interventions for decision makers. Increasing physicians' awareness to this topic by targeted medical educational programs might be useful. Finally, strategies such as the Swiss "Migrant Friendly Hospital" project ((FOPH), 2013) , designed for vulnerable populations and taking into consideration many aspects of the attending patients might help these migrants overcome language barriers, cultural differences and economic issues.

Conflicts of Interest:

An investigator-initiated grant from Pfizer (Switzerland) was provided only for data collection and analysis, but Pfizer had no role in the study design, the choice of statistical analyses, or the preparation of the manuscript.

References

(FOPH), Federal Office of Public Health, 2007. What about the health of migrant population groups?
(FOPH), Federal Office of Public Health, 2012. Migrants Heallth in Switzerland.
(FOPH), Federal Office of Public Health, 2013. National Program on Migration and Health, Report 2008-2013 and Priority Lines 2014-2017.
(IOM), International Organization for Migration, 2004. Glossary on Migration, in: IOM (Ed.), p. 81.
Asch, S.M., Kerr, E.A., Keesey, J., Adams, J.L., Setodji, C.M., Malik, S., McGlynn, E.A., 2006. Who is at greatest risk for receiving poor-quality health care? The New England journal of medicine 354:1147-56.
Barnett, P.F.W.a.E.D., 2007. Immigrant Health. Elsevier.
Bartlett, L.A., Purdin, S., McGinn, T., 2004. Forced migrants--turning rights into reproductive health. Lancet 363:76-7.
Bodenmann, P., Althaus, F., Burnand, B., Vaucher, P., Pecoud, A., Genton, B., 2007. Medical care of asylum seekers: a descriptive study of the appropriateness of nurse practitioners' care compared to traditional physician-based care in a gatekeeping system. BMC Public Health 7:310.
Campbell, S.M., Roland, M.O., Buetow, S.A., 2000. Defining quality of care. Social science & medicine (1982) 51:1611-25.
Collet, T.H., Salamin, S., Zimmerli, L., Kerr, E.A., Clair, C., Picard-Kossovsky, M., Vittinghoff, E., Battegay, E., Gaspoz, J.M., et al., 2011. The quality of primary care in a country with universal health care coverage. Journal of general internal medicine 26:724-30.
Fiscella, K., Franks, P., Doescher, M.P., Saver, B.G., 2002. Disparities in health care by race, ethnicity, and language among the insured: findings from a national sample. Medical care 40:52-9.
Graham, E.A., Jacobs, T.A., Kwan-Gett, T.S., Cover, J., 2008. Health services utilization by low-income limited English proficient adults. Journal of immigrant and minority health / Center for Minority Public Health 10:207-17.
Gray, J., Millett, C., Saxena, S., Netuveli, G., Khunti, K., Majeed, A., 2007. Ethnicity and quality of diabetes care in a health system with universal coverage: population-based cross-sectional survey in primary care. Journal of general internal medicine 22:1317-20.
Hargreaves, S., Holmes, A., Friedland, J.S., 2000. Refugees, asylum seekers, and general practice: room for improvement? The British journal of general practice : the journal of the Royal College of General Practitioners 50:531-2.
HEDIS, 2007. State of Health Care Quality.
http://www.ncqa.org/Portals/0/Publications/Resource%20Library/SOHC/SOHC_07.pdf.
Jacobs, E., Chen, A.H., Karliner, L.S., Agger-Gupta, N., Mutha, S., 2006. The need for more research on language barriers in health care: a proposed research agenda. The Milbank quarterly 84:111-33.
Jones, D., Gill, P.S., 1998. Refugees and primary care: tackling the inequalities. BMJ 317:1444-6.
Kerr, E.A., Gerzoff, R.B., Krein, S.L., Selby, J.V., Piette, J.D., Curb, J.D., Herman, W.H., Marrero, D.G., Narayan, K.M., et al., 2004. Diabetes care quality in the Veterans Affairs Health Care System and commercial managed care: the TRIAD study. Annals of internal medicine 141:272-81.
McGlynn, E.A., Asch, S.M., Adams, J., Keesey, J., Hicks, J., DeCristofaro, A., Kerr, E.A., 2003. The quality of health care delivered to adults in the United States. The New England journal of medicine 348:2635-45.
O'Donnell, C.A., Higgins, M., Chauhan, R., Mullen, K., 2007. "They think we're OK and we know we're not". A qualitative study of asylum seekers' access, knowledge and views to health care in the UK. BMC Health Serv Res 7:75.
Peabody, J.W., Luck, J., Glassman, P., Dresselhaus, T.R., Lee, M., 2000. Comparison of vignettes, standardized patients, and chart abstraction: a prospective validation study of 3 methods for measuring quality. JAMA : the journal of the American Medical Association 283:1715-22.

Reeves, D., Campbell, S.M., Adams, J., Shekelle, P.G., Kontopantelis, E., Roland, M.O., 2007. Combining multiple indicators of clinical quality: an evaluation of different analytic approaches. Medical care 45:489-96.
Roland, M., 2004. Linking physicians' pay to the quality of care--a major experiment in the United kingdom. The New England journal of medicine 351:1448-54.
Schofield, P., Saka, O., Ashworth, M., 2011. Ethnic differences in blood pressure monitoring and control in south east London. The British journal of general practice : the journal of the Royal College of General Practitioners 61:190-6.
Silveira, E., Skoog, I., Sundh, V., Allebeck, P., Steen, B., 2002. Health and well-being among 70-year-old migrants living in Sweden--results from the H 70 gerontological and geriatric population studies in Goteborg. Social psychiatry and psychiatric epidemiology 37:13-22.
Stagg, H.R., Jones, J., Bickler, G., Abubakar, I., 2012. Poor uptake of primary healthcare registration among recent entrants to the UK: a retrospective cohort study. BMJ open 2.
Urquia, M.L., Gagnon, A.J., 2011. Glossary: migration and health. Journal of epidemiology and community health 65:467-72.
van Ginneken, E., Gray, B.H., 2013. Coverage for Undocumented Migrants Becomes More Urgent. Annals of internal medicine 158:347-48.
Wolff, H., Epiney, M., Lourenco, A.P., Costanza, M.C., Delieutraz-Marchand, J., Andreoli, N., Dubuisson, J.-B., Gaspoz, J.-M., Irion, O., 2008. Undocumented migrants lack access to pregnancy care and prevention. BMC Public Health 8:93.
Wortley, P., 2005. Who's getting shots and who's not: racial/ethnic disparities in immunization coverage. Ethnicity & disease 15:S3-4-S3-6.

Table 1. Characteristics of a random sample of 966 adults aged 50-80 years in 4 Swiss University primary care settings (Basel, Geneva, Lausanne, Zürich) followed over 2 years (2005-2006)

	Overall	Swiss nationality	Residence permit holders	Forced migrants [a]	P-value for difference
No. patients	966	560	325	81	
Women, no (%)	431 (44.6)	247 (44.1)	132 (40.6)	52 (64.2)	0.001
Age					
Mean, yr (SD)	63.5 (8.3)	65.2 (8.1)	62.2 (7.9)	57.3 (6.0)	0.004
Range, min - max	50 - 80	50 - 80	50 - 80	50 - 80	
Civil status (n = 960), no (%)					<0.001
Married	490 (51.0)	262 (47.0)	199 (61.8)	29 (35.8)	
Divorced, separated	225 (23.4)	144 (25.9)	58 (18.0)	23 (28.4)	
Single	145 (15.1)	95 (17.1)	34 (10.6)	16 (19.8)	
Widow/-er	100 (10.4)	56 (10.1)	31 (9.6)	13 (16.0)	
Occupation [b] (n = 948), no (%)					<0.001
Retired	357 (37.7)	254 (46.3)	102 (32.0)	1 (1.3)	
Employed	279 (29.4)	164 (29.9)	78 (24.5)	37 (46.3)	
At home	111 (11.7)	62 (11.3)	48 (15.0)	1 (1.3)	
Social aid	106 (11.2)	54 (9.8)	52 (16.3)	0 (0.0)	
Unemployed	95 (10.0)	15 (2.7)	39 (12.2)	41 (51.3)	
Birth Place [c] (n = 964), no (%)					<0.001
Switzerland	459 (47.6)	459 (82.3)	0 (0.0)	0 (0.0)	
Europe + North America	349 (36.2)	71 (12.7)	257 (79.1)	21 (25.9)	
Eastern Mediterranean Region	32 (3.3)	8 (1.4)	21 (6.5)	3 (3.7)	
African Region	34 (3.5)	8 (1.4)	16 (4.9)	10 (12.3)	
Latin America	55 (5.7)	5 (0.9)	10 (3.1)	40 (49.4)	
South East Asia + Western Pacific	35 (3.6)	7 (1.3)	21 (6.5)	7 (8.6)	
Cardiovascular risk factors [d], no (%)					
Hypertension	725 (75.1)	425 (75.9)	250 (76.9)	50 (61.7)	0.014
Dyslipidemia	598 (61.9)	347 (62.0)	212 (65.2)	39 (48.1)	0.016
Diabetes	284 (29.4)	140 (25.0)	125 (38.5)	19 (23.5)	<0.001
Family history of early CHD [e]	97 (10.0)	62 (11.1)	28 (8.6)	7 (8.6)	0.46
Smoking status [f] (n = 947), no (%)					
Former smokers	169 (17.8)	110 (19.6)	55 (16.9)	4 (4.9)	0.001
Current smokers	242 (25.6)	145 (25.9)	80 (24.6)	17 (21.0)	0.48
At risk consumers or binge drinkers [g]	127 (13.1)	84 (15.0)	40 (12.3)	3 (3.7)	0.02

[a] Forced migrants comprised 31 asylum seekers and 50 undocumented immigrants. 3 patients whose asylum request had been rejected were grouped with undocumented immigrants. For 36 patients, legal status was unknown.

[b] Occupation was reclassified accordingly: 2 part-time worker patients were defined as "Employed", 2 patients in education were assigned to "At home", 1 patient who was seeking social aid was classified as on "Social Aid".

[c] Birth place was classified according to the WHO Region classification: North America was gathered with Europe, Algeria with Eastern Mediteranean Region, Somalia with Africa.

[d] Criteria of Dyslipidemia, Hypertension and Diabetes are defined in Appendix Table A.

[e] Early Coronary Heart Disease (CHD) was defined as a CHD event in male relatives < 55 years or in female relatives < 65 years. 1 patient had his family history of early CHD not documented.

[f] Smoking status was defined as: Former smoker = stopped smoking ≥ 6 months before baseline; current smoker = smoking at baseline or stopped < 6 months before baseline. 19 patients had their smoking status not documented.

[g] At risk drinking was defined as >14 drinks per week for men <65 years or >7 drinks per week for others. Binge drinking was defined as >4 drinks per occasion for men <65 years or >3 drinks for others.

Table 2. Adjusted aggregate scores of recommended preventive care delivered to patients, according to their characteristics.
Random sample of patients followed in 4 Swiss University primary care settings over 2 years (2005-2006)

N = 943 [a]	Multivariate adjusted aggregate scores (95% CI) [b]	Odd ratios (Multivariate, 95% CI)
Overall preventive care	69.6 (68.5-70.6)	-
Gender		
Women	65.4 (63.5-67.2)	ref
Men	72.8 (71.4-74.2)	1.42 (1.27-1.59)
Age [c]		
50-59 yr	71.0 (69.1-72.9)	ref
60-69 yr	69.9 (68.1-71.7)	0.95 (0.83-1.08)
70-80 yr	66.7 (63.9-69.4)	0.82 (0.68-0.98)
Civil Status		
Married	69.1 (67.7-70.5)	ref
Divorced, separated	71.8 (69.7-73.8)	1.14 (1.00-1.28)
Single	66.7 (63.4-69.9)	0.90 (0.76-1.06)
Widow/-er	71.2 (67.4-74.6)	1.10 (0.91-1.33)
Occupation		
Retired	69.7 (67.6-71.8)	ref
Employed	70.5 (68.2-72.7)	1.04 (0.88-1.23)
At home	70.3 (67.3-73.2)	1.03 (0.86-1.22)
Social aid	68.6 (65.1-71.9)	0.95 (0.78-1.16)
Unemployed	66.6 (62.3-70.5)	0.86 (0.69-1.08)
Legal Status [d]		
Swiss nationality	71.1 (69.7-72.4)	ref
Residence permit holders	68.7 (66.6-70.6)	0.89 (0.79-1.0)
Forced migrants	62.7 (57.6-67.4)	0.68 (0.54-0.86)

[a] Data was missing for civil status in 6 patients and for work in 18 patients.
[b] Aggregate scores of preventive care were adjusted for gender, age category, civil status, occupation, legal status and center as a fixed-effect.
[c] p value for trend = 0.03
[d] p value for trend = 0.001

Table 3. Adjusted aggregate scores of recommended chronic care of cardiovascular risk factors delivered to patients, according to their characteristics

Random sample of patients followed in 4 Swiss University primary care settings (Basel, Geneva, Lausanne, Zürich) over 2 years (2005-2006)

N = 781 [a]	Multivariate adjusted aggregate scores (95% CI) [b]	Odd ratios (Multivariate, 95% CI)
Overall chronic care of cardiovascular risk factors	83.1 (82.0-84.2)	-
Gender		
Women	83.0 (81.1-84.8)	ref
Men	83.2 (81.6-84.8)	1.01 (0.84-1.22)
Age [c]		
50-59 yr	83.9 (81.7-85.8)	ref
60-69 yr	84.4 (82.6-86.1)	1.04 (0.86-1.27)
70-80 yr	79.9 (77.2-82.4)	0.77 (0.60-0.98)
Civil Status		
Married	82.4 (80.7-83.9)	ref
Divorced, separated	85.4 (83.3-87.3)	1.26 (1.03-1.53)
Single	81.9 (78.0-85.2)	0.97 (0.74-1.26)
Widow/-er	83.4 (79.8-86.4)	1.07 (0.83-1.39)
Occupation		
Retired	83.6 (81.4-85.5)	ref
Employed	81.6 (78.9-84.0)	0.87 (0.68-1.11)
At home	83.5 (80.2-86.3)	0.99 (0.76-1.30)
Social aid	81.7 (77.4-85.4)	0.88 (0.64-1.21)
Unemployed	86.0 (82.1-89.1)	1.21 (0.86-1.69)
Legal Status		
Swiss nationality	83.8 (82.2-85.3)	ref
Resident permit holders	82.6 (80.7-84.3)	0.92 (0.78-1.09)
Forced migrants	80.2 (74.1-85.2)	0.79 (0.53-1.16)

[a] Data was missing for civil status in 6 patients and for work in 18 patients. 165 patients without cardiovascular risk factors were not eligible for this analysis.

[b] Aggregate scores of preventive care were adjusted for gender, age category, civil status, occupation, legal status and center as a fixed-effect.

[c] p value for trend = 0.04

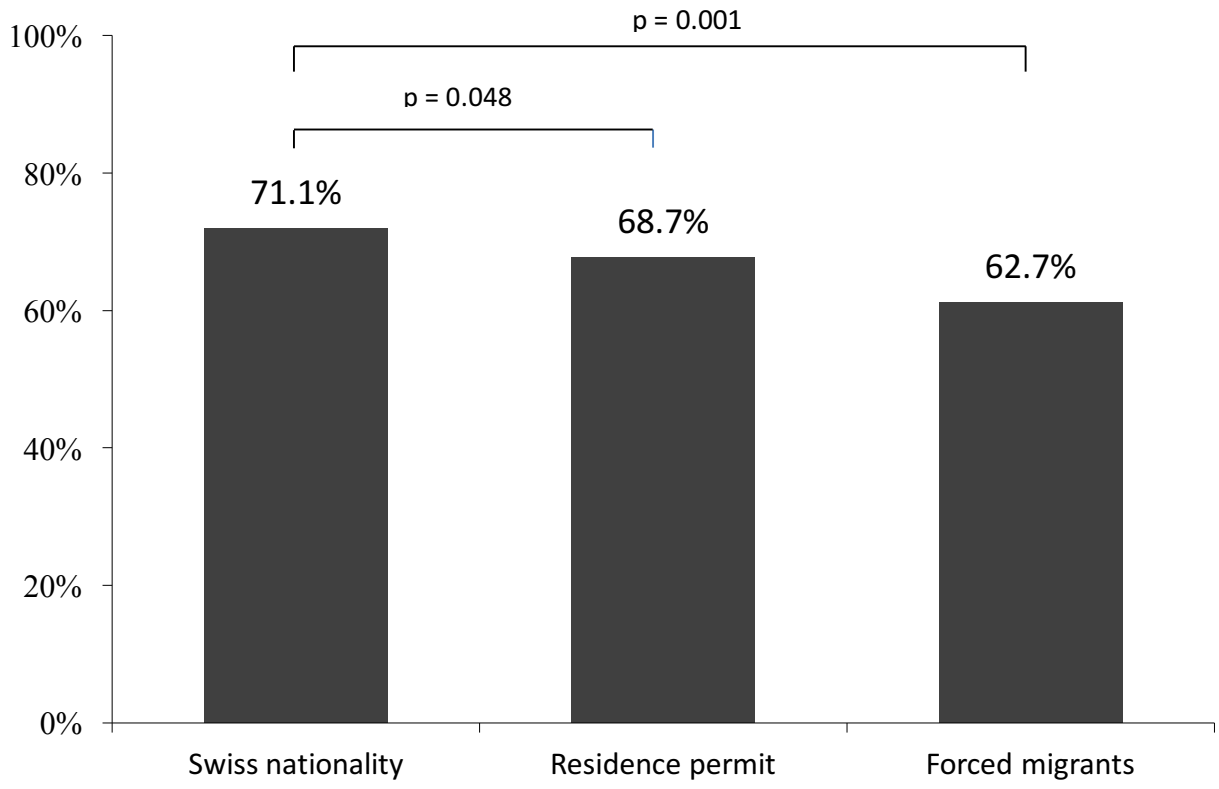

Figure 1. Preventive care according to legal status of a Random sample of patients followed in 4 Swiss University primary care settings (Basel, Geneva, Lausanne, Zürich) over 2 years (2005-2006).

Scores adjusted for gender, age category, civil status, occupation, legal status and center as a fixed-effect.

Appendix Table A. Diagnostic criteria for Dyslipidemia, Hypertension and Diabetes [a]

Random sample of patients followed in 4 Swiss University primary care settings (Basel, Geneva, Lausanne, Zürich) over 2 years (2005-2006)

Condition	Diagnostic criteria (at least one criteria)
Dyslipidemia	1. At least 1 prescription for a lipid-lowering agent
	2. Outpatient diagnosis of dyslipidemia or hypercholesterolemia with a previous LDL cholesterol value ≥ risk-appropriate cut-point value, as defined by NCEP ATP III
Hypertension	1. At least 1 prescription for an antihypertensive medication plus an outpatient diagnosis of hypertension
	2. At least 2 outpatient diagnoses of hypertension
	3. At least 1 prescription for an antihypertensive medication plus 1 or more elevated outpatient blood pressure readings (≥140 mmHg systolic or ≥90 mmHg diastolic)
	4. At least 1 outpatient diagnosis of hypertension plus at least 1 blood pressure reading of ≥140 mmHg systolic or ≥90 mmHg diastolic
Diabetes	1. At least 1 prescription of insulin or an oral hypoglycemic agent
	2. At least 2 outpatient diagnoses of diabetes mellitus
	3. One outpatient diagnosis of diabetes mellitus plus HbA1c ≥7%
	4. At least 1 hospital discharge with a primary diabetes mellitus-related diagnosis
	5. At least 2 fasting glycemia ≥7.0 mmol/l
	6. At least 2 times 2-hour plasma glucose ≥11.0 mmol/l during an oral glucose tolerance test

[a] Adapted from Rodondi N, et al. (Therapy modifications in response to poorly controlled hypertension, dyslipidemia, and diabetes mellitus. Ann Intern Med 2006;144:475-84)

Appendix Table B. Recommended Preventive Care according to legal status

Random sample of patients followed in 4 Swiss University primary care settings (Basel, Geneva, Lausanne, Zürich) over 2 years (2005-2006)

	Swiss (n = 560)			Residence permit holders (n = 325)			Forced migrants (n = 81)			va
	Eligible patients no	Care provided [a] no	Care provided % (95% CI)	Eligible patients no	Care provided [a] no	Care provided % (95% CI)	Eligible patients no	Care provided [a] no	Care provided % (95% CI)	
Global adjusted aggregate score for Preventive Care			69.2 (67.8-70.6)			68.6 (66.7-70.4)			65.4 (61.5-69.2)	0.
Physical examination										
Annual blood pressure measurement	560	530	94.6 (92.4-96.4)	325	313	96.3 (93.6-98.1)	81	74	91.4 (83.0-96.5)	
Weight measurement	560	542	96.8 (95.0-98.1)	325	305	93.8 (90.7-96.2)	81	73	90.1 (81.5-95.6)	
Height measurement	560	418	74.6 (70.8-78.2)	325	253	77.8 (72.9-82.2)	81	57	70.4 (59.2-80.0)	
Adjusted aggregate score for physical examination [b]			92.5 (90.9-93.9)			91.5 (89.4-93.3)			83.7 (75.7-89.4)	0.
Alcohol consumption counseling										
Asked about drinking problem	560	365	65.2 (61.1-69.1)	325	225	69.2 (63.9-74.2)	81	58	71.6 (60.5-81.1)	
Advice to decrease drinking for at risk or binge drinkers [c]	84	64	76.2 (65.7-84.8)	40	33	82.5 (67.2-92.7)	3	2	66.7 (9.4-99.2)	
Adjusted aggregate score for alcohol consumption counseling [b]			72.3 (67.9-76.3)			73.6 (67.7-78.7)			68.5 (54.0-80.0)	0
Smoking cessation counseling										
Smoking status documented	560	438	78.2 (74.6-81.6)	325	253	77.8 (72.9-82.2)	81	69	85.2 (75.6-92.1)	
Annual advice to quit smoking	133	96	72.2 (63.7-79.6)	75	55	73.3 (61.9-82.9)	16	11	68.8 (41.3-89.0)	
Counseling offered to smokers attempting to quit	45	30	66.7 (51.0-80.0)	21	15	71.4 (47.8-88.7)	8	5	62.5 (24.5-91.5)	

Pharmacotherapy offered to smokers attempting to quit if more than 10 cigarettes per day	45	20	44.4 (29.6-60.0)	21	10	47.6 (25.7-70.2)	8	5	62.5 (24.5-91.5)	
Abstinence documented 4 weeks after smoking cessation counseling	30	15	50.0 (31.3-68.7)	15	6	40.0 (16.3-67.7)	5	2	40.0 (5.3-85.3)	
Adjusted aggregate score for smoking cessation counseling [b]			75.2 (71.8-78.4)			74.5 (69.4-78.9)			78.9 (69.0-86.2)	0
Cancer screening [d]										
Screening for colon cancer (aged 50-80)	551	212	38.5 (34.4-42.7)	317	105	33.1 (28.0-38.6)	80	18	22.5 (13.9-33.2)	
Screening for breast cancer (aged 50-70)	155	68	43.9 (35.9-52.1)	94	37	39.4 (29.4-50.0)	52	17	32.7 (20.3-47.1)	
Adjusted aggregate score for cancer screening [b]			39.4 (35.5-43.4)			33.2 (28.4-38.3)			25.9 (17.9-35.9)	0
Influenza immunization										
Annual influenza vaccine for patients ≥ 65 years	276	99	35.9 (30.2-41.8)	121	39	32.2 (24.0-41.3)	14	3	21.4 (4.7-50.8)	
Annual influenza vaccine for immunocompromised patients < 65 years [e]	137	50	36.5 (28.4-45.1)	108	22	20.4 (13.2-29.2)	19	5	26.3 (9.1-51.2)	
Adjusted aggregate score for influenza immunization [b]			34.4 (29.1-40.0)			24.6 (19.3-30.7)			18.4 (8.3-35.9)	0

[a] When care was refused by eligible patients, it was counted as provided care to measure physician-initiated health care. When care was provided less frequently tha specified (i.e. once a year instead of twice a year, or only once instead of annually), it was counted as unprovided care to measure physician adherence to recommendations.

[b] Aggregate scores were adjusted for gender, age category, civil status, occupation, legal status and center as a fixed-effect.

[c] Definitions of at risk drinking and binge drinking are detailed in Table 1 footnotes.

[d] Patients were excluded of screening because of a prior diagnosis of colon cancer (n = 18) or breast cancer (n = 17).

[e] Indications to influenza immunization for patients younger than 65 years: living in a nursing home, chronic cardiovascular disease, chronic obstructive pulmonary disease, renal failure, diabetes, immunosuppression, hemoglobinopathy.