

Gender awareness among medical students of the University of Lausanne

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GENDER AWARENESS AMONG MEDICAL STUDENTS OF THE UNIVERSITY OF LAUSANNE

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50 Journals to be considered:

51 - [BMC Medical Education](#)

52 - [Journal of women's health](#)

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54

55

56 **Abstract**

57 Background: Gender is an important social determinant, that influences healthcare. The lack
58 of gender awareness leads to gender bias and can contribute to poor patient care. Our
59 objectives were to assess gender sensitivity and the presence of gender stereotypes among
60 medical students.

61 Methods: A valid scale (NGAMS – Nijmegen Gender Awareness in Medicine Scale), with 3
62 sub scores assessing gender sensitivity (GS) and gender stereotypes toward patients (GRIP)
63 and doctors (GRID) (ranging from 1 to 5), was translated in French and was distributed to all
64 the medical students registered at the University of Lausanne in April 2017. In parallel, gender
65 gap in medical knowledge was assessed using a clinical case of a non-gender specific
66 pathology (ankle sprain) and a multiple-choice question about the main cause of mortality in
67 Switzerland. Mean subscales were calculated for male and female students. A linear model
68 with students' sex and age was built. For the clinical vignette and multiple-choice question,
69 percentage of correct answers were compared between male and female using χ^2 tests.

70 Results: In total, 396 students answered to the N-GAMS questionnaire, their mean age was
71 22 years old, 62.6% of them were women. GS and GRID sub-scores were not significantly
72 different between female and male students (GS 3.62 for women, 3.70 for men, $p=0.270$, GRID
73 2.10 for women, 2.13 for men, $p= 0.758$). A significant difference was found with the GRIP
74 subscale, with a mean score of 1.83 for women and 2.07 for men ($p <0.001$), which suggests
75 a more stereotyped opinion toward patients among male students. A trend was observed with
76 age, gender sensibility increased ($p<0.001$) and stereotypes decreased (GRIP $p=0.04$, GRID
77 $p=0.02$) with students getting older. The clinical case vignette and multiple-choice
78 questionnaire were answered by 607 students (61.2% women). Students choose the same
79 management for female and male clinical case. However, in the multiple-choice question
80 students acknowledged that cardiovascular disease was the main cause of mortality for men
81 in 73% of cases vs. 51.3% of women ($p <0.001$).

GENDER AWARENESS AMONG MEDICAL STUDENTS OF THE UNIVERSITY OF LAUSANNE

82 Conclusion: Medical students' gender sensitivity seems to improve throughout the medical
83 curriculum and women have less stereotypes toward patient than men do. Gender bias exists
84 in student's knowledge and the implementation of a gender teaching in the medical curriculum
85 could improve students' knowledge, limit gender bias and improve patient care.

86 Keywords: Gender, gender's awareness, Switzerland, medicine

87

88

89 **Introduction**

90 The gender dimension in medicine plays an important role and is a social determinant, which
91 influences the domain of healthcare. Gender awareness aims toward a better health for men
92 and women[1] . The lack of gender awareness leads to gender stereotypes or bias and can
93 contribute to poor patient care or disparities of patient management [2][3]. Gender bias have
94 been observed in some domains like cardiovascular diseases and mental health issues[3]
95 where the stereotypes of gender are recognized and acknowledged for a long time.
96 Stereotypes and bias were also noticed in specific diseases, such as neck pain, Parkinson's
97 disease and irritated bowel syndrome, where female and male patients are treated
98 differently[3][4].

99 A definition of the gender dimension is however necessary to recognize the patterns that can
100 be improved. Gender is defined as the socially constructed characteristics of women and men
101 – such as norms, roles and relationships of and between groups of women and men. It varies
102 from society to society and over time. Sex is an assigned label based on the biological and
103 genetical characteristics that can be observed after birth, such as chromosomes, hormones
104 and genitals.

105 It is also important to understand the difference between a gender stereotype, which is defined
106 as the assessing of differences between men and women where there are none and gender
107 blindness, which is defined by the inability to recognize differences when they are pertinent[5].
108 These two patterns come often in the everyday practice, and like for race or culture bias, it is
109 important for physicians to prevent them in order to assure equity in health management.

110 The disparities that we can observe in healthcare between female and male patients are due
111 to many causes but are difficult to isolate, because many factors affect the relation between
112 the physician and the patient and many facts of medicine are based on the sex determinant,
113 due to the biological differences of women and men's bodies. However, among these factors,
114 it is established that gender stereotypes influence the differential diagnose and decision of

115 management of physicians[5]. Most of the stereotypes concern women and disadvantage them
116 in healthcare. Diagnosis are more often missed and management is less effective than for
117 men[5]. Where do these stereotypes about women come from? First the research in medicine
118 was often conducted with male participants, especially in cardiovascular diseases[6] where the
119 management and treatments are based on the male specifics and presentation of symptoms
120 but are after applied to both sexes. In reality, women present more often with unspecific
121 symptoms of a coronary syndrome and the diagnosis could be missed, because of unspecified
122 guidelines for women[7] .

123 Stereotypes exist however also for men. Diseases like osteoporosis were always associated
124 to the post-menopausal women, without addressing this issue to men. In reality, one third of
125 hip fractures concern men. A study of 2008 stated that 19% of men over 50 suffer from an
126 osteoporosis or osteopenia[8]. Prevention and test exist mostly for women. Although the
127 pathology is associated with female hormones, it is important to consider both sexes to ensure
128 the quality of care.

129 Another aspect of gender bias is the position of women in society, which is reflected also in
130 healthcare. General suggesting that women are more sensitive and need more psychological
131 support, or that men go to the doctor only when the problem is organic and serious, come
132 directly from the social constructed gender roles defined in our modern society[9][10].
133 Physicians need to recognize these received ideas and prevent them from influencing their
134 neutral point of view in the relation with patients.

135 In addition, women have still a weak position and influence in the healthcare, with a patriarchal
136 model dominating in the profession, even if most of medical students are women¹ . No
137 strengthening of the position of women in the profession affects the organization of the
138 healthcare system, which is still dominated by a patriarchal philosophy and where gender
139 attributes are strongly reinforced. The same reasoning can be seen in research, where men

¹ In the faculty of medicine in the University of Lausanne, 62.6% of medical students were women in 2016

GENDER AWARENESS AMONG MEDICAL STUDENTS OF THE UNIVERSITY OF LAUSANNE

140 have a monopole and are less inclined to address the problematic of gender inequalities and
141 integrate it in clinical research. Only 37% of the first authorship in high medical journals in
142 2014 were women[11]. All these factors influence the healthcare operation, and have to be
143 prevented in order to avoid disparities.

144 The awareness of gender in health became official in 1995, with the World health organization
145 creating the department of *Women, gender and health*. Studies agree that this progress has
146 shown improvement in healthcare[12]. However, the background of doctors influences their
147 practice, such as personal hobby or interests, former education, social status or the family's
148 model that exposes the individuals to the questions of gender even before they are confronted
149 with this problematic in medicine. In a study where gender awareness was compared between
150 Netherlands's medical students and Swedish medical students, the profession of the mother
151 and the position of the women in society played a role in the results. In fact, it is thought that
152 Swedish students had a better awareness because their mothers worked and had a strong
153 position in the society[9].

154 In Switzerland, gender studies were integrated in 2000 in the Faculty of social and political
155 sciences of the University of Lausanne, and in 2005 was the first lecture about gender and
156 medicine presented to the medical students[13]. From 2003, the University of Lausanne
157 realized the importance of gender, along with the Federal office of Public Health in Switzerland,
158 who created a "Gender Health" service in 2001[13]. Actually, the students of the University of
159 Lausanne have only 2 hours of introduction to gender during their first year of studies (MICS
160 1.5), an optional 12h seminar (MICS1.5), and 2 hours course on gender and health during the
161 4th and 5th year of studies (B1.5, B2.5). There is no integrated structured teaching of the gender
162 dimension in medicine, even though some teachers and seminars might include some degree
163 of gender dimension in their programs. The faculty of Biology and Medicine of the University
164 of Lausanne is currently developing a project to implement the teaching of the gender
165 dimension during the pre-graduate education of medical students. This project is based on the
166 national *Gender Mainstreaming* research and action of the Prof. T.Lagro-Janssen in

167 Netherlands, who succeeded in the implementing of gender perspective in all 8 medical
168 faculties in Netherlands during 2002-2005[14].

169 For this purpose, a commission composed of professors of different disciplines, of students
170 and researchers is developing a strategy of implementation of gender perspective in every
171 step of the pre-graduate education. For now, there was no research conducted in this area in
172 Switzerland. Therefore, we decided to establish a first assessment in Lausanne to start studies
173 in this area and for further comparison.

174 Through this master's work we will try to establish a baseline of gender awareness among
175 students in the University of Lausanne and highlight the evolution of gender awareness
176 throughout the years of the medical education. The comparison of the results between the
177 female and male participants, between age and level of medical education will permit a more
178 targeted implementation of gender dimension in the teaching of medicine. Furthermore, our
179 study will help understand if different believes exist among students about this subject.
180 Besides, the NGAMS questionnaire can be evaluated and validated for further use in
181 Switzerland. In addition, our study will probably awake students' curiosity about this matter.

182 **Participants and methods**

183 *Population*

184 We sent the questionnaire to all medical students of the University of Lausanne. During the
185 academic year of 2016-2017, there were 1686 registered students at the faculty of medicine
186 in the University of Lausanne, amongst them are 1056 women, which makes 62.6% of female
187 students². About 40% were first year medical students and their number decrease and stabilize
188 after the 2nd year of medical school. The mean age of participants was 22 years old and most
189 of them live in Lausanne. Table 1 shows the proportion of students in each academic year and
190 the proportion of women registered each year.

² Informations obtained from the Système d'informations et statistiques de l'Université de Lausanne (UNISIS)

191 *Gender measures*

192 To measure student's gender sensitivity we used the NGAMS scale (Nijmegen Gender
193 Awareness Medicine Scale), validated scale for evaluating gender awareness which was used
194 in two major studies in Netherlands and Sweden [5][9]. This scale is based on the two
195 attitudinal aspects of gender-awareness, the gender sensitivity (GS) and the gender role
196 ideology which is assessed towards patients (GRIP) or doctors (GRID). Those 3 subscales
197 contain statements to which the student can agree using a 5 likert point scale (ranges from
198 "not agree at all" to "totally agree"). The GS group has 14 statements, and the more you agree,
199 the highest your score. The GRIP has 11 and GRID has 7, and where a higher score means
200 a higher stereotyping way of thinking. Supplementary figure 1 shows all the statements of the
201 NGAMS questionnaire, in French.

202 As there were no validated version of the NGAMS scale in French, we translated it from Dutch
203 to French. The questionnaire was tested by 3 students of the 5th year and colleagues of the
204 department, and we adapted the translation when necessary. We established an anonymous
205 online survey using the Surveygizmo® software, and submitted the NGAMS questionnaire as
206 well as questions on age, sex and year of study to the participants. We also offered the
207 possibility to put comments at the end of the survey, to obtain a qualitative opinion about the
208 questions. The recruitment of participants was conducted through email sent to all the students
209 of the faculty of medicine. Announcements in different Facebook students' groups were also
210 posted. The survey was initially open for a month. We noticed a lack of male participants, and
211 encouraged their participation through a second targeted email.

212 The second evaluation consisted in proposing a simple multiple-choice question with a medical
213 case of ankle sprain which was randomly presented with a female patient to half of the
214 participants, and a male patient to the other half. The clinical case was identical, the only
215 variable that changed was the patient's sex. The medical case was about a patient consulting
216 his/her general practitioner with a persistent pain in the ankle. He/she already consulted the

GENDER AWARENESS AMONG MEDICAL STUDENTS OF THE UNIVERSITY OF LAUSANNE

217 emergency department 2 days ago, where an examination and an x-ray were performed. The
218 emergency doctor concludes that there were no fractures and the patient was treated with
219 painkillers. We suggested 4 options of management from the least (reassure) to the most
220 interventionist (refer to a specialist). The expected attitude for both sexes was to augment the
221 antalgics, because according to the Ottawa score, the probability of an ankle fracture is low.
222 Supplementary figure 2 contains the two versions of the medical case, with the multiple-choice
223 answers. Each medical case had a picture of a woman or a man expressing pain. We added
224 a multiple-choice question asking the main cause of mortality in men and women in
225 Switzerland, as well as some personal information such as sex, age and year of study.

226 For the first and fourth year of study, the case was presented just before a lecture of Gender
227 Medicine given by one of the study member. The second year responded before a random
228 lecture and the quiz was presented by a Professor not involved in the study. Concerning the
229 third and fifth year, they were solicited through an online survey. The students of the last year
230 of study answered during a rehearsal lecture and the questionnaire was presented by a
231 student.

232 Exploratory factor analysis was adopted in order to define NGAMS subscales. Scores with
233 loading smaller than a cut-off of 0.4 and *cross-loading* scores were dropped leading to define
234 three relevant dimensions globally explaining 40% of total variability. The first subscale
235 represented gender sensibility (GS; the higher the score value the higher the sensibility to the
236 gender issue) and was defined by the mean of 10 out of the 14 original scores. Eight of them
237 were reversed since they presented a negative loading in the factor analysis. The second
238 subscale represented stereotypes towards patients, (GRIP: the higher the score value the
239 stronger the stereotypes) and was defined by the mean of 9 out of the 11 original scores. The
240 third subscale represented stereotypes towards doctors, (GRID: the higher the score value the
241 stronger the stereotypes) and was defined by the mean of 4 out of the 7 original scores.
242 Reliability of the three above subscales was assessed calculating the alpha Chronbach
243 coefficient. Mean subscales were calculated for male and female students and compared using

244 two sample t-tests. A linear model was built with each subscale as a dependent variable and
245 students' sex and age as covariables. Interaction between age and sex were tested. For the
246 clinical vignette and multiple-choice question, percentage of correct answers were compared
247 between male and female patient and students, using chi-squared tests. Two logistic models
248 were built with correct attitude or answer as the dependent variable and students' sex and age
249 and patients' sex as independent variables.

250 Reliability of the NGAMS subscales was assessed calculating the alpha Chronbach coefficient.
251 Mean subscales were calculated for male and female students. A linear model with students'
252 sex and age was built and interaction between age and sex were tested. For the clinical
253 vignette and multiple-choice question, percentage of correct answers were compared between
254 male and female patient and students, using chi-squared tests. Two logistic models were built
255 with correct attitude or answer as the dependent variable and students' sex and age and
256 patients' sex as independent variables.

257 The study did not collect medical data and the local ethics committee (CER-VD) confirmed that
258 the study was waived from ethics approval.

259 **Results**

260 In total, 560 students participated to the NGAMS inquiry, with 396 students who fully completed
261 the questionnaire. Amongst them 245 were female (61.9%), 150 male (37.1%) and one
262 participant categorized as "other", which was excluded. For each academic year, the number
263 of participants was proportional to the total number of students, except for the 1st academic
264 year, where only 14.2% students participated. There were more female participants in every
265 year, except for the 5th academic year, where 58.21 % were male participants. They had also
266 the highest rate of participation with 36.2% of fifth year students answering the NGAMS
267 questionnaire. Table 1 resumes the participation rate for each year.

268 Through the exploratory factor analysis of the NGAMS questionnaire results, the first
269 impression is that 2 factors are enough, one for gender sensibility and a second for stereotypes

GENDER AWARENESS AMONG MEDICAL STUDENTS OF THE UNIVERSITY OF LAUSANNE

270 (GRIP and GRID). The reliability of the NGAMS questionnaire and the subscales showed a
271 Chronbach's alpha of 0.79 for the GS subscore, 0.88 for the GRIP and 0.77 for the GRID.

272 The Chronbach's alpha was of 0.79 for the GS subscale, 0.88 for the GRIP and 0.77 for the
273 GRID. As shown in Table 2, GS and GRID sub-scores were not significantly different between
274 female and male students (GS 3.62 for women, 3.70 for men, $p=0.270$, GRID 2.10 for women,
275 2.13 for men, $p= 0.758$). A significant difference was found with the GRIP subscale, with a
276 mean score of 1.83 for women and 2.07 for men ($p <0.001$), which suggests a more
277 stereotyped opinion toward patients among male students. A trend was observed with age
278 (Table 3 and Figure 1): gender sensibility showed a significant quadratic trend with age, with
279 an initial increase followed by a stabilization (both linear and quadratic $p<0.001$); stereotypes
280 towards patients and doctors decreased linearly with students getting older (GRIP $p=0.04$,
281 GRID $p=0.02$). Adjusting for age, student sex was still associated with GRIP subscale, women
282 having less tendency to have stereotyped beliefs (Table 3; coefficient 0.27, p -value <0.001).
283 The 4th year male students of Lausanne have the highest GS score in comparison to the other
284 students. There was a significant difference of score in the GRIP statements, where men of
285 the 3rd (p -value = 0.02) and 4th year (p -value=0.01) had a more stereotypical score than
286 women.

287 We collected 36 comments about the NGAMS questionnaire, with 23 comments from female
288 students. Most of the participants complained about the formulation of the statements, which
289 were too suggestive for some students, and too stereotypical for most of them. Some of them
290 suggested to add also negative stereotyped statements about men, because the questionnaire
291 addressed negative roles for women only. Some students said that their gender awareness
292 has nothing to do with their education in medicine, but comes from their external interests.

293 For the medical case, there were 607 participants with 61.2% women. The results showed that
294 there were no differences between the management of male and female patients. Most of the
295 students (84% for female students, 87% for male students) chose to refer to a specialist or do

296 again a radiography, for both male and female patients. However, when testing students'
297 knowledge, a significant difference was shown between the answer about the main cause of
298 mortality of women versus men. The results showed that 73% students knew that the first
299 cause of mortality were cardiovascular diseases among men in Switzerland but only 54% knew
300 that cardiovascular diseases were the first cause of mortality among women in Switzerland
301 ($p < 0.001$). No significant difference was found in the management regarding students' sex. A
302 correlation between age and the type of answer was measured, with older patients having a
303 greater probability of knowing the right answer ($OR = 1.66$ ($p < 0.001$)). Furthermore, older
304 participants tend to choose less interventions possibilities.

305 **Discussion**

306 The different results we obtain from the NGAMS questionnaire permitted to obtain a general
307 overview of students' gender awareness and identify some patterns, which play a role in the
308 general gender awareness in medicine. First, we can surely declare that female students feel
309 more concerned by the subject than male students, because female students made a better
310 score than male students about stereotypes. Most of the negative stereotypes in medicine
311 concern the female patient, which can be victim of a poor patient care. Therefore, women in
312 general and, in this case, female medical students feel more concerned because it speaks
313 about their own position and their right to a better health care. It would be interesting to create
314 seminars and lectures that are more targeted for male students, but also identify the negative
315 stereotypes that concern men.

316 Additionally, the weak position of women in the medical profession in general tends to reinforce
317 the stereotypes, seen in our study by the score of students concerning gender role ideology
318 toward doctors (GRID). A reinforcement of women's position in the medical professions would
319 increase the probability of establishing gender dimension in the everyday practice, because,
320 as seen in our study, they are more concerned by the gender issues. Secondly, the equality of
321 chances for both sexes would be ensured and general negative stereotypes about female
322 doctors could be prevented. Also in the field of clinical research, education of women

323 researchers to aim for the highest positions has to be encouraged, in addition to developing
324 more research about women's health in general.

325 The high score of gender stereotypes among 3rd and 4th year students can be associated to
326 the absence of gender-focused lectures during those first clinical years. It would be then
327 interesting to put a lecture of one hour again in the 3rd year of Bachelor, in order to ensure a
328 critical thinking about all the clinical facts that are learned during this year. This score can also
329 be correlated with the start of the clinical years in the 3rd year, when students learn about
330 statistical facts and how to process in the differential diagnosis. During this process, most of
331 the diseases are described with scores and guidelines based on clinical research, which
332 contain often a gender or sex aspect. Students start then to sort out diseases also by gender
333 and sex patterns influences, and develop stereotypes. This aspect could be prevented by an
334 implemented gender dimension in all lectures of all specialties, where the influence of gender
335 is explained more precisely.

336 We also compared our results with the results of the Netherland and Swedish study. The mean
337 GS score of the students of Lausanne were greater than the score of the Swedish (GS of 3.37
338 for women and 3.30 for men) and Dutch (3.43 for both sexes) students. Male students of
339 Lausanne were more stereotyped than male Swedish students (GRIP of 2.07 compared to
340 1.96), according to the GRIP scores, but were less stereotyped about the doctors than the
341 Netherlands Students (GRID of 2.13 for 2.44 among dutch students). Table 4 shows the mean
342 scores of the three countries. These differences can be explained by the influence of culture
343 and social determinants that characterize each country. The social status of women is stronger
344 in Sweden, where equality of sexes is ensured in more aspects than in Switzerland³. It would
345 be then interesting to explore the influence of politics and functioning of a country or a region
346 in gender awareness, with a qualitative study in which students could explain the importance
347 of these patterns.

³ For example, parental leave is ensured in Sweden for both sexes: information taken from the following website <https://sweden.se/quickfact/parental-leave/> (31.01.2018)

GENDER AWARENESS AMONG MEDICAL STUDENTS OF THE UNIVERSITY OF LAUSANNE

348 There was no difference between the results of the ankle sprain medical case. This medical
349 case was a first prototype about a disease which is rarely used for highlighting stereotyped
350 behavior (in comparison to cardiovascular disease). The propositions were intentionally
351 thought to be opposite. The first hypothesis was that the management of the women patient
352 pain would be less serious than the male patient pain, based on the cultural stereotype that
353 men complain about pain only when it's serious and organic pain. [15][16] The main reasoning
354 of this medical case is to decide if there is a probability of an ankle fracture. According to the
355 Ottawa score, there is no indication to renew the radiography, and the best management for
356 both patients were to increase the antalgics.

357 Multiple hypothesis can explain the answers of the students, who didn't show a stereotyped
358 reasoning for the ankle sprain management. It can be explained firstly by considering that
359 students have no gender stereotype about ankle sprain pain and shows that this pathology is
360 less influenced by gender than other diseases. Secondly, the representation of the situation in
361 real life is difficult for students, who maybe have never seen a person suffering from an ankle
362 sprain pain. Most of the participants were in their first year of study and have never seen an
363 actual patient. Moreover, the formulation of the clinical case didn't permit the generation of the
364 stereotype in their management reasoning. Even if the vignette contained a picture of the
365 patient, the vignette didn't depict enough the influence of the patient's sex as it would probably
366 in the reality.

367 Three years ago, a similar medical case about a thoracic pain was presented to first, fourth
368 and fifth year students, who addressed more easily the male patient to a cardiologic center,
369 and sent the female patient home with pain killers. This difference in the management of male
370 or female patients was probably showing a sign of the stereotypes that students had about
371 cardiovascular diseases and women. The difference of management's answers of these two
372 medical cases can be explain by the hypothesis that ankle sprain is a pathology less influenced
373 by gender than the thoracic pain. Furthermore, the results of the thoracic pain clinical case
374 were showed directly to the students and served as a pedagogic tool.

GENDER AWARENESS AMONG MEDICAL STUDENTS OF THE UNIVERSITY OF LAUSANNE

375 We found an important gender gap in the knowledge of the main cause of mortality. The
376 difference of answers about the main cause of mortality can be explained by 3 mechanisms.
377 First, the patient lambda used in the medical education is often a man, and the male patient is
378 considered as the norm or standard[3]. Most of the statistical facts learned during the 6 years
379 of medicine concern the whole population, but are presented with a male patient. Thus,
380 students associated the main cause of mortality among men as the first cause of mortality of
381 the whole population in Switzerland. When it concerns women, the question is perceived as a
382 more specific question, which concerns a particular part of the population. Secondly, there is
383 still a strong stereotype about cardiovascular diseases and gender. Most of the students get
384 confused about the main cause of mortality of women because they think cardiovascular
385 diseases concern more men than women. Thirdly, the students might have an actual gap of
386 knowledge about gender associated facts. This result can be interpreted as a lack of teaching
387 about women's health and gender differences in epidemiologic facts.

388 *Limitations*

389 The NGAMS questionnaire has many limits. First, the statements are twisted with complicated
390 formulations, like double negative sentences. Most of the questions contain negative
391 stereotypes for women that are caricatural, as noticed by many of the students and the best
392 answer was clearly suggested. Indeed, many participants didn't finish the questionnaire (136
393 participants, which were excluded from results) because they actually didn't agree with any
394 statement. Furthermore, the use of the words "sex" and "gender", or "female patient", "male
395 patient", "woman" or "man" confused the meaning of the sentence. This brings bias in the
396 scores of students who answered the highest proposition to have a better gender awareness.
397 This was however prevented by the anonymity of the inquiry.

398 Other bias is the method of recruitment which was different for the questionnaire and the
399 medical case. Also, many participants were in the first year of medicine, which doesn't reflect
400 the effect of the gender education in the faculty. Indeed, the first gender lectures start in May

GENDER AWARENESS AMONG MEDICAL STUDENTS OF THE UNIVERSITY OF LAUSANNE

401 during the second semester and the inquiry was sent in April. For a first and unique tool about
402 our subject, the NGAMS questionnaire permitted to obtain a general overview of students'
403 gender awareness but not precise which kind of stereotypes are stronger or weaker. Secondly,
404 this tool was used in three studies until now and is still in the process of improving.

405 As for the medical case, the method was not validated and has to be improved. More medical
406 cases of specific diseases should be presented to students, with a quiz about the management
407 of a male or female patient. As a pedagogic tool, the presentation of their answers directly after
408 the quiz confronts them to their biased thinking and draws more easily students' attention about
409 the subject. Besides, other questions about epidemiologic facts can be integrated to identify
410 gender stereotypes and blindness.

411 The vignette we invented was a first prototype, with 4 answer possibilities and was not based
412 on a real case. Our clinical case about ankle sprain could have been improved by portraying
413 more gender characteristics of the patient and adding a video of an actual patient complaining
414 about his/her pain. More precise and ambiguous management propositions could have helped
415 the students to consider all the characteristics of the patient in their reasoning.

416 Furthermore, this method should be adapted if applied in other countries or universities,
417 because of the cultural differences that influence gender awareness and healthcare. Our
418 results cannot be generalized for all students in Switzerland, or even for students of Geneva,
419 because of the different organization of the medical education and external social determinants
420 that influence strongly the patterns of gender awareness.

421 *Strengths*

422 Our study managed to translate the recently developed tool NGAMS in French, which can
423 open possibilities of its application in all French speaking countries. In parallel, we distributed
424 the questionnaire to all 1678 students of the medicine faculty of the University of Lausanne,
425 with a participation rate of 23.4%. This thesis also permitted to statistically evaluate the
426 questionnaire and validate its utilization in Switzerland. By adding a remarks section in the

427 questionnaire, we gave the possibility to students to assess the statements of NGAMS and to
428 explain individually their opinion of gender questions.

429 In comparison to other similar studies, we added a second method to complete our results. In
430 fact, we evaluated additional aspects of gender awareness: gender epidemiologic and general
431 knowledge and the reasoning and management of specific medical cases. Finally, our study is
432 the first of its kind in Switzerland and will serve as a baseline for further research in this area.

433 **Conclusion**

434 Our study shows that students of the University of Lausanne present a certain interest about
435 the gender issues in medicine, but a developed and constructed implementation of the gender
436 dimension in the medical curriculum is necessary to prevent stereotypes that still affect the
437 future healthcare providers of Lausanne. In addition, we highlighted the difference of
438 knowledge of students about medical facts of women and men and isolated the patterns that
439 play a role in their gender awareness, such as sex and age.

440 In conclusion, gender awareness is a strong social determinant in medicine and is still poorly
441 integrated in the Swiss literature and education of healthcare. An early sensitization of the
442 future professionals in the Swiss Universities about gender bias and its influence can help the
443 improvement of the relation patient-doctor in general and ensure a healthcare system with
444 equality of care. The implementation of the gender dimension in the curriculum of medicine
445 shows results, but would be more effective if targeted specialties and situations with
446 stereotyped and biased behavior were highlighted during lectures, especially during the first
447 years of clinical learning. Doctors play an important role, but it would be interesting to integrate
448 all the professionals of healthcare, like nurses, physiotherapist, ergotherapists, etc to
449 understand and integrate the actual gender issues of our system.

450 In the gender equality movements that are happening nowadays, healthcare is implied by
451 being a fundamental institution that builds our society. Education is the key to shaping a more
452 equal society, not only in healthcare but in general. The earlier and the more we talk about

GENDER AWARENESS AMONG MEDICAL STUDENTS OF THE UNIVERSITY OF LAUSANNE

453 gender issues, the more we can work to ensure the best quality of care and life not only for
454 women, but for the whole population, regardless of their gender, sex, orientation, race or origin.

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497 Tables et figures

498 **Figure 1:** predicted mean subscales according to the linear model, with student's
499 age and sex

500

GENDER AWARENESS AMONG MEDICAL STUDENTS OF THE UNIVERSITY OF LAUSANNE

501 **Table 1:** number of participants stratified by gender and years of education, with
 502 total number of students registered in Autumn 2016 in the University of Lausanne in
 503 parentheses
 504

Year of study	Number of male participants (male students in total)	Number of female participants (female students in total)	Total number of participants (total number of students)	Participation rate in %	Percentage of female students in total
1	20 (200)	74 (468)	95*(668)	14.20%	70%
2	29 (103)	43 (135)	72 (238)	30.20%	56.70%
3	27 (84)	35 (110)	62 (194)	31.90%	56.70%
4	23 (82)	33 (122)	56 (204)	27.40%	59.80%
5	39 (90)	28 (95)	67 (185)	36.20%	51.40%
6	12(68)	32(121)	44 (189)	23.20%	64%
Total	150 (627)	245 (1051)	396 (1678)	23.60%	62.60%

* Retrait du participant de catégorie "autre"

505
 506 **Table 2:** mean subscores stratified by sex
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	Women	Men	p of the difference
GS	3.62	3.70	0.270
GRIP	1.83	2.07	<0.001
GRID	2.10	2.13	0.758

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518 **Table 3:** linear model with student sex and age (interactions have been tested but
 519 they are not significant)
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521

	Sex (Men)	Age	Age ²
522 GS	0.005 (0.942)	0.80 (<0.001)	-0.02 (<0.001)
523 GRIP	0.27 (<0.001)	-0.03 (0.035)	-
524 GRID	0.06 (0.472)	-0.04 (0.024)	-

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528 **Table 4:** mean subscores for the three universities where NGAMS was distributed

529

530

	Radboud University ⁴ Netherlands		Umeå University ⁵ Sweden		Lausanne University Switzerland	
	Female students (n=428)	Male students (n=188)	Female students (n=259)	Male students (n=221)	Female students (n=245)	Male students (n=150)
<u>GS</u>	3.43	3.43	3.37	3.30	3.62	3.70
<u>GRIP</u>	2.27	2.52	1.70	1.96	1.83	2.07
<u>GRID</u>	2.43	2.44	2.00	2.07	2.10	2.13

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^{4 5} Results exported from the article: J. Andersson, P. Verdonk, E. E. Johansson, T. Lagro-Janssen, and K. Hamberg, "Comparing gender awareness in Dutch and Swedish first-year medical students - Results from a questionnaire," *BMC Med. Educ.*, vol. 12, no. 1, 2012.

534

535 **Supplementary table 1**

536

Nijmegen Gender Awareness in Medicine Scale (N-GAMS)

Translated from the dutch version

GS : Gender sensitivity

GS1	Tenir compte des différences entre homme et femme engendre l'inégalité dans la prise en charge
GS2	La connaissance des différences de genre homme/femme en bonne santé et en situation de maladie améliore pour les médecins la qualité de prise en charge
GS3	Les médecins doivent tenir compte uniquement des différences biologiques entre hommes et femmes
GS4	En ce qui concerne les affections non spécifiques au sexe, le sexe et/ou le genre du patient n'a aucune importance
GS5	Un médecin doit s'en tenir autant que possible aux aspects médicaux des symptômes des hommes et des femmes
GS6	Les médecins n'ont pas besoin de connaître quoi que ce soit de la vie personnelle des hommes et des femmes pour dispenser des soins médicaux
GS7	Les différences entre médecins hommes et médecins femmes sont trop faibles pour avoir de l'importance
GS8	C'est précisément parce que les hommes et les femmes sont différents que les médecins doivent traiter tout le monde de la même façon
GS9	Les médecins qui tiennent compte des différences de genre ne s'occupent pas des problèmes importants
GS10	Dans le cadre de la communication avec les patients, le fait que le patient soit un homme ou une femme n'a aucune importance pour un médecin
GS11	Dans le cadre de la communication avec les patients, peu importe que le médecin traitant soit un homme ou femme
GS12	Les différences entre les patients de sexe masculin et les patients de sexe féminin sont tellement faibles que les médecins peuvent difficilement en tenir compte
GS13	Pour un traitement efficace, les médecins doivent tenir compte des différences de genre en ce qui concerne le déroulement et les conséquences de la maladie
GS14	Il n'est pas nécessaire de considérer les différences de genre des patients lors de la description de leurs plaintes

GRIP: Gender role ideology towards patients

- GRIP1** Les patients de sexe masculin comprennent mieux la façon de travailler des médecins que les patients de sexe féminin
-
- GRIP2** Les patients de sexe féminin ont des attentes déraisonnables de la part des médecins en comparaison avec les patients de sexe masculin
-
- GRIP3** Les femmes ont plus tendance que les hommes à aborder des thèmes avec le médecin qui n'ont pas leur place dans un cabinet de consultation
-
- GRIP4** Les femmes attendent plus de soutien affectif que les hommes de la part des médecins
-
- GRIP5** Les patients de sexe masculin sont moins exigeants que les patientes de sexe féminin
-
- GRIP6** Les femmes ont plus recours aux services de santé que nécessaire
-
- GRIP7** Les hommes ne vont pas consulter un médecin pour des problèmes de santé mineurs
-
- GRIP8** Des affections médicalement inexplicables se manifestent chez les femmes parce qu'elles sont trop préoccupées par leur santé
-
- GRIP9** Les patientes de sexe féminin se plaignent de leur santé parce qu'elles exigent plus d'attention que les patients de sexe masculin
-
- GRIP10** Il est plus facile de déceler la cause des symptômes chez les hommes parce qu'ils disent directement de quoi il s'agit
-
- GRIP11** Les hommes font plus souvent appel aux services de santé pour des problèmes qu'ils auraient pu prévenir
-

GRID: Gender role ideology toward doctors

- GRID1** Les médecins de sexe masculin attachent trop d'importance aux aspects techniques de la médecine en comparaison avec les médecins de sexe féminin
-
- GRID2** Les médecins de sexe féminin consacrent beaucoup trop de temps à leur consultation en comparaison avec les médecins de sexe masculin
-
- GRID3** Les médecins de sexe masculin sont plus efficaces que les médecins de sexe féminin
-
- GRID4** Les médecins de sexe féminin ont plus d'empathie que les médecins de sexe masculin
-
- GRID5** Les médecins de sexe féminin tiennent beaucoup trop compte de la vie personnelle du patient
-
- GRID6** Les médecins de sexe masculin sont plus capables d'assumer leur travail que les médecins de sexe féminin
-
- GRID7** Les médecins de sexe féminin sont trop impliquées émotionnellement avec leurs patients
-

Supplementary table 2

Clinical case of ankle sprain as presented to students*via the survey website www.socrative.com

<p>Madame Patricia Aebi est une femme de 49 ans en bonne santé habituelle, conseillère en assurance. Elle vous consulte, car elle présente une douleur au niveau de la cheville droite suite à une chute il y a 2 jours en descendant les escaliers (a raté une marche). Elle a consulté aux urgences dans une permanence de la ville où un examen clinique a été effectué et une radiographie de la cheville qui n'a pas montré de fracture. On lui a dit qu'elle avait une entorse et elle ressort avec un traitement antalgique et des béquilles.</p> <p>Elle vous reconsulte 48h plus tard en vous disant que les douleurs sont insupportables malgré le traitement de paracétamol (2g/j) et d'AINS (Ibuprofène 400 mg 3x/j).</p> <p>A l'examen clinique elle arrive à poser le pied mais la marche est douloureuse. Il y a une forte tuméfaction péri-malléolaire externe et une douleur diffuse à la palpation de la région malléolaire externe. La partie postérieure du péroné n'est pas particulièrement sensible à la</p>	<p>Monsieur Patrick Aebi est un homme de 49 ans en bonne santé habituelle, conseiller en assurance. Il vous consulte, car il présente une douleur au niveau de la cheville droite suite à une chute il y a 2 jours en descendant les escaliers (a raté une marche). Il a consulté aux urgences dans une permanence de la ville où un examen clinique a été effectué et une radiographie de la cheville qui n'a pas montré de fracture. On lui a dit qu'il avait une entorse et il ressort avec un traitement antalgique et des béquilles.</p> <p>Il vous reconsulte 48h plus tard en vous disant que les douleurs sont insupportables malgré le traitement de paracétamol (2g/j) et d'AINS (Ibuprofène 400 mg 3x/j).</p> <p>A l'examen clinique il arrive à poser le pied mais la marche est douloureuse. Il y a une forte tuméfaction péri-malléolaire externe et une douleur diffuse à la palpation de la région malléolaire externe. La partie postérieure du péroné n'est pas particulièrement sensible à la palpation, ni la région naviculaire. Le reste de</p>
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GENDER AWARENESS AMONG MEDICAL STUDENTS OF THE UNIVERSITY OF LAUSANNE

<p>palpation, ni la région naviculaire. Le reste de l'examen est sans particularité.</p> <p>Que faites-vous? (ne cocher qu'une seule réponse)</p>	<p>l'examen est sans particularité.</p> <p>Que faites-vous? (ne cocher qu'une seule réponse)</p>
<ul style="list-style-type: none">• Vous refaites une radiographie de la cheville pour exclure une fracture (les radios faites à la permanence sont introuvables).• Vous rassurez le.la patient.e en lui expliquant qu'il faut attendre plusieurs jours pour que les médicaments soient efficaces.• Vous êtes inquiet-ète et le.la réferez rapidement à votre collègue orthopédiste pour un 2e avis.• Vous lui suggérez de prendre un peu plus d'anti-douleurs, il.elle n'a probablement pas reçu un traitement assez fort.	

Figure 1

