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Original investigation

Weekly working hours for Norwegian hospital doctors since 1994 with special attention to postgraduate training, work-home balance and the European Working Time Directive.

A longitudinal study

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ABSTRACT

Objectives: To examine the weekly working hours of Norwegian hospital doctors from 1994 to 2012 with special emphasis on the quality of postgraduate training and work-home balance, and in relation to the requirements of the European Working Time Directive (EWTD).

Design: Longitudinal study based on postal questionnaires.

Setting: Norway.

Participants: Unbalanced cohort of 1,300 to 1,600 doctors in 1994, 1995, 1996, 1997, 2000, 2002, 2004, 2006, 2008, 2010 and 2012.

Outcome measures: Self-reported total weekly working hours and whether 45 weekly working hours are too short, sufficient, or too long to meet the quality requirements of obligatory postgraduate training for junior doctors.

Results: From 1994 to 2012, the number of weekly working hours was stable for senior (46-47 hours) and junior (45-46 hours) hospital doctors. Significantly more senior (31-35%) than junior (12-19%) doctors reported sub-optimal work-home balance, defined as working more than 48 hours a week. The majority perceived the present situation with an average of 45 hours per week for juniors as sufficient for obligatory postgraduate specialist training, but doctors of higher age (OR 1.04, 95% CI 1.01-1.08), senior doctors (1.07, 1.04-1.11) and doctors working in surgical specialties (OR 1 vs. laboratory medicine 0.03, 0.01-0.25, internal medicine 0.31, 0.17-0.58, psychiatry 0.12, 0.04-0.36, paediatrics 0.36, 0.12-1.07, anaesthesiology 0.08, 0.02-0.39, gynaecology 0.07, 0.01-0.56 and others 0.39, 0.04-3.56) were more likely to want the work-week to be longer.

Conclusions: The weekly working hours of Norwegian hospital doctors were always below the EWTD requirements. A significant growth of hospital doctor density over the past two decades, national regulations and cultural values might be important factors. Speciality differences in perception of sufficient training time may call for more flexibility in working time regulations.

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Strengths and limitations of this study

- The study documents that working hours among Norwegian hospital doctors have always been below the EWDT requirements
- The representative cohort with repeated data allows for generalisation to the whole population of hospital doctors in Norway.
- Self-reported working hours may deviate from the actual number of hours worked, but it is not easy to judge whether the respondents are likely to overestimate or underestimate their own hours.

INTRODUCTION

The question of doctors' work hours is an important public health issue. Too long hours may reduce the quality of health care, threaten patient safety and influence and affect the doctors' own health and work-home balance.^{1,2} In 2000 the European Working Time Directive (EWTD)³ signalled a gradual reduction in weekly work hours for junior doctors from a maximum of 58 hours in August 2004 to 56 hours in August 2007 and to 48 hours in August 2009. Member states could apply for further postponement of introduction of the 48 hour work week until August 2012 at the latest, but it is still possible for member states to apply their national legislation, also when it allows for more than 48 hours work weeks for doctors.⁴ A number of member states have introduced rotas to restrict the number of hours worked.^{5,6}

In the non-EU member state Norway, where doctors' working hours has been a subject for annual deliberations between employers (state, counties, hospital trusts) and the doctors through The Norwegian Medical Association since 1985, a reduction in working hours for doctors had already taken place in 1993. The contracted basic 48 working hours from 1960 was reduced to 37.5 hours for most employees in 1987, and to 35.5-37.5 hours for junior doctors in 1988.^{7,8} Presently all full time employed junior and senior doctors have a contracted basic working week of 35.5-37.5 hours, with the possibility of a permanent 2.5 hours extension. Doctors are not obliged to work beyond this, but they can choose to extend their weekly working time to 60 hours. The working patterns is usually day-working with on-call duties, where at least 20 hours per week must be between 7am to 5pm from Monday to Friday.^{9,10}

On this background we think a more detailed description on how Norway and Norwegian doctors get along with their long standing comparatively short working weeks might be of international interest.

A study based on all Norwegian hospital doctors in full-time shows that the numbers of planned weekly working hours plus hours from overtime increased from 43.17 hours in 2001 to 45.04 hours in 2003 and fell to 42.76 hours in 2007.¹¹

We have surveyed a representative cohort of Norwegian doctors regularly from 1994 to 2012, and one of the most central and repeated measures has been self-reported weekly working hours. Studies with data from 2006 show that hospital doctors in Norway enjoy a higher level of satisfaction with working time compared with Germany hospital doctors¹² and a shorter working week, respectively lower proportions of doctors exceeding a 9 hours working day (27% vs. 59%) and 60 hours on-call per month (18% vs. 63%).¹³ A preliminary analysis of weekly working hours in 2000 and 2010 among all hospital doctors working full and part-time suggests stability of 45 hours for senior doctors and a slight increase from 42 hours to 43 hours for junior doctors.¹⁴

Several publications from EU member states report higher weekly working hours in groups as diverse as Irish junior doctors (more than 63 hours in 2013),¹⁵ general surgical trainees in The Netherlands (55 hours in 2005),¹⁶ surgical residents in Switzerland (55 hours in 2005),¹⁷ most consultants, (>50 hours in 2005), the majority of junior doctors (56 hours in 2010) and many of the medical specialist registrars with night shifts (90 hours in 2006).¹⁸⁻²⁰ Two cross-sectional studies show that weekly working hours declined but remained high in Austria (59 hours in 2006, 54 hours in 2013)²¹ and in Germany (57 hours in 2007, 55 hours in 2010, >48 hours 74% of doctors in 2013).^{22,23} A study among doctors in France demonstrates a decline in working hours from 53 hours in 1977 to 48 hours in 2007.²⁴

A good balance between professional and private life is of increasing importance in modern society, also for doctors. Many hospital doctors try to reduce their working hours by choosing family friendly specialties with less on-call or shift duties – particularly female doctors.^{11,25-28}

In Norway, the majority of doctors start their postgraduate training shortly after the internship period, by applying to hospital trusts for training positions. Junior doctors in hospitals have both the right and duty to receive teaching and vocational training leading to their specialist accreditation. According to specialty 100 to 300 course hours are also required. The content of the undergone training is usually documented through course exams, procedures and skills requirements, attestation forms, checklists etc., plus documented participation of at least 2 hours per week in the hospital teaching program. The training typically takes 5 to 7 years. According to a study of junior doctors in Norway from 1999 to 2010,²⁵ 67.9% of females and 78.7% of males completed their specialization by the end of study. Hospital factors such as more supervision, lower workload related to routine patient treatment and working in university hospital or central hospitals reduced the time to attain the specialist qualification.

The impact of EWTD on educational opportunities for junior doctors has been widely debated over the last decade.²⁹⁻³¹ Two recent publications in the UK setting suggest that doctors are critical of the implementations of the EWTD. In the study with data from 2010, no doctor reported that the EWTD improved training opportunities for junior doctors.³² In another study with data from 2012, the majority of doctors felt that the EWTD had neither benefited junior nor senior doctors. More negative views were reported by doctors in surgical specialities.³³ How doctors in Norway perceive the relationship between the quality of postgraduate training for junior doctors and the actual work-week, is unknown.

This study describes the work-weeks in terms of hours per week for Norwegian doctors, with a special emphasis on junior hospital doctors in training (interns and residents), but also senior hospital doctors (consultants) based on longitudinal data from 1994 to 2012. It also looks at the perceived quality of postgraduate specialist training and the work-home balance.

METHODS

Design and participants

Since 1994 the Institute for Studies of the Medical Profession at the Norwegian Medical Association has regularly surveyed a representative panel of active Norwegian doctors with mailed questionnaires. This is a so called unbalanced cohort, starting with 1,272 randomly selected doctors in 1994 and supplemented with approximately 400 young doctors in 2000, 250 young doctors in 2008, and 300 in 2012. Over the same period 470 doctors have left the panel due to retirement, death, or voluntary withdrawal. The 2012 sample comprised 1,792 doctors. The present study is based mainly on responses from junior and senior hospital doctors. See table 1 and figure 1 for a more detailed description.

Measurements

Weekly working hours

The following question was asked at all 11 points in time: “In an average working week, approximately how many hours do you spend on: Working with patients, meetings, paperwork, telephones, other tasks.” Graphically the time components were ordered vertically, and the respondents themselves should calculate their own total number of hours. Based on respondent feedback the 2006 questionnaire was slightly revised to also single out extra jobs, and from 2008 to also specify time spent on professional update.

The questionnaire lay-out in 2012 was:

	Hours per
In an average work week, including on-call duties and extra jobs, about how many hours	week
do you spend on:	
Patient work (all direct patient or peer contacts, including telephones etc.)	<input type="text"/> <input type="text"/>
Meetings (team meetings, supervision etc.)	<input type="text"/> <input type="text"/>
Paper work, telephones, e-mails, etc.	<input type="text"/> <input type="text"/>
Professional update	<input type="text"/> <input type="text"/>
Other job-related tasks	<input type="text"/> <input type="text"/>
Sum: total number of hours per week	<input type="text"/> <input type="text"/>

Work-home balance

Work-home balance can be measured by different methods.^{28,34} We define working more than 48 hours a week on a regular basis as a sub-optimal work-home balance.³⁵

Perceived quality of postgraduate training

In 2012 the following question was asked: The average work-week for junior doctors is approximately 44.9 hours. How do you perceive these hours in relation to the quality of postgraduate medical training within your specialty? The response alternatives were: “could be less”, “just about right”, and “could be more”. This question was answered both by junior and senior doctors.

Job situation and specialty

In all waves of the survey we asked about job situation and medical specialty. Job situation is grouped into hospital doctors (seniors and juniors), general practitioners, private specialists, researchers, doctors in administrative positions and others. In the present article we concentrate on the seniority level: senior and junior hospital doctors. Senior doctors are specialists

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permanently employed by the hospital trusts. Junior doctors are specialists in training with limited contracts with the hospital trusts. Specialists in general surgery or general internal medicine usually continue on a subspecialist career, which may imply going back to junior status until the subspecialty authorization is acquired.

In 2012 there were 43 different medical specialties in Norway, including five subspecialties under general surgery (cardiothoracic surgery, gastroenterological surgery, paediatric surgery, urology and vascular surgery) and eight under general (internal) medicine (cardiology, communicable diseases, endocrinology, geriatrics, gastroenterology, haematology, renal diseases and respiratory medicine). For the purpose of this study the 43 specialties are collapsed into eight specialist categories: surgery, internal medicine, anaesthesiology, gynaecology, paediatrics, psychiatry, laboratory medicine (including radiology and pathology) and others.

Analysis

General linear modelling (GLM) with age as co-variate and gender and seniority level as fixed factors (ANCOVA) was used to estimate weekly working hours at different points in time. Logistic regressions were used to estimate the simultaneous effect of gender, age, total weekly working hours, medical specialty and seniority level on the perceived quality of the postgraduate training. Separate analyses for gender were also performed. Full time work was defined as 37 hours or more per week.³⁶ Proportions were compared with 95% confidence intervals. Units with missing data were excluded. Predictive Analytics Software Statistics 19 was used for the analyses.

RESULTS

Sample characteristics

Table 1 shows the numbers, response rates and composition of the 11 waves of the survey.

Table 1.

Figure 1 illustrates the inclusions, stability and attritions of senior and junior doctors in the unbalanced cohort from 1994 to 2012.

Figure 1.

Table 2 shows the sample characteristics and the representativeness of the sample with regard to age, gender and seniority level in 1994 and 2012.³⁷ The proportion of females increased significantly from 1994 to 2012, both in our samples and in the general hospital doctor population. The proportion of junior doctors among our respondents compared to all hospital doctors was significantly lower in 1994, while it did not differ significantly in 2012. The proportion of senior doctors was comparable in our sample and all hospital doctors in 1994, but significantly higher in our sample 2012. These differences are consequences of the unbalanced cohort design.

Table 2.

Average work-weeks

From 1994 to 2012, the majority of hospital doctors worked in full time, but the proportion of part time working doctors (with 95% CI) increased slightly among seniors (from 5.2, 2.9-7.5 to 6.5, 4.2-8.8) and significantly among juniors (from 3.4, 0.8-6.1 to 10.2, 6.4-14.0).

Figure 2 shows the estimated average number of weekly working hours for full time working senior and junior doctors controlled for gender and age. The work-week is stable over the 18 year period. Senior doctors report slightly longer hours than junior doctors, but the difference is not statistically significant as judged from the 95% confidence intervals (except for 2000).

Figure 2.

Figure 3 shows that full time working female hospital doctors in Norway over the whole period have worked significantly fewer hours than their male colleagues. However, this difference is decreasing over time.

Figure 3.

We also looked at the inter-specialty differences in average work-week (with 95% CI) controlled for gender, age and seniority. From 2000 to 2012, the number of weekly working hours was stable for all specialist groups, respectively doctors in surgical domains (47.1, 46.0-48.3 vs. 47.7, 46.3-49.0), laboratory medicine (44.7, 43.4-45.9 vs. 44.7, 43.1-46.2), internal medicine (46.1, 45.3-46.9 vs. 46.7, 44.9-46.5), psychiatry (43.4, 42.2-44.6 vs. 44.3, 43.1-45.6), paediatrics (45.2, 43.6-46.8 vs. 46.5, 44.4-48.6), anaesthesiology (46.1, 44.5-47.8 vs. 45.9, 44.1-47.7), gynaecology (45.6, 43.7-47.5 vs. 46.1, 44.2-48.1) and others (45.7, 43.5-47.8 vs. 42.9, 39.8-46.0). Doctors in the surgical domain had longer working weeks than doctors in other specialist groups in 2000 as well as in 2012.

In 2012, the estimated average work-week (with 95% CI) for different categories of full-time working n doctors in Norway, controlled for age and gender, was 44.7 (43.6-45.8) hours for junior hospital doctors, 46.3 (45.6-45.8) for senior hospital doctors, 47.5 (45.8-49.1) for full time researchers, 44.4 (42.3-46.4) for doctors in administrative positions, 47.5 (46.6-48.3) for

general practitioners, and 45.0 (43.1-46.9) for private practice specialists. No significant changes were found from 2000 to 2012.

Work-home balance

From 2002 to 2012 (before and after the effectuation date of EWTD), the proportion of doctors working 48 hours or more per week, our criterion for a suboptimal work-home balance, decreased among junior doctors from 26 (17.5 to 34.4)% to 14.6 (10.6 to 19.8)% and increased among senior doctors from 23.9 (18.1 to 29.7)% to 30.7 (26.5 to 35.3)%.

In a multivariate logistic regression model, significant predictors for sub-optimal work-home balance in 2012 (n=670), controlled for age was being senior doctor, being male and working in the surgical domain (OR=1) vs. laboratory medicine (0.37, 0.18-0.76), internal medicine (0.58, 0.34-0.98), psychiatry (0.37, 0.19-0.74), paediatrics (0.70, 0.30-1.65), anaesthesiology (0.48, 0.21-1.09), gynaecology (0.53, 0.22-1.28) and others (0.75, 0.17-3.31).

Time for postgraduate training

The majority of hospital doctors (64.2%) reported that a 45 hour work-week was sufficient for securing the quality of obligatory postgraduate training for junior doctors, while a minority reported that it could have been shorter (24.8%) or it could have been longer (11%). No significant difference was found between juniors and seniors (data not shown).

Table 3 shows a multivariate logistic regression model with wanting more than 45 hours a week for postgraduate training as response variable. Age, weekly working hours and working within surgical specialty were significant predictors, but not gender or seniority level.

Table 3.

Figure 4 shows the proportion of different hospital-based specialties in Norway who think a 45 hours' work-week is about right (blue), could have been shorter (grey) and could have been longer (red) in relation to the quality of specialist training in 2012. The variation is considerable. Doctors in most surgical specialties were more likely to report that the work-week could be longer.

Figure 4.

DISCUSSION

Main findings

Average weekly work hours for Norwegian hospital doctors have remained more or less unchanged between 1994 and 2012, and amount to approximately 47 hours for males and 45 hours for females, lower than the requirements of the EWTD, starting at 58 hours in 2004 and going down to 48 hours in 2009. In 2012, the majority of senior and junior doctors in Norway expressed that this was sufficient for the obligatory postgraduate training.

Comparison with other studies

A cross-national comparison of doctors' working hours is limited by methodological differences. However, Norwegian junior and senior doctors have clearly shorter working hours than other hospital doctors in the EU, who report between 50 and 90 hours a week during the last decade.^{6,15,16,18,19,21-23} In contrast to Norway, the weekly working hours for hospital doctors in Austria, France, Germany, and the UK all decreased after the introduction of the EWTD.^{21-24,30} Norwegian doctors also seem to have a better work-home balance. Working more than 48 hours a week was reported from 30.7% of senior and 14. 6% of junior doctor in 2012, compared with of 73% of German hospital doctors in 2013,²³ and 68% of UK consultants in 2005. In 2013, 36% of Austrian hospital doctors worked more than 60 hours per week,²¹ compared with only 2.5% in our sample in 2012.

Weekly working hours for Norwegian junior doctors is slightly shorter than for senior doctors. In other European studies there is no clear pattern here.^{21,23,24} The longer working hours for male doctors is more consistent.^{6,13,24,38,39}

In comparison with most other professional groups in Norway, senior and junior doctors are more likely to work longer hours, even though such a comparison must be made with caution. In the OECD study from 2011 on Better Life Index, 2.8% of employed Norwegians had a longer working week than 50 hours⁴⁰ compared to 28.7% of senior and 12.2% of junior doctors in our sample in 2012. In a national survey from 2011,³⁶ 2% of office workers, 3% of cleaners, 4% of sales and service occupations, 6% of college graduates, 7% of craftsmen, 13% of managers, 13% of university graduates, 13% of chauffeurs, 20% of transport workers and 42% of farmers and fishermen worked more than 45 hours per week, compared to 55% of senior and 35% of junior doctors in our 2012 sample.

Interestingly, the total weekly working hours in Norway for full time employed junior and senior doctors that are subject to the EWTD legislation^{9,10} are similar to those of GPs and private practice specialists who decide their own working hours. No comparative studies were found on this issue.

In 2012, the majority of senior and junior doctors in Norway felt that the present 45 hours working week is sufficient for postgraduate training. This is in accordance with a recent review by Temple of the impact of the EWTD on the quality of training for doctors showing that a high quality of training can be delivered within the framework of a 48 hour working week.³⁰ That doctors in most surgical domains in our study were more likely to report that the work-week could have been longer in relation to the quality of obligatory specialist training for juniors is in

line with a number of studies discussing the effect of working time reduction on the performance of surgeons.^{29,32}

Why is Norway different?

Hospital doctors' work conditions are of course closely associated with work organisation⁴¹ and national directives.⁵

One of the main differences between the European and the Norwegian directives on doctors' working time is the effectuation date. In Norway, a significant reduction of working hours for doctors took place already between 1960 and 1987.^{8,36} Today, the contracted basic working week in full-time employment in Norway (35.5-40 hours) is lower than the maximum weekly working week in the EWTD (48 hours). However, both the European and the Norwegian directives include an opt-out option allowing for longer hours with the employee's consent. It is also worth noting that working hours for junior and senior hospital doctors in Norway since 1985 have been decided through annual deliberations between the relevant employer and employee organisations.^{7,8}

Hospital doctor density and workload influence working hours. OECD data from 2012 show a density of practising doctors per 1,000 inhabitants in Norway of 3.7, higher than in most other European countries, e.g. UK (2.8), Belgium (2.9), Finland (3.2), Denmark (3.5).⁴² Norwegian doctor workforce statistics indicates a significant increase in practising junior doctors, from 2,558 in 1994 to 5,063 in 2012, and senior doctors from 3,700 in 1994 to 6,892 in 2012 (Table 2).³⁷ According to Statistics Norway, the number of doctors from 1990 to 2009 increased faster than in any other European country, particularly hospital doctors.⁴³ Furthermore, a study of staff and productivity in somatic specialist health care in 2008 suggested a lower workload for hospital doctors due to more hospital doctors and less clinical productivity (measured by

numbers of hospital dismissals and outpatient consultations and treatments) in Norway than in Denmark, Finland, Germany, and Scotland.⁴⁴

The family friendly Norwegian welfare system should also be mentioned. The Norwegian legislations grant the mothers a year's leave with full pay in connection with childbirth or adoption, and the fathers are entitled to an additional three months.

Adherence to mandatory regulations of hospital doctors' work time varies considerably within the European countries. A study on UK junior doctors' working arrangements from 2008 to 2010 shows that over half of the junior doctors experienced pressure to work unofficially beyond the work time limit.²⁰ A survey by the Royal College of Physicians in 2004 found that many junior doctors were forced to work over ninety hours during seven-night rotas.¹⁹ According to surveys by the German Doctors Union and the Norwegian Medical Association, 59% of German hospitals doctors complained about the renege on stipulated maximum working hours, while only 30% of the Norwegian hospital doctors reported a pressure from the hospital administrations to deviate from actual work time agreements.^{22,45} Only very few senior (2-4%) and junior (1-3%) doctors in Norway ever exceed the 60 hours per week maximum (data not shown).

We have shown that the difference in weekly working hours between senior and junior doctors in Norway was not statistically significant, with exception of 2000. This may partly be due to small differences in remuneration between senior and junior doctors. In a study from 2007, immigrant German doctors in Norwegian hospitals reported better collegial teamwork and no or flat hierarchy between seniors and doctors in training as reasons for coming to and staying in Norway.⁴⁶ In a study with data from 2006 we have shown how Norwegian doctors compared with their colleagues in German hospitals were significantly more satisfied with working hours and payment.¹²

Adherence to working time regulations and a good balance between professional and private life are important cultural values in Norway. In the Fourth European Working Conditions Survey, Norway was found to have the second-lowest average weekly work time (39.4 hours vs. 43.2 hours in the UK, 41.9 hours in EU), and the lowest percentage of employees with a work-week exceeding 48 hours (6% vs. 13% in the UK, 15% in the EU).^{35,47}

Even if the majority of Norwegian hospital doctors are satisfied with the present situation in terms of postgraduate training, one third of those working in the surgical domain would like longer work hours. Previous studies show that surgeons compared to non-surgeons have higher workload, longer working hours, more night's on-calls and stronger professional interest.^{6,11,25,48} A recent study on Norwegian doctors in specialisation with data from 1999 to 2010 found the highest number of working hours per week in surgery, orthopaedics, anaesthesiology and internal medicine.²⁵ According to a literature review on the impact of the working time regulations on medical education and training in European studies, doctors in the surgical domain perceive the workweek limitation largely negative on surgical training.²⁹ Important elements in surgical training are based on being present and available in emergency situations, which cannot always be planned. It is also often a question of having taken part in a number of defined but not necessarily frequent procedures. If the training comes to a point where the junior doctors too often miss important acute or emergency operations simply because they are not present, the only remedy is more presence. In a study among surgical residents and surgical consultants in Switzerland, 60% of surgical consultants felt that surgical residents should be present longer than the workweek limitation.¹⁷ Therefore, it should be considered whether Norwegian junior doctors in surgical training should practice longer hours, at least for parts of their training.

Strengths and limitations

The study's main strength is the representative cohort with repeated data that allows for generalisation to the whole population of hospital doctors in Norway. The response rates are fairly good, ranging from 67% to 95%, which is higher than in a number of similar studies,^{6,18,20-23} but do not rule out the possibility of non-response bias. Self-reported working hours may of course deviate from the actual number of hours worked, but it is not easy to judge whether the respondents are likely to overestimate or underestimate their own hours. The expanded specification of different elements of weekly work hours - secondary positions mentioned explicitly from 2006 and on-call time from 2008 - should not affect the total number of hours worked since the phrasing of the questions has always focused on the total number of hours worked per week. The inclusions and exclusions of respondents over time, and the exchange between junior and senior doctors, is a reason for caution. Over a period of 18 years some doctors will also work in functions other than that hospital doctor. Some doctors may leave the panel due to retirement, death or voluntary withdrawal, and a few senior doctors become junior doctors if they embark on sub specialisation or want a second specialty.

Conclusion

The average weekly working hours and the proportion with sub-optimal work-home balance did not change among Norwegian junior and senior doctors from 1994 to 2012. No differences were found in weekly working hours of employed hospital doctors and self-employed GPs or private practice specialists. Junior and senior hospital doctors in Norway enjoy a shorter work-week than hospital doctors in several other countries. National work time regulations based on deliberations, cultural values and the high and growing doctor density are important causes. When the majority of Norwegian junior and senior hospital doctors report that sufficient postgraduate training schemes can be executed within a 45 hour working week, it lends support to the EWTD of maximum 48 hours. However, the speciality differences may call for more flexibility in working time regulations, particularly among surgeons.

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DECLARATIONS

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Contributors Both authors contributed to concept and design of the study, statistical analysis, interpretation of data, and writing the article. Both authors had full access to all of the data (including statistical reports and tables) in the study and can take responsibility for the integrity of the data and the accuracy of the data analysis.

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Competing interest None declared.

Ethics approval According to the Regional Committee for Medical Research Ethics, the study based on “Norwegian Physician Survey - A bi-annual prospective questionnaire survey to a representative sample of Norwegian physicians” is exempt from review in Norway, cf. §§ 4 of The Act. The project can be implemented without the approval by the Regional Committee for Medical Research Ethics (IRB 0000 1870). Additionally, approval for data protection of the bi-annual prospective survey among Norwegian doctors was obtained from the Norwegian Social Science Data Service (Reference 19521).

Data sharing No additional data available.

Figure captions

Figure 1. Sample characteristics

Figure 2. Average weekly working hours for consultants and junior doctors in full-time, with a 95 per cent confidence interval, 1994-2012.

Figure 3. Average weekly working hours for female and male hospital doctors in full-time, with a 95 per cent confidence interval, 1994-2012.

Figure 4. Proportion of different hospital-based specialties in Norway who think a 45 hour working week is about right (blue), could have been shorter (grey) and could have been longer (red) in relation to the quality of specialist training in 2012

Specialties marked * are surgical subspecialties, that require 3 extra years of training after authorization in general surgery. Specialties marked** are medical subspecialties that require 3 extra years of training after authorization in general (internal) medicine. Numbers of respondents are in parentheses.

Table 1. The numbers, response rates and composition of the 11 waves of the survey

	sample	respondents	response rate	hospital seniors	hospital juniors	other doctors
1994	1272	1209	95.0	371	179	659
1995	1258	1145	91.0	372	166	607
1996	1287	965	75.0	374	130	461
1997	1260	951	75.5	322	86	543
2000*)	1606	1321	82.3	389	226	706
2002	1608	1174	73.0	205	104	865
2004	1499	1004	67.0	194	91	719
2006	1400	966	69.0	375	71	520
2008*)	1649	1072	65.0	405	176	491
2010	1520	1014	66.7	415	116	483
2012*)	1792	1279	71.4	436	246	597

*) young doctors added to the cohort

Table 2. Sample characteristics and representativeness of the sample with regard to seniority, gender and age in 1994 and 2012.

	Study samples		Norway	
	1994	2012	1994	2012
All doctors (n)	1,209	1,272	11,847	23,260
Seniority (n)				
junior doctors	179	246	2,558	5,063
senior doctors	371	436	3,700	6,892
Seniority (%)				
junior doctors	14.5 (12.5 - 16.5)	19.3 (17.4 - 21.8)	22.6	21.8
senior doctors	30.7 (28.1 - 33.3)	34.3 (31.8 - 37.0)	31.2	29.6
Females (%)				
junior doctors	43.0 (40.2 - 45.8)	65.4 (62.8 - 68.0)	40.2	59.2
senior doctors	18.3 (14.4 - 22.2)	39.2 (34.6 - 43.8)	15.8	37.2
Mean age (years)				
junior doctors	36.4 (35.4 - 37.5)	34.4 (33.4 - 35.5)	35.4	35.4
senior doctors	48.9 (48.2 - 49.7)	50.7 (50.0 - 51.5)	49.3	51.2

Table 3. Logistic regression with wanting more than 45 hours a week for postgraduate training in 2012 as response variable, N= 628

	OR	95% CI for OR	P
Age in years	1.04	1.01-1.08	0.014
Female (vs. male)	0.57	0.31-1.07	0.083
Total weekly working hours	1.77	0.73-4.29	0.203
Senior doctors (vs. junior doctors)	1.07	1.04-1.11	0.0001
Medical specialty, ref. surgeons			
laboratory medicine	0.03	0.00-0.25	0.001
internal medicine	0.31	0.17-0.58	0.0001
psychiatry	0.12	0.04-0.36	0.0001
pediatrics	0.36	0.12-1.07	0.066
anaesthesiology	0.08	0.02-0.39	0.002
gynaecology	0.07	0.01-0.56	0.012
other	0.39	0.04-3.56	0.401

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Figure 1. Sample characteristics.

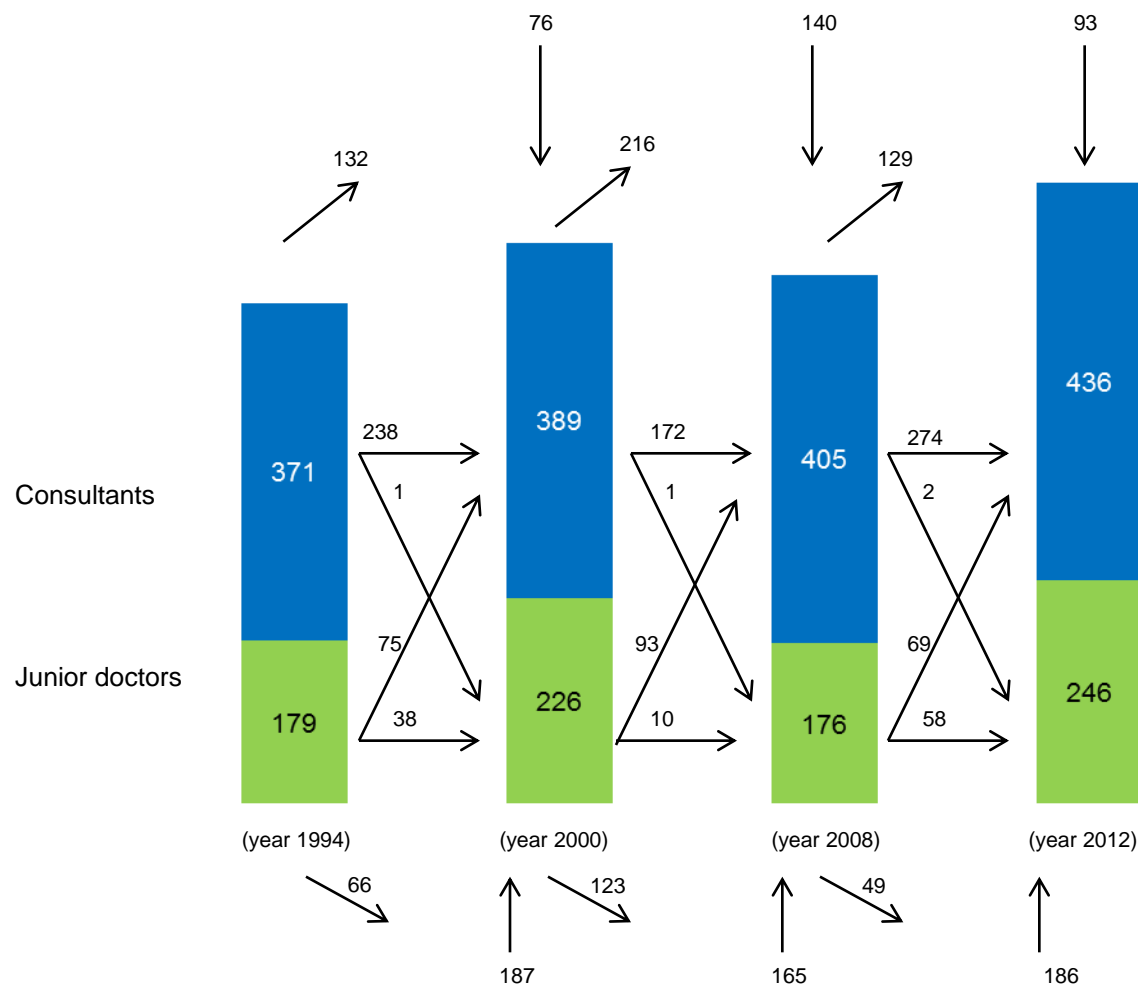


Figure 2. Average weekly working hours for consultants and junior doctors in full-time, with a 95 per cent confidence interval, 1994-2012.

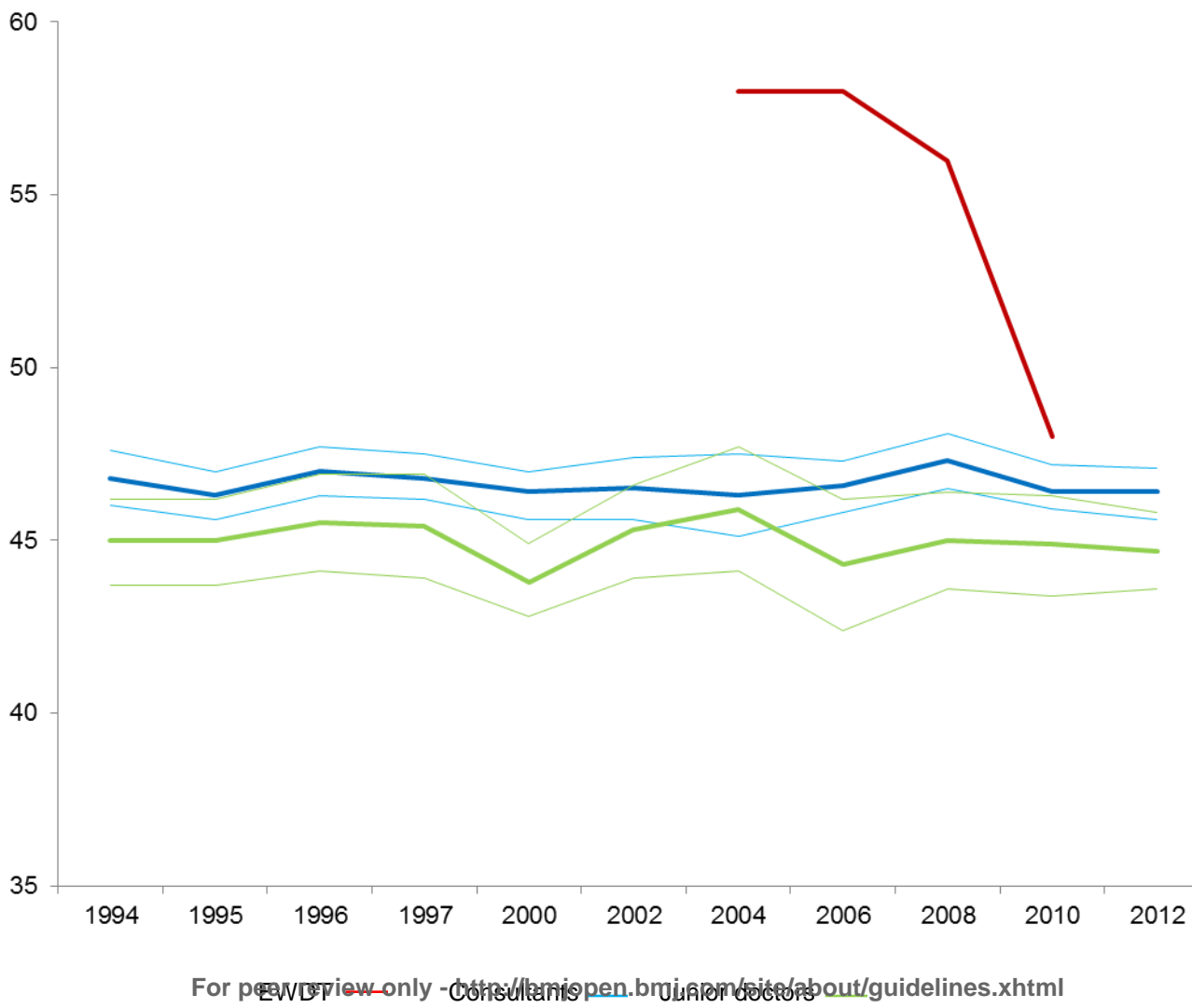


Figure 3. Average weekly working hours for female and male hospital doctors in full-time, with a 95 per cent confidence interval, 1994-2012.

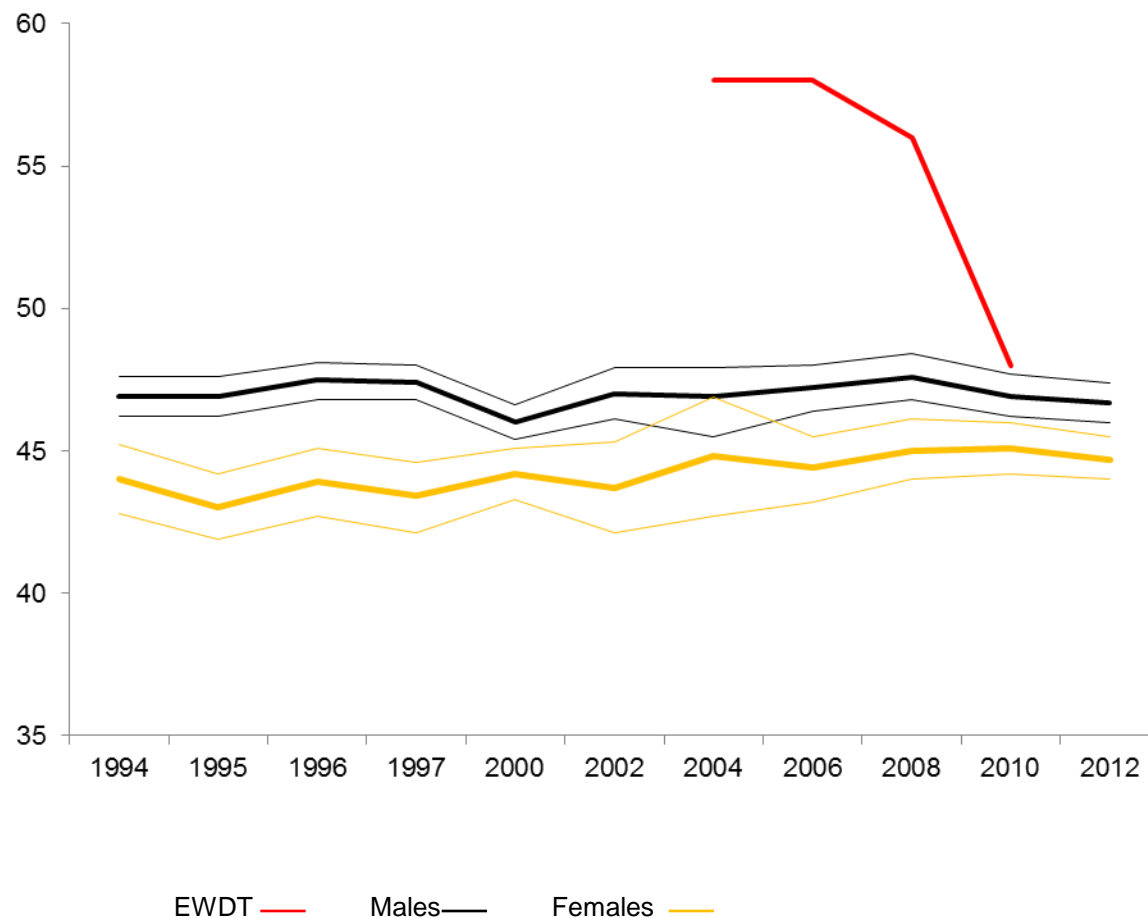
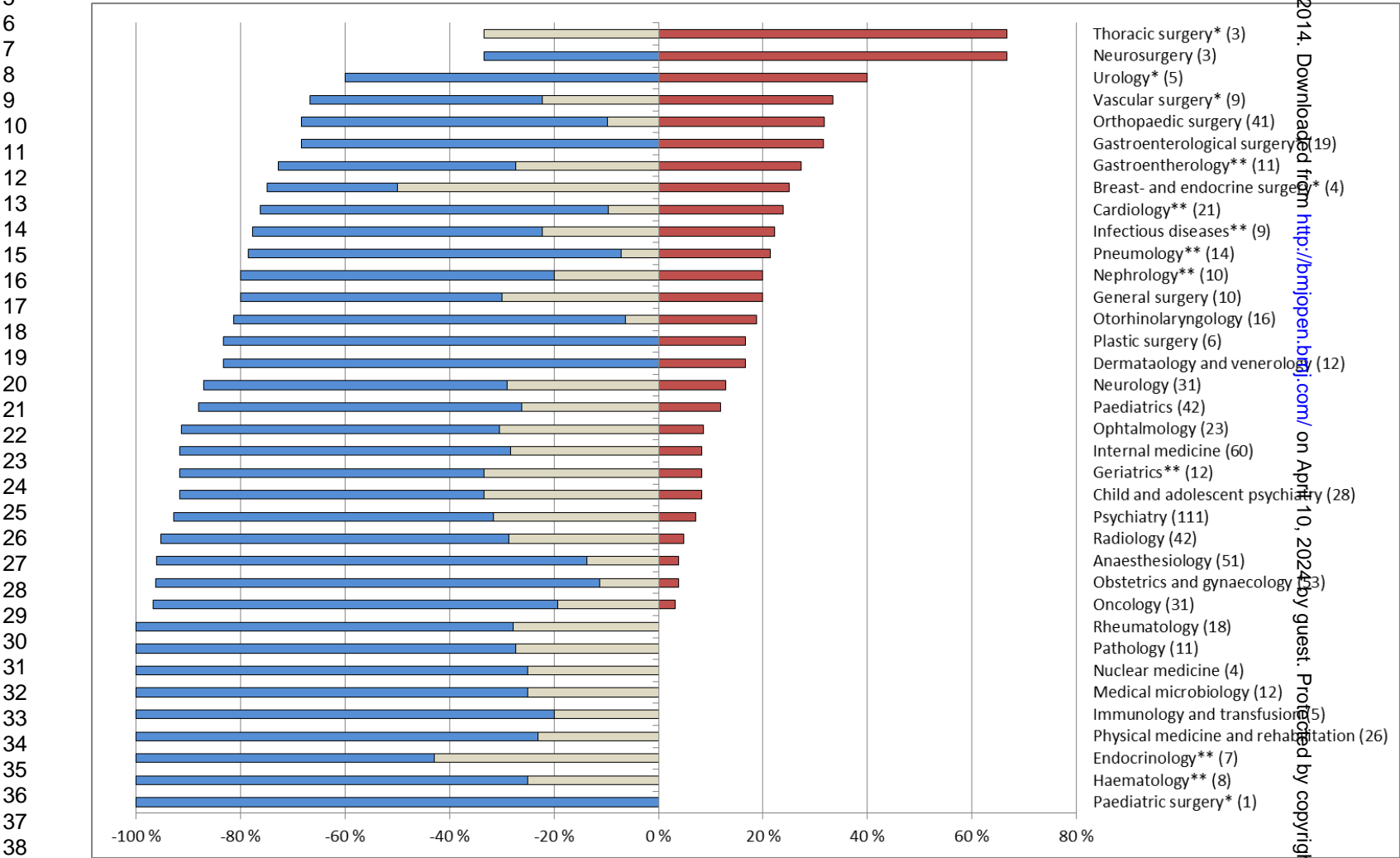


Figure 4. Proportion of different hospital-based specialties in Norway who think a 45 hour working week is about right (blue), could have been shorter (grey) and could have been longer (red) in relation to the quality of specialist training in 2012



Specialties marked * are surgical subspecialties that require 3 extra years of training after authorization in general surgery. Specialties marked ** are medical subspecialties that require 3 extra years of training after authorization in general (internal) medicine. Numbers of respondents are in parentheses.

STROBE Statement—Checklist of items

Submission to BMJ Open

Original research article

Weekly working hours for Norwegian hospital doctors since 1994 with special attention to postgraduate training, work-home balance and the European Working Time Directive: a longitudinal study

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	Item No	Recommendation	Research article Page
Title and abstract	1	(a) Indicate the study's design with a commonly used term in the title or the abstract	1-2
		(b) Provide in the abstract an informative and balanced summary of what was done and what was found	2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	4-6
Objectives	3	State specific objectives, including any prespecified hypotheses	6
Methods			
Study design	4	Present key elements of study design early in the paper	7
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	7
Participants	6	(a) Give the eligibility criteria, and the sources and methods of selection of participants	7
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	7
Data sources/measurement	8	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	8-9
Bias	9	Describe any efforts to address potential sources of bias	7
Study size	10	Explain how the study size was arrived at	7, and Table 1, Figure 1
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	7-9
Statistical methods	12	(a) Describe all statistical methods, including those used to control for confounding	9
		(b) Describe any methods used to examine subgroups and interactions	9
		(c) Explain how missing data were addressed	9
		(d) If applicable, describe analytical methods taking account of sampling strategy	N/A
		(e) Describe any sensitivity analyses	N/A

	Item Nr.	Recommendation	Page
Results			
Participants	13	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	10 and Figure 1, Table 1
		(b) Give reasons for non-participation at each stage	10, and Figure 1
		(c) Consider use of a flow diagram	N/A
Descriptive data	14	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	10, and Table 2
		(b) Indicate number of participants with missing data for each variable of interest	10, Table 2
Outcome data	15	Report numbers of outcome events or summary measures	10-11, Figure 2-3
Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	10-11
		(b) Report category boundaries when continuous variables were categorized	N/A
		(c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	N/A
Other analyses	17	Report other analyses done—eg, analyses of subgroups and interactions, and sensitivity analyses	11-13
Discussion			
Results	18	Summarise key results with reference to study objectives	13
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	18
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	13-15
Generalisability	21	Discuss the generalisability (external validity) of the study results	15-18
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	No funders

BMJ Open

Weekly working hours for Norwegian hospital doctors since 1994 with special attention to postgraduate training, work-home balance and the European Working Time Directive. A panel study

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Original investigation

Weekly working hours for Norwegian hospital doctors since 1994 with special attention to postgraduate training, work-home balance and the European Working Time Directive.

A panel study

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ABSTRACT

Objectives: To examine the weekly working hours of Norwegian hospital doctors from 1994 to 2012 with special emphasis on the quality of postgraduate training and work-home balance, and in relation to the requirements of the European Working Time Directive (EWTD).

Design: Panel study based on postal questionnaires.

Setting: Norway.

Participants: Unbalanced cohort of 1,300 to 1,600 doctors in 1994, 1995, 1996, 1997, 2000, 2002, 2004, 2006, 2008, 2010 and 2012.

Outcome measures: Self-reported total weekly working hours and whether 45 weekly working hours are too short, sufficient, or too long to meet the quality requirements of obligatory postgraduate training for junior doctors.

Results: From 1994 to 2012, the number of weekly working hours was stable for senior (46-47 hours) and junior (45-46 hours) hospital doctors. In 2012, significantly more senior (27-35%) than junior (11-20%) doctors reported sub-optimal work-home balance, defined as working more than 48 hours a week. The majority perceived the present situation with an average of 45 hours per week for juniors as sufficient for obligatory postgraduate specialist training, but doctors of higher age (OR 1.04, 95% CI 1.01-1.08), senior doctors (1.07, 1.04-1.11) and doctors working in surgical specialties (OR 1 vs. laboratory medicine 0.03, 0.01-0.25, internal medicine 0.31, 0.17-0.58, psychiatry 0.12, 0.04-0.36, paediatrics 0.36, 0.12-1.07, anaesthesiology 0.08, 0.02-0.39, gynaecology 0.07, 0.01-0.56 and others 0.39, 0.04-3.56) were more likely to want the work-week to be longer.

Conclusions: The weekly working hours of Norwegian hospital doctors were always below the EWTD requirements. A significant growth of hospital doctor density over the past two decades, national regulations and cultural values might be important factors. Speciality differences in perception of sufficient training time may call for more flexibility in working time regulations.

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1 **Strengths and limitations of this study**

2

3 • The study documents that working hours among Norwegian hospital doctors have always
4 been below the EWTD requirements.

5

6 • The representative cohort with repeated data allows for generalisation to the whole
7 population of hospital doctors in Norway.

8

9 • Self-reported working hours may deviate from the actual number of hours worked, but it is
10 not easy to judge whether the respondents are likely to overestimate or underestimate their
11 own hours.

12

13

INTRODUCTION

The question of doctors' work hours is an important public health issue. Too long hours may reduce the quality of health care, threaten patient safety and influence and affect the doctors' own health and work-home balance.^{1,2} In 2000 the European Working Time Directive (EWTD)³ signalled a gradual reduction in weekly work hours for junior doctors from a maximum of 58 hours in August 2004 to 56 hours in August 2007 and to 48 hours in August 2009. Member states could apply for further postponement of introduction of the 48 hour work week until August 2012 at the latest, but it is still possible for member states to apply their national legislation, also when it allows for more than 48 hours work weeks for doctors.⁴ A number of member states have introduced rotas to restrict the number of hours worked.^{5,6}

In the non-EU member state Norway, where doctors' working hours has been a subject for annual deliberations between employers (state, counties, hospital trusts) and the doctors through The Norwegian Medical Association since 1985, a reduction in working hours for doctors had already taken place between 1960 and 1988. The contracted basic 48 working hours from 1960 was reduced to 37.5 hours for most employees in 1987, and to 35.5-37.5 hours for junior doctors in 1988.^{7,8} Presently all full time employed junior and senior doctors have a contracted basic working week of 35.5-37.5 hours, with the possibility of a permanent 2.5 hours extension. Doctors are not obliged to work beyond this, but they can choose to extend their weekly working time to 60 hours. The working patterns is usually day-working with on-call duties, where at least 20 hours per week must be between 7am to 5pm from Monday to Friday.^{9,10}

On this background we think a more detailed description on how Norway and Norwegian doctors get along with their long standing comparatively short working weeks might be of international interest.

1 A study based on all Norwegian hospital doctors in full time shows that the numbers of planned
2 weekly working hours plus hours from overtime increased from 43.17 hours in 2001 to 45.04
3 hours in 2003 and fell to 42.76 hours in 2007.¹¹
4
5 We have surveyed a representative cohort of Norwegian doctors regularly from 1994 to 2012,
6 and one of the most central and repeated measures has been self-reported weekly working hours.
7 Studies with data from 2006 show that hospital doctors in Norway enjoy a higher level of
8 satisfaction with working time compared with Germany hospital doctors¹² and a shorter working
9 week, respectively lower proportions of doctors exceeding a 9 hours working day (27% vs. 59%)
10 and 60 hours on-call per month (18% vs. 63%).¹³ A preliminary analysis of weekly working
11 hours in 2000 and 2010 among all hospital doctors working full and part time suggests stability
12 of 45 hours for senior doctors and a slight increase from 42 hours to 43 hours for junior
13 doctors.¹⁴
14
15 Several publications from EU member states report higher weekly working hours in groups as
16 diverse as Irish junior doctors (more than 63 hours in 2013),¹⁵ general surgical trainees in The
17 Netherlands (55 hours in 2005),¹⁶ surgical residents in Switzerland (55 hours in 2005),¹⁷ most
18 consultants (>50 hours in 2005), the majority of junior doctors (56 hours in 2010) and many of
19 the medical specialist registrars with night shifts (90 hours in 2006) in the UK.¹⁸⁻²⁰ Two cross-
20 sectional studies show that weekly working hours declined but remained high in Austria (59
21 hours in 2006, 54 hours in 2013)²¹ and in Germany (57 hours in 2007, 55 hours in 2010, >48
22 hours 74% of doctors in 2013).^{22,23} A study among doctors in France demonstrates a decline in
23 working hours from 53 hours in 1977 to 48 hours in 2007.²⁴
24
25 A good balance between professional and private life is of increasing importance in modern
26 society, also for doctors. Many hospital doctors try to reduce their working hours by choosing
27 family friendly specialties with less on-call or shift duties – particularly female doctors.^{11,25-28}

1 In Norway, the majority of doctors start their postgraduate training shortly after the internship
2 period, by applying to hospital trusts for training positions. Junior doctors in hospitals have both
3 the right and duty to receive teaching and vocational training leading to their specialist
4 accreditation. According to specialty 100 to 300 course hours are also required. The content of
5 the undergone training is usually documented through course exams, procedures and skills
6 requirements, attestation forms, checklists etc., plus documented participation of at least 2 hours
7 per week in the hospital teaching program. The training typically takes 5 to 7 years. According
8 to a study of junior doctors in Norway from 1999 to 2010,²⁵ 67.9% of females and 78.7% of
9 males completed their specialization by the end of study. Hospital factors such as more
10 supervision, lower workload related to routine patient treatment and working in university
11 hospital or central hospitals reduced the time to attain the specialist qualification.

12
13 The impact of EWTD on educational opportunities for junior doctors has been widely debated
14 over the last decade.²⁹⁻³¹ Two recent publications in the UK setting suggest that doctors are
15 critical of the implementations of the EWTD. In the study with data from 2010, no doctor
16 reported that the EWTD improved training opportunities for junior doctors.³² In another study
17 with data from 2012, the majority of doctors felt that the EWTD had neither benefited junior nor
18 senior doctors. More negative views were reported by doctors in surgical specialities.³³ How
19 doctors in Norway perceive the relationship between the quality of postgraduate training for
20 junior doctors and the actual work-week, is unknown.

21
22 The main aim of the study is to describe the weekly working hours for junior hospital doctors in
23 specialisation (interns and residents) and senior hospital doctors (consultants) in Norway based
24 on panel data from 1994 to 2014, and in relation to the requirements of the EWTD. The study
25 also looks at the work-home balance and the perceived quality of postgraduate training within
26 the actual working week.

METHODS

Design and participants

Since 1994 the Institute for Studies of the Medical Profession at the Norwegian Medical Association has regularly surveyed a representative panel of active Norwegian doctors with mailed questionnaires. The original panel was based on an invitation to 2,000 active Norwegian doctors, randomly selected in 1993 from the master file of the Norwegian Medical Association, which includes almost all doctors in Norway. The 1,272 doctors who agreed to participate were representative of the total doctor work force in terms of age, sex, and specialty and place of work. Whenever new younger members were to be included, a group of randomly selected doctors were invited. The number of invitees was estimated according to the age composition of all active doctors, taking into account that only about 50% would agree to participate. In this way the unbalanced cohort has remained representative, with only negligible deviations. The cohort was supplemented with approximately 400 young doctors in 2000, 250 young doctors in 2008, and 300 in 2012. Over the same period 470 doctors have left the panel due to retirement, death, or voluntary withdrawal. The 2012 sample comprised 1,792 doctors. The response rates ranged from 67 % to 95 %. The present study is based mainly on responses from junior and senior hospital doctors. The numbers of junior and senior doctors in the 11 waves of the survey were different (Table 1).

Table 1.

As shown in Figure 1, there is a rather considerable attrition and renewal in the groups of junior and senior doctors between each round. This is because some respondents retire, withdraw from the panel or change their profession or position (for example GP, specialist in private practice, researcher or doctor in administrative function). Few senior doctors (n=4) became junior doctors, when they develop their professional career on a sub specialty or a second specialty.

Figure 1.

1 *Measurements*

2 *Weekly working hours*

3 The following question was asked at all 11 points in time: "In an average working week,
4 approximately how many hours do you spend on: Working with patients, meetings, paperwork,
5 telephones, other tasks." Graphically the time components were ordered vertically, and the
6 respondents themselves should calculate their own total number of hours. Based on respondent
7 feedback, the 2006 questionnaire was slightly revised to also single out secondary position, and
8 from 2008 to also specified time spent on on-call work and professional update like reading or
9 attending courses.

10 The questionnaire lay-out in 2012 was:

	Hours per
In an average working week, including on-call duties and any secondary position, about	week
how many hours do you spend on:	
Patient work (all direct patient or peer contacts, including telephones etc.)	<input type="text"/> <input type="text"/>
Meetings (team meetings, supervision etc.)	<input type="text"/> <input type="text"/>
Paper work, telephones, e-mails, etc.	<input type="text"/> <input type="text"/>
Professional update	<input type="text"/> <input type="text"/>
Other job-related tasks	<input type="text"/> <input type="text"/>
Sum: total number of hours per week	<input type="text"/> <input type="text"/>

12 *Work-home balance*

13 Work-home balance can be measured by different methods.^{28,34} We define working more than
14 48 hours a week on a regular basis as a sub-optimal work-home balance.³⁵

16 *Perceived quality of postgraduate training*

17 In 2012 the following question was asked: The average work-week for junior doctors is
18 approximately 44.9 hours. How do you perceive these hours in relation to the quality of

1 postgraduate medical training within your specialty? The response alternatives were: “could be
2 less”, “just about right”, and “could be more”. This question was answered both by junior and
3 senior doctors.

4
5 *Job situation and specialty*

6 In all waves of the survey we asked about job situation and medical specialty. Job situation is
7 grouped into hospital doctors (seniors and juniors), general practitioners, private practice
8 specialists, researchers, doctors in administrative positions and others. In the present article we
9 concentrate on the seniority level: senior and junior hospital doctors. Senior doctors are
10 specialists permanently employed by the hospital trusts. Junior doctors are specialists in training
11 with limited contracts with the hospital trusts. Specialists in general surgery or general internal
12 medicine usually continue on a subspecialist career, which may imply going back to junior
13 status until the subspecialty authorization is acquired.

14
15 In 2012 there were 43 different medical specialties in Norway, including five subspecialties
16 under general surgery (cardiothoracic surgery, gastroenterological surgery, paediatric surgery,
17 urology and vascular surgery) and eight under general (internal) medicine (cardiology,
18 communicable diseases, endocrinology, geriatrics, gastroenterology, haematology, renal
19 diseases and respiratory medicine). For the purpose of this study the 43 specialties are collapsed
20 into eight specialist categories: surgery, internal medicine, anaesthesiology, gynaecology,
21 paediatrics, psychiatry, laboratory medicine (including radiology and pathology) and others.

22
23 *Analysis*

24 Proportions were compared with 95% confidence intervals. General linear modelling (GLM)
25 with age as co-variate and gender and seniority level as fixed factors (ANCOVA) was used to
26 estimate weekly working hours at different points in time. Separate analyses for gender were
27 also performed. Full time work was defined as 37 hours or more per week.³⁶ Based on cross

sectional data in 2012, two multivariate logistic regression models were used. One model assessed the association of sub-optimal work-home balance (defined more than 48 hours per week) with gender, age, seniority and medical speciality. Another model estimated the simultaneous effect of gender, age, total weekly working hours, medical specialty and seniority level on the perceived quality of the postgraduate training. Units with missing data were excluded. Predictive Analytics Software Statistics 19 was used for the analyses.

RESULTS

Sample characteristics

Table 2 shows the sample characteristics and the representativeness of the sample with regard to age, gender and seniority level in 1994 and 2012.³⁷ The proportion of females increased significantly from 1994 to 2012, both in our samples and in the general hospital doctor population. The proportion of junior doctors among our respondents compared to all hospital doctors was significantly lower in 1994, while it did not differ significantly in 2012. The proportion of senior doctors was comparable in our sample and all hospital doctors in 1994, but significantly higher in our sample 2012. These differences are consequences of the unbalanced cohort design.

Table 2.

Average work-weeks

From 1994 to 2012, the majority of hospital doctors worked in full time, but the proportion of part time working doctors (with 95% CI) increased slightly among seniors (from 5.2, 2.9-7.5 to 6.5, 4.2-8.8) and significantly among juniors (from 3.4, 0.8-6.1 to 10.2, 6.4-14.0).

Figure 2 shows the estimated average number of weekly working hours for full time working senior and junior doctors controlled for gender and age. The work-week is stable over the 18

1 year period. Senior doctors report slightly longer hours (46-47 hours) than junior doctors (45-46
2 hours), but the difference is not statistically significant as judged from the 95% confidence
3 intervals (except for 2000).

4 Figure 2.

6 Figure 3 shows that full time working female hospital doctors in Norway over the whole period
7 have worked significantly fewer hours (43-45 hours) than their male colleagues (47-48 hours).
8 However, this difference is decreasing over time.

10 Figure 3.

12 We also looked at the inter-specialty differences in an average work-week (with 95% CI,
13 controlled for gender, age and seniority) for hospital doctors in 2000 and 2012 respectively,
14 before and after the effectuation data of the EWTD. The number of weekly working hours
15 remained unchanged for all specialist groups: surgical domains (47.1, 46.0-48.3 vs. 47.7, 46.3-
16 49.0), laboratory medicine (44.7, 43.4-45.9 vs. 44.7, 43.1-46.2), internal medicine (46.1, 45.3-
17 46.9 vs. 46.7, 44.9-46.5), psychiatry (43.4, 42.2-44.6 vs. 44.3, 43.1-45.6), paediatrics (45.2,
18 43.6-46.8 vs. 46.5, 44.4-48.6), anaesthesiology (46.1, 44.5-47.8 vs. 45.9, 44.1-47.7),
19 gynaecology (45.6, 43.7-47.5 vs. 46.1, 44.2-48.1) and others (45.7, 43.5-47.8 vs. 42.9, 39.8-
20 46.0). Doctors in the surgical domain had longer working weeks than doctors in other specialist
21 groups in 2000 as well as in 2012 (data not shown).

23 In 2012, the estimated average work-week (with 95% CI) for different categories of full time
24 working doctors in Norway, controlled for age and gender, was 44.7 (43.6-45.8) hours for junior
25 hospital doctors, 46.3 (45.6-45.8) for senior hospital doctors, 47.5 (45.8-49.1) for full time
26 researchers, 44.4 (42.3-46.4) for doctors in administrative positions, 47.5 (46.6-48.3) for general

1 practitioners, and 45.0 (43.1-46.9) for private practice specialists. No significant changes were
2 found from 2000 to 2012 (data not shown).

3 4 *Work-home balance*

5 From 2002 to 2012 (before and after the effectuation date of EWTD), the proportion of doctors
6 working more than 48 hours per week, our criterion for a suboptimal work-home balance,
7 decreased among junior doctors from 26 (17.5 to 34.4)% to 14.6 (10.6 to 19.8)% and increased
8 among senior doctors from 23.9 (18.1 to 29.7)% to 30.7 (26.5 to 35.3)%.

9
10 In a multivariate logistic regression model, sub-optimal work-home balance in 2012 (n=670),
11 controlled for age associated significantly with being senior doctor (2.18, 1.25-3.81), being male
12 (1.51, 1.01-2.25) and working in the surgical domain (OR=1) vs. laboratory medicine (0.37,
13 0.18-0.76), internal medicine (0.58, 0.34-0.98), psychiatry (0.37, 0.19-0.74), paediatrics (0.70,
14 0.30-1.65), anaesthesiology (0.48, 0.21-1.09), gynaecology (0.53, 0.22-1.28) and others (0.75,
15 0.17-3.31) (data not shown).

16 17 *Time for postgraduate training*

18 The majority of hospital doctors (64.2%) reported that a 45 hour work-week was sufficient for
19 securing the quality of obligatory postgraduate training for junior doctors, while a minority
20 reported that it could have been shorter (24.8%) or it could have been longer (11%) (data not
21 shown).

22
23 Table 3 shows a multivariate logistic regression model with wanting more than 45 hours a week
24 for postgraduate training as response variable. Significant associations were found with age,
25 being senior doctors and working within surgical specialty, but not with gender or total weekly
26 working hours.

Table 3.

Figure 4 shows the proportion of different hospital-based specialties in Norway who think a 45 hours' work-week is about right (blue), could have been shorter (grey) and could have been longer (red) in relation to the quality of specialist training in 2012. The variation is considerable. Doctors in most surgical specialties were more likely to report that the work-week could be longer.

Figure 4.

DISCUSSION

Main findings

Average weekly work hours for Norwegian hospital doctors have remained more or less unchanged between 1994 and 2012, and amount to approximately 46-47 hours for senior doctors and 45-46 hours for junior doctors, lower than the requirements of the EWTD, starting at 58 hours in 2004 and going down to 48 hours in 2009. In 2012, the majority of senior and junior doctors in Norway expressed that this was sufficient for the obligatory postgraduate training.

Comparison with other studies

A cross-national comparison of doctors' working hours is limited by methodological differences. However, Norwegian junior and senior doctors have clearly shorter working hours than other hospital doctors in the EU, who report between 50 and 90 hours a week during the last decade.^{6,15,16,18,19,21-23} In contrast to Norway, the weekly working hours for hospital doctors in Austria, France, Germany, and the UK all decreased after the introduction of the EWTD.^{21-24,30} Norwegian doctors also seem to have a better work-home balance. Working more than 48 hours a week was reported from 30.7% of senior and 14.6% of junior doctor in 2012, compared with 73% of German hospital doctors in 2013,²³ and 68% of UK consultants in 2005. In 2013, 36%

1 of Austrian hospital doctors worked more than 60 hours per week,²¹ compared with only 2.5%
2 in our sample in 2012.

3
4 Weekly working hours for Norwegian junior doctors is slightly shorter than for senior doctors.
5 In other European studies there is no clear pattern here.^{21,23,24} The longer working hours for male
6 doctors is more consistent.^{6,13,24,38,39} Longer work-week among seniors and male doctors is a
7 possible explanation for the significant association of sub-optimal work-home balance (defined
8 as working more than 48 hours a week) with being a male and being a senior doctor.

9
10 In comparison with most other professional groups in Norway, senior and junior doctors are
11 more likely to work longer hours, even though such a comparison must be made with caution.
12 In the OECD study from 2011 on Better Life Index, 2.8% of employed Norwegians had a
13 longer working week than 50 hours⁴⁰ compared to 28.7% of senior and 12.2% of junior doctors
14 in our sample in 2012. In a national survey from 2011,³⁶ 2% of office workers, 3% of cleaners, 4%
15 of sales and service occupations, 6% of college graduates, 7% of craftsmen, 13% of managers,
16 13% of university graduates, 13% of chauffeurs, 20% of transport workers and 42% of farmers
17 and fishermen worked more than 45 hours per week, compared to 55% of senior and 35% of
18 junior doctors in our 2012 sample.

19
20 Interestingly, the total weekly working hours in Norway for full time employed junior and
21 senior doctors that are subject to national legislations^{9,10} are similar to those of GPs and private
22 practice specialists who decide their own working hours. No comparative studies were found on
23 this issue.

24
25 In 2012, the majority of senior and junior doctors in Norway felt that the present 45 hours
26 working week is sufficient for postgraduate training. This is in accordance with a review by
27 Temple of the impact of the EWTD on the quality of training for doctors showing that a high

1 quality of training can be delivered within the framework of a 48 hour working week.³⁰ That
2 doctors in most surgical domains in our study were more likely to report that the work-week
3 could have been longer in relation to the quality of obligatory specialist training for juniors is in
4 line with a number of studies discussing the effect of working time reduction on the
5 performance of surgeons.^{29,32} Our findings that senior doctors were more inclined than junior
6 doctors to have more than 45 hours a week for postgraduate training, confirm previous studies.²⁹

7
8 *Why is Norway different?*

9 Hospital doctors' work conditions are of course closely associated with work organisation⁴¹ and
10 national directives.⁵

11
12 One of the main differences between the European and the Norwegian directives on doctors'
13 working time is the effectuation date. In Norway, a significant reduction of working hours for
14 doctors took place already between 1960 and 1988.^{8,36} Today, the contracted basic working
15 week in full time employment in Norway (35.5-40 hours) is lower than the maximum weekly
16 working week in the EWTD (48 hours). However, both the European and the Norwegian
17 directives include an opt-out option allowing for longer hours with the employee's consent. It is
18 also worth noting that working hours for junior and senior hospital doctors in Norway since
19 1985 have been decided through annual deliberations between the relevant employer and
20 employee organisations.^{7,8}

21
22 Hospital doctor density and workload influence working hours. OECD data from 2012 show a
23 density of practising doctors per 1,000 inhabitants in Norway of 3.7, higher than in most other
24 European countries, e.g. UK (2.8), Belgium (2.9), Finland (3.2), Denmark (3.5).⁴² Norwegian
25 doctor workforce statistics indicates a significant increase in practising junior doctors, from
26 2,558 in 1994 to 5,063 in 2012, and senior doctors from 3,700 in 1994 to 6,892 in 2012 (Table
27 2).³⁷ According to Statistics Norway, the number of doctors from 1990 to 2009 increased faster

1 than in any other European country, particularly hospital doctors.⁴³ Furthermore, a study of staff
2 and productivity in somatic specialist health care in 2008 suggested a lower workload for
3 hospital doctors due to more hospital doctors and less clinical productivity (measured by
4 numbers of hospital dismissals and outpatient consultations and treatments) in Norway than in
5 Denmark, Finland, Germany, and Scotland.⁴⁴

6
7 The family friendly Norwegian welfare system should also be mentioned. The Norwegian
8 legislations grant the mothers a year's leave with full pay in connection with childbirth or
9 adoption, and the fathers are entitled to an additional three months. This in itself is a strong
10 driver for shorter work-weeks.

11
12 Adherence to mandatory regulations of hospital doctors' work time varies considerably within
13 the European countries. A study on UK junior doctors' working arrangements from 2008 to
14 2010 shows that over half of the junior doctors experienced pressure to work unofficially
15 beyond the work time limit.²⁰ A survey by the Royal College of Physicians in 2004 found that
16 many junior doctors were forced to work over ninety hours during seven-night rotas.¹⁹
17 According to surveys by the German Doctors Union and the Norwegian Medical Association,
18 59% of German hospitals doctors complained about the renege on stipulated maximum working
19 hours, while only 30% of the Norwegian hospital doctors reported a pressure from the hospital
20 administrations to deviate from actual work time agreements.^{22,45} Only very few senior (2-4%)
21 and junior (1-3%) doctors in Norway ever exceed the 60 hours per week maximum (data not
22 shown).

23
24 We have shown that the difference in weekly working hours between senior and junior doctors
25 in Norway was not statistically significant, with exception of 2000. This may partly be due to
26 small differences in remuneration between senior and junior doctors. In a study from 2007,
27 immigrant German doctors in Norwegian hospitals reported better collegial teamwork and no or

1 flat hierarchy between seniors and doctors in training as reasons for coming to and staying in
2 Norway.⁴⁶ In a study with data from 2006 we have shown how Norwegian doctors compared
3 with their colleagues in German hospitals were significantly more satisfied with working hours
4 and payment.¹²
5
6 Adherence to working time regulations and a good balance between professional and private life
7 are important cultural values in Norway. In the Fourth European Working Conditions Survey,
8 Norway was found to have the second-lowest average weekly work time (39.4 hours vs. 43.2
9 hours in the UK, 41.9 hours in EU), and the lowest percentage of employees with a work-week
10 exceeding 48 hours (6% vs. 13% in the UK, 15% in the EU).^{35,47}
11
12 Even if the majority of Norwegian hospital doctors are satisfied with the present situation in
13 terms of postgraduate training, significantly more senior doctors and those doctors working in
14 the surgical domain would like longer work hours. That senior doctors were more inclined than
15 junior doctors to express the view that longer working week had benefit junior doctors might
16 suggest a “generational shift”.²⁹ According to differences between doctors in different
17 specialties, previous studies show that surgeons compared to non-surgeons have higher
18 workload, longer working hours, more night’s on-calls and stronger professional interest.^{6,11,25,48}
19 A recent study on Norwegian doctors in specialisation with data from 1999 to 2010 found the
20 highest number of working hours per week in surgery, orthopaedics, anaesthesiology and
21 internal medicine.²⁵ According to a literature review on the impact of the working time
22 regulations on medical education and training in European studies, doctors in the surgical
23 domain perceive the work week limitation largely negative on surgical training.²⁹ Important
24 elements in surgical training are based on being present and available in emergency situations,
25 which cannot always be planned. It is also often a question of having taken part in a number of
26 defined but not necessarily frequent procedures. If the training comes to a point where the junior
27 doctors too often miss important acute or emergency operations simply because they are not

present, the only remedy is more presence. In a study among surgical residents and surgical consultants in Switzerland, 60% of surgical consultants felt that surgical residents should be present longer than the work-week limitation.¹⁷ Therefore, it should be considered whether Norwegian junior doctors in surgical training should practice longer hours, at least for parts of their training.

Strengths and limitations

The study's main strength is the representative cohort with repeated data that allows for generalisation to the whole population of hospital doctors in Norway. The response rates are fairly good, ranging from 67% to 95%, which is higher than in a number of similar studies,^{6,18,20-23} but do not rule out the possibility of non-response bias. Self-reported working hours may of course deviate from the actual number of hours worked, but it is not easy to judge whether the respondents are likely to overestimate or underestimate their own hours. The expanded specification of different elements of weekly work hours - secondary positions mentioned explicitly from 2006 and on-call time and professional update from 2008 - should not affect the total number of hours worked since the questions have consistently focused on eliciting the total number of hours worked per week. The inclusions and exclusions of respondents over time, and the exchange between junior and senior doctors, is a reason for caution. Over a period of 18 years some doctors will also work in functions other than that hospital doctor. Some doctors may leave the panel due to retirement, death or voluntary withdrawal, and a few senior doctors become junior doctors if they embark on sub specialisation or want a second specialty.

Conclusion

The average weekly working hours and the proportion with sub-optimal work-home balance did not change significantly among Norwegian junior and senior doctors from 1994 to 2012. No differences were found in weekly working hours of employed hospital doctors and self-employed GPs or private practice specialists. Junior and senior hospital doctors in Norway

1 enjoy a shorter work-week than hospital doctors in several other countries. National work time
2 regulations based on deliberations, cultural values and the high and growing doctor density are
3 important causes. When the majority of Norwegian junior and senior hospital doctors report that
4 sufficient postgraduate training schemes can be executed within a 45 hour working week, it
5 lends support to the EWTD of maximum 48 hours. However, the speciality differences may call
6 for more flexibility in working time regulations, particularly among surgeons.

DECLARATIONS

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Contributors Both authors contributed to concept and design of the study, statistical analysis, interpretation of data, and writing the article. Both authors had full access to all of the data (including statistical reports and tables) in the study and can take responsibility for the integrity of the data and the accuracy of the data analysis.

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Competing interest None declared.

Ethics approval According to the Regional Committee for Medical Research Ethics, the study based on “Norwegian Physician Survey - A bi-annual prospective questionnaire survey to a representative sample of Norwegian physicians” is exempt from review in Norway, cf. §§ 4 of The Act. The project can be implemented without the approval by the Regional Committee for Medical Research Ethics (IRB 0000 1870). Additionally, approval for data protection of the bi-annual prospective survey among Norwegian doctors was obtained from the Norwegian Social Science Data Service (Reference 19521).

Data sharing statement The authors may be able to provide aggregated data on which the analysis is based, on request. No additional data available.

1 **Figure captions**

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8 **Figure 1.** Sample characteristics

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13 **Figure 2.** Average weekly working hours for senior (blue) and junior (green) hospital doctors in

14 full time, with a 95 per cent confidence interval, from 1994 to 2012 , and in relation to the

15 requirements of the EWTD (red).

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20 **Figure 3.** Average weekly working hours for female (yellow) and male (black) hospital doctors

21 in full time, with a 95 per cent confidence interval, from 1994 to 2012, and in relation to the

22 requirements of the EWTD (red).

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29 **Figure 4.** Proportion of different hospital-based specialties in Norway who think a 45 hour

30 working week is about right (blue), could have been shorter (grey) and could have been longer

31 (red) in relation to the quality of specialist training in 2012

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Specialties marked* are surgical subspecialties, that require 3 extra years of training after authorization in general surgery. Specialties marked** are medical subspecialties that require 3 extra years of training after authorization in general (internal) medicine. Numbers of respondents are in parentheses.

Table 1. The numbers, response rates and composition of the 11 waves of the survey

	sample	respondents	response rate	hospital seniors	hospital juniors	other doctors
1994	1272	1209	95.0	371	179	659
1995	1258	1145	91.0	372	166	607
1996	1287	965	75.0	374	130	461
1997	1260	951	75.5	322	86	543
2000*)	1606	1321	82.3	389	226	706
2002	1608	1174	73.0	205	104	865
2004	1499	1004	67.0	194	91	719
2006	1400	966	69.0	375	71	520
2008*)	1649	1072	65.0	405	176	491
2010	1520	1014	66.7	415	116	483
2012*)	1792	1279	71.4	436	246	597

*) young doctors added to the cohort

1 **Table 2.** **Sample characteristics and representativeness of the sample with regard to**
2 **seniority, gender and age in 1994 and 2012.**
3

	Study samples		Norway	
	1994	2012	1994	2012
All doctors (n)	1,209	1,272	11,847	23,260
Seniority (n)				
junior doctors	179	246	2,558	5,063
senior doctors	371	436	3,700	6,892
Seniority (%)				
junior doctors	14.5 (12.5 - 16.5)	19.3 (17.4 - 21.8)	22.6	21.8
senior doctors	30.7 (28.1 - 33.3)	34.3 (31.8 - 37.0)	31.2	29.6
Females (%)				
junior doctors	43.0 (40.2- 45.8)	65.4 (62.8 - 68.0)	40.2	59.2
senior doctors	18.3 (14.4 - 22.2)	39.2 (34.6 - 43.8)	15.8	37.2
Mean age (years)				
junior doctors	36.4 (35.4 - 37.5)	34.4 (33.4 - 35.5)	35.4	35.4
senior doctors	48.9 (48.2 - 49.7)	50.7 (50.0 - 51.5)	49.3	51.2

Table 3. Logistic regression with wanting more than 45 hours a week for postgraduate training in 2012 as response variable, N= 628

	OR	95% CI for OR	P
Age in years	1.04	1.01-1.08	0.014
Female (vs. male)	0.57	0.31-1.07	0.083
Total weekly working hours	1.77	0.73-4.29	0.203
Senior doctors (vs. junior doctors)	1.07	1.04-1.11	0.0001
Medical specialty, ref. surgeons			
laboratory medicine	0.03	0.00-0.25	0.001
internal medicine	0.31	0.17-0.58	0.0001
psychiatry	0.12	0.04-0.36	0.0001
pediatrics	0.36	0.12-1.07	0.066
anaesthesiology	0.08	0.02-0.39	0.002
gynaecology	0.07	0.01-0.56	0.012
other	0.39	0.04-3.56	0.401

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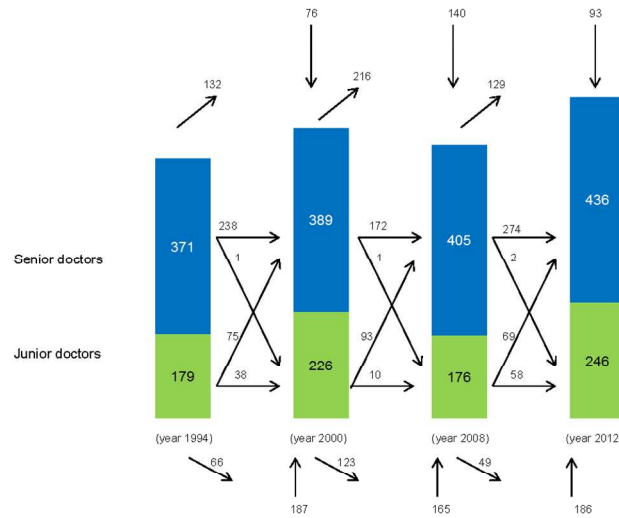
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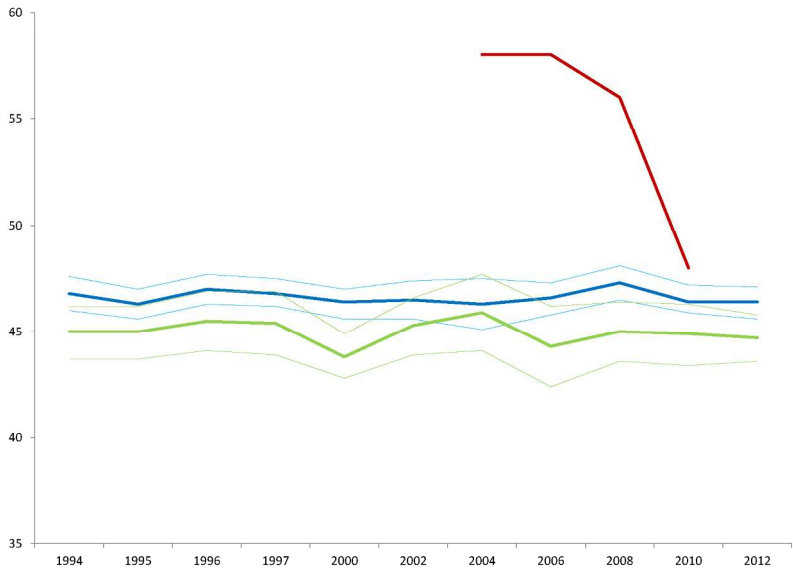
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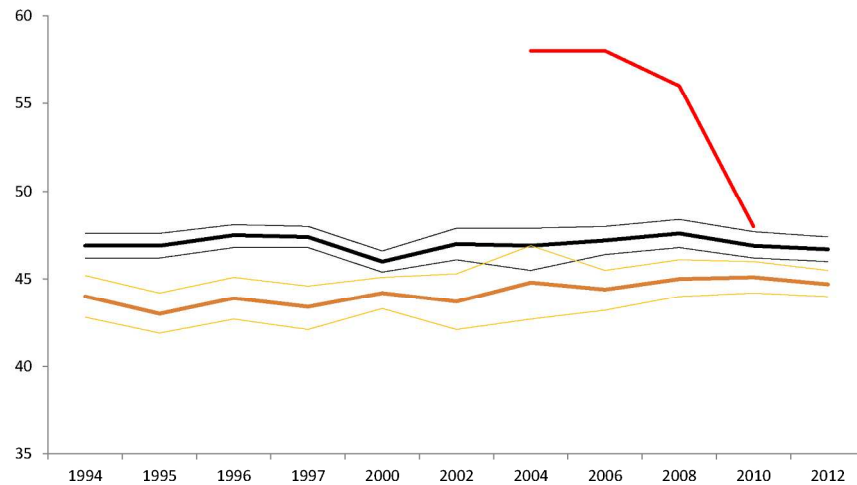
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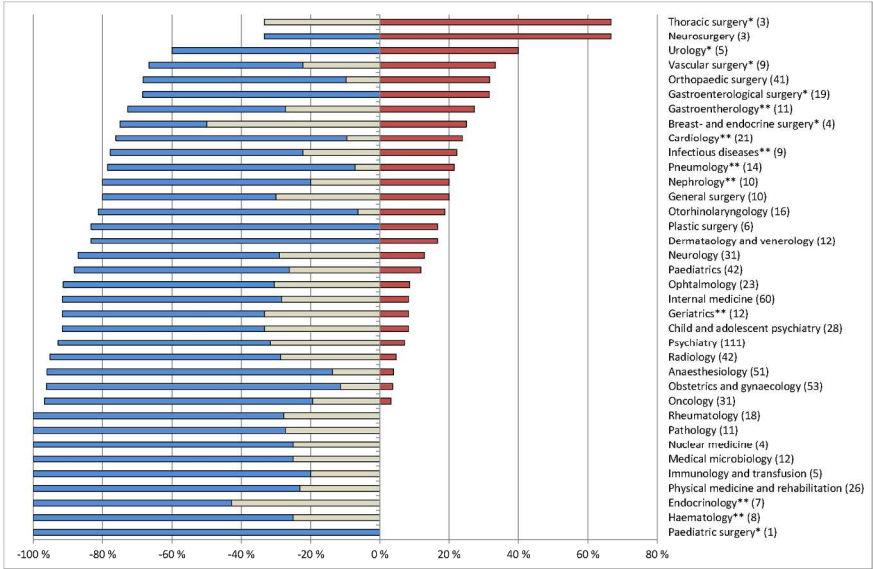
Sample characteristics
127x95mm (300 x 300 DPI)



Average weekly working hours for senior (blue) and junior (green) hospital doctors in full time, with a 95 per cent confidence interval, from 1994 to 2012 , and in relation to the requirements of the EWTD (red).
198x140mm (300 x 300 DPI)



Average weekly working hours for female (yellow) and male (black) hospital doctors in full time, with a 95 per cent confidence interval, from 1994 to 2012, and in relation to the requirements of the EWTD (red).
198x140mm (300 x 300 DPI)



Proportion of different hospital-based specialties in Norway who think a 45 hour working week is about right (blue), could have been shorter (grey) and could have been longer (red) in relation to the quality of specialist training in 2012

Specialties marked* are surgical subspecialties, that require 3 extra years of training after authorization in general surgery. Specialties marked** are medical subspecialties that require 3 extra years of training after authorization in general (internal) medicine. Numbers of respondents are in parentheses.

STROBE Statement—Checklist of items

Submission to BMJ Open

Original research article

Weekly working hours for Norwegian hospital doctors since 1994 with special attention to postgraduate training, work-home balance and the European Working Time Directive. A panel study

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	Item No	Recommendation	Research article Page
Title and abstract	1	(a) Indicate the study's design with a commonly used term in the title or the abstract	1-2
		(b) Provide in the abstract an informative and balanced summary of what was done and what was found	2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	4-6
Objectives	3	State specific objectives, including any prespecified hypotheses	6
Methods			
Study design	4	Present key elements of study design early in the paper	7
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	7
Participants	6	(a) Give the eligibility criteria, and the sources and methods of selection of participants	7
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	7
Data sources/measurement	8	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	8-9
Bias	9	Describe any efforts to address potential sources of bias	7
Study size	10	Explain how the study size was arrived at	7, and Table 1, Figure 1
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	7-9
Statistical methods	12	(a) Describe all statistical methods, including those used to control for confounding	9-10
		(b) Describe any methods used to examine subgroups and interactions	9-10
		(c) Explain how missing data were addressed	9-10
		(d) If applicable, describe analytical methods taking account of sampling strategy	N/A
		(e) Describe any sensitivity analyses	N/A

	Item Nr.	Recommendation	Page
Results			
Participants	13	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	10 and Figure 1, Table 1
		(b) Give reasons for non-participation at each stage	10, and Figure 1
		(c) Consider use of a flow diagram	N/A
Descriptive data	14	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	10, and Table 2
		(b) Indicate number of participants with missing data for each variable of interest	10, Table 2
Outcome data	15	Report numbers of outcome events or summary measures	10-11, Figure 2-3
Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	10-11
		(b) Report category boundaries when continuous variables were categorized	N/A
		(c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	N/A
Other analyses	17	Report other analyses done—eg, analyses of subgroups and interactions, and sensitivity analyses	11-13
Discussion			
Results	18	Summarise key results with reference to study objectives	13
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	18
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	13-15
Generalisability	21	Discuss the generalisability (external validity) of the study results	15-18
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	No funders

Original investigation

Weekly working hours for Norwegian hospital doctors since 1994 with special attention to postgraduate training, work-home balance and the European Working Time Directive.

A panel study

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ABSTRACT

Objectives: To examine the weekly working hours of Norwegian hospital doctors from 1994 to 2012 with special emphasis on the quality of postgraduate training and work-home balance, and in relation to the requirements of the European Working Time Directive (EWTD).

Design: Panel study based on postal questionnaires.

Setting: Norway.

Participants: Unbalanced cohort of 1,300 to 1,600 doctors in 1994, 1995, 1996, 1997, 2000, 2002, 2004, 2006, 2008, 2010 and 2012.

Outcome measures: Self-reported total weekly working hours and whether 45 weekly working hours are too short, sufficient, or too long to meet the quality requirements of obligatory postgraduate training for junior doctors.

Results: From 1994 to 2012, the number of weekly working hours was stable for senior (46-47 hours) and junior (45-46 hours) hospital doctors. In 2012, significantly more senior (27-35%) than junior (11-20%) doctors reported sub-optimal work-home balance, defined as working more than 48 hours a week. The majority perceived the present situation with an average of 45 hours per week for juniors as sufficient for obligatory postgraduate specialist training, but doctors of higher age (OR 1.04, 95% CI 1.01-1.08), senior doctors (1.07, 1.04-1.11) and doctors working in surgical specialties (OR 1 vs. laboratory medicine 0.03, 0.01-0.25, internal medicine 0.31, 0.17-0.58, psychiatry 0.12, 0.04-0.36, paediatrics 0.36, 0.12-1.07, anaesthesiology 0.08, 0.02-0.39, gynaecology 0.07, 0.01-0.56 and others 0.39, 0.04-3.56) were more likely to want the work-week to be longer.

Conclusions: The weekly working hours of Norwegian hospital doctors were always below the EWTD requirements. A significant growth of hospital doctor density over the past two decades, national regulations and cultural values might be important factors. Speciality differences in perception of sufficient training time may call for more flexibility in working time regulations.

Strengths and limitations of this study

- The study documents that working hours among Norwegian hospital doctors have always been below the EWTD requirements.
- The representative cohort with repeated data allows for generalisation to the whole population of hospital doctors in Norway.
- Self-reported working hours may deviate from the actual number of hours worked, but it is not easy to judge whether the respondents are likely to overestimate or underestimate their own hours.

INTRODUCTION

The question of doctors' work hours is an important public health issue. Too long hours may reduce the quality of health care, threaten patient safety and influence and affect the doctors' own health and work-home balance.^{1,2} In 2000 the European Working Time Directive (EWTD)³ signalled a gradual reduction in weekly work hours for junior doctors from a maximum of 58 hours in August 2004 to 56 hours in August 2007 and to 48 hours in August 2009. Member states could apply for further postponement of introduction of the 48 hour work week until August 2012 at the latest, but it is still possible for member states to apply their national legislation, also when it allows for more than 48 hours work weeks for doctors.⁴ A number of member states have introduced rotas to restrict the number of hours worked.^{5,6}

In the non-EU member state Norway, where doctors' working hours has been a subject for annual deliberations between employers (state, counties, hospital trusts) and the doctors through The Norwegian Medical Association since 1985, a reduction in working hours for doctors had already taken place between 1960 and 1988. The contracted basic 48 working hours from 1960 was reduced to 37.5 hours for most employees in 1987, and to 35.5-37.5 hours for junior doctors in 1988.^{7,8} Presently all full time employed junior and senior doctors have a contracted basic working week of 35.5-37.5 hours, with the possibility of a permanent 2.5 hours extension. Doctors are not obliged to work beyond this, but they can choose to extend their weekly working time to 60 hours. The working patterns is usually day-working with on-call duties, where at least 20 hours per week must be between 7am to 5pm from Monday to Friday.^{9,10}

On this background we think a more detailed description on how Norway and Norwegian doctors get along with their long standing comparatively short working weeks might be of international interest.

1 A study based on all Norwegian hospital doctors in full time shows that the numbers of planned
2 weekly working hours plus hours from overtime increased from 43.17 hours in 2001 to 45.04
3 hours in 2003 and fell to 42.76 hours in 2007.¹¹

4
5 We have surveyed a representative cohort of Norwegian doctors regularly from 1994 to 2012,
6 and one of the most central and repeated measures has been self-reported weekly working hours.
7 Studies with data from 2006 show that hospital doctors in Norway enjoy a higher level of
8 satisfaction with working time compared with Germany hospital doctors¹² and a shorter working
9 week, respectively lower proportions of doctors exceeding a 9 hours working day (27% vs. 59%)
10 and 60 hours on-call per month (18% vs. 63%).¹³ A preliminary analysis of weekly working
11 hours in 2000 and 2010 among all hospital doctors working full and part time suggests stability
12 of 45 hours for senior doctors and a slight increase from 42 hours to 43 hours for junior
13 doctors.¹⁴

14
15 Several publications from EU member states report higher weekly working hours in groups as
16 diverse as Irish junior doctors (more than 63 hours in 2013),¹⁵ general surgical trainees in The
17 Netherlands (55 hours in 2005),¹⁶ surgical residents in Switzerland (55 hours in 2005),¹⁷ most
18 consultants (>50 hours in 2005), the majority of junior doctors (56 hours in 2010) and many of
19 the medical specialist registrars with night shifts (90 hours in 2006) in the UK.¹⁸⁻²⁰ Two cross-
20 sectional studies show that weekly working hours declined but remained high in Austria (59
21 hours in 2006, 54 hours in 2013)²¹ and in Germany (57 hours in 2007, 55 hours in 2010, >48
22 hours 74% of doctors in 2013).^{22,23} A study among doctors in France demonstrates a decline in
23 working hours from 53 hours in 1977 to 48 hours in 2007.²⁴

24
25 A good balance between professional and private life is of increasing importance in modern
26 society, also for doctors. Many hospital doctors try to reduce their working hours by choosing
27 family friendly specialties with less on-call or shift duties – particularly female doctors.^{11,25-28}

1 In Norway, the majority of doctors start their postgraduate training shortly after the internship
2 period, by applying to hospital trusts for training positions. Junior doctors in hospitals have both
3 the right and duty to receive teaching and vocational training leading to their specialist
4 accreditation. According to specialty 100 to 300 course hours are also required. The content of
5 the undergone training is usually documented through course exams, procedures and skills
6 requirements, attestation forms, checklists etc., plus documented participation of at least 2 hours
7 per week in the hospital teaching program. The training typically takes 5 to 7 years. According
8 to a study of junior doctors in Norway from 1999 to 2010,²⁵ 67.9% of females and 78.7% of
9 males completed their specialization by the end of study. Hospital factors such as more
10 supervision, lower workload related to routine patient treatment and working in university
11 hospital or central hospitals reduced the time to attain the specialist qualification.

12
13 The impact of EWTD on educational opportunities for junior doctors has been widely debated
14 over the last decade.²⁹⁻³¹ Two recent publications in the UK setting suggest that doctors are
15 critical of the implementations of the EWTD. In the study with data from 2010, no doctor
16 reported that the EWTD improved training opportunities for junior doctors.³² In another study
17 with data from 2012, the majority of doctors felt that the EWTD had neither benefited junior nor
18 senior doctors. More negative views were reported by doctors in surgical specialities.³³ How
19 doctors in Norway perceive the relationship between the quality of postgraduate training for
20 junior doctors and the actual work-week, is unknown.

21
22 The main aim of the study is to describe the weekly working hours for junior hospital doctors in
23 specialisation (interns and residents) and senior hospital doctors (consultants) in Norway based
24 on panel data from 1994 to 2014, and in relation to the requirements of the EWTD. The study
25 also looks at the work-home balance and the perceived quality of postgraduate training within
26 the actual working week.

METHODS

Design and participants

Since 1994 the Institute for Studies of the Medical Profession at the Norwegian Medical Association has regularly surveyed a representative panel of active Norwegian doctors with mailed questionnaires. The original panel was based on an invitation to 2,000 active Norwegian doctors, randomly selected in 1993 from the master file of the Norwegian Medical Association, which includes almost all doctors in Norway. The 1,272 doctors who agreed to participate were representative of the total doctor work force in terms of age, sex, and specialty and place of work. Whenever new younger members were to be included, a group of randomly selected doctors were invited. The number of invitees was estimated according to the age composition of all active doctors, taking into account that only about 50% would agree to participate. In this way the unbalanced cohort has remained representative, with only negligible deviations. The cohort was supplemented with approximately 400 young doctors in 2000, 250 young doctors in 2008, and 300 in 2012. Over the same period 470 doctors have left the panel due to retirement, death, or voluntary withdrawal. The 2012 sample comprised 1,792 doctors. The response rates ranged from 67 % to 95 %. The present study is based mainly on responses from junior and senior hospital doctors. The numbers of junior and senior doctors in the 11 waves of the survey were different (Table 1).

Table 1.

As shown in Figure 1, there is a rather considerable attrition and renewal in the groups of junior and senior doctors between each round. This is because some respondents retire, withdraw from the panel or change their profession or position (for example GP, specialist in private practice, researcher or doctor in administrative function). Few senior doctors (n=4) became junior doctors, when they develop their professional career on a sub specialty or a second specialty.

Figure 1.

1 *Measurements*

2 *Weekly working hours*

3 The following question was asked at all 11 points in time: “In an average working week,

4 approximately how many hours do you spend on: Working with patients, meetings, paperwork,

5 telephones, other tasks.” Graphically the time components were ordered vertically, and the

6 respondents themselves should calculate their own total number of hours. Based on respondent

7 feedback, the 2006 questionnaire was slightly revised to also single out **secondary position, and**

8 **from 2008 to also specified time spent on on-call work and professional update like reading or**

9 **attending courses.**

10 The questionnaire lay-out in 2012 was:

	Hours per
In an average working week, including on-call duties and any secondary position , about	week
how many hours do you spend on:	
Patient work (all direct patient or peer contacts, including telephones etc.)	<input type="text"/> <input type="text"/>
Meetings (team meetings, supervision etc.)	<input type="text"/> <input type="text"/>
Paper work, telephones, e-mails, etc.	<input type="text"/> <input type="text"/>
Professional update	<input type="text"/> <input type="text"/>
Other job-related tasks	<input type="text"/> <input type="text"/>
Sum: total number of hours per week	<input type="text"/> <input type="text"/>

11

12 *Work-home balance*

13 Work-home balance can be measured by different methods.^{28,34} We define working more than

14 48 hours a week on a regular basis as a sub-optimal work-home balance.³⁵

15

16 *Perceived quality of postgraduate training*

17 In 2012 the following question was asked: The average work-week for junior doctors is

18 approximately 44.9 hours. How do you perceive these hours in relation to the quality of

1 postgraduate medical training within your specialty? The response alternatives were: “could be
2 less”, “just about right”, and “could be more”. This question was answered both by junior and
3 senior doctors.

4 5 *Job situation and specialty*

6 In all waves of the survey we asked about job situation and medical specialty. Job situation is
7 grouped into hospital doctors (seniors and juniors), general practitioners, private practice
8 specialists, researchers, doctors in administrative positions and others. In the present article we
9 concentrate on the seniority level: senior and junior hospital doctors. Senior doctors are
10 specialists permanently employed by the hospital trusts. Junior doctors are specialists in training
11 with limited contracts with the hospital trusts. Specialists in general surgery or general internal
12 medicine usually continue on a subspecialist career, which may imply going back to junior
13 status until the subspecialty authorization is acquired.

14
15 In 2012 there were 43 different medical specialties in Norway, including five subspecialties
16 under general surgery (cardiothoracic surgery, gastroenterological surgery, paediatric surgery,
17 urology and vascular surgery) and eight under general (internal) medicine (cardiology,
18 communicable diseases, endocrinology, geriatrics, gastroenterology, haematology, renal
19 diseases and respiratory medicine). For the purpose of this study the 43 specialties are collapsed
20 into eight specialist categories: surgery, internal medicine, anaesthesiology, gynaecology,
21 paediatrics, psychiatry, laboratory medicine (including radiology and pathology) and others.

22 23 *Analysis*

24 Proportions were compared with 95% confidence intervals. General linear modelling (GLM)
25 with age as co-variate and gender and seniority level as fixed factors (ANCOVA) was used to
26 estimate weekly working hours at different points in time. Separate analyses for gender were
27 also performed. Full time work was defined as 37 hours or more per week.³⁶ Based on cross

sectional data in 2012, two multivariate logistic regression models were used. One model assessed the association of sub-optimal work-home balance (defined more than 48 hours per week) with gender, age, seniority and medical speciality. Another model estimated the simultaneous effect of gender, age, total weekly working hours, medical specialty and seniority level on the perceived quality of the postgraduate training. Units with missing data were excluded. Predictive Analytics Software Statistics 19 was used for the analyses.

RESULTS

Sample characteristics

Table 2 shows the sample characteristics and the representativeness of the sample with regard to age, gender and seniority level in 1994 and 2012.³⁷ The proportion of females increased significantly from 1994 to 2012, both in our samples and in the general hospital doctor population. The proportion of junior doctors among our respondents compared to all hospital doctors was significantly lower in 1994, while it did not differ significantly in 2012. The proportion of senior doctors was comparable in our sample and all hospital doctors in 1994, but significantly higher in our sample 2012. These differences are consequences of the unbalanced cohort design.

Table 2.

Average work-weeks

From 1994 to 2012, the majority of hospital doctors worked in full time, but the proportion of part time working doctors (with 95% CI) increased slightly among seniors (from 5.2, 2.9-7.5 to 6.5, 4.2-8.8) and significantly among juniors (from 3.4, 0.8-6.1 to 10.2, 6.4-14.0).

Figure 2 shows the estimated average number of weekly working hours for full time working senior and junior doctors controlled for gender and age. The work-week is stable over the 18

1 year period. Senior doctors report slightly longer hours (46-47 hours) than junior doctors (45-46 hours), but the difference is not statistically significant as judged from the 95% confidence intervals (except for 2000).

Figure 2.

Figure 3 shows that full time working female hospital doctors in Norway over the whole period have worked significantly fewer hours (43-45 hours) than their male colleagues (47-48 hours). However, this difference is decreasing over time.

Figure 3.

We also looked at the inter-specialty differences in an average work-week (with 95% CI, controlled for gender, age and seniority) for hospital doctors in 2000 and 2012 respectively, before and after the effectuation data of the EWTD. The number of weekly working hours remained unchanged for all specialist groups: surgical domains (47.1, 46.0-48.3 vs. 47.7, 46.3-49.0), laboratory medicine (44.7, 43.4-45.9 vs. 44.7, 43.1-46.2), internal medicine (46.1, 45.3-46.9 vs. 46.7, 44.9-46.5), psychiatry (43.4, 42.2-44.6 vs. 44.3, 43.1-45.6), paediatrics (45.2, 43.6-46.8 vs. 46.5, 44.4-48.6), anaesthesiology (46.1, 44.5-47.8 vs. 45.9, 44.1-47.7), gynaecology (45.6, 43.7-47.5 vs. 46.1, 44.2-48.1) and others (45.7, 43.5-47.8 vs. 42.9, 39.8-46.0). Doctors in the surgical domain had longer working weeks than doctors in other specialist groups in 2000 as well as in 2012 (data not shown).

In 2012, the estimated average work-week (with 95% CI) for different categories of full time working doctors in Norway, controlled for age and gender, was 44.7 (43.6-45.8) hours for junior hospital doctors, 46.3 (45.6-45.8) for senior hospital doctors, 47.5 (45.8-49.1) for full time researchers, 44.4 (42.3-46.4) for doctors in administrative positions, 47.5 (46.6-48.3) for general

1 practitioners, and 45.0 (43.1-46.9) for private practice specialists. No significant changes were
2 found from 2000 to 2012 (data not shown).

3
4 *Work-home balance*

5 From 2002 to 2012 (before and after the effectuation date of EWTD), the proportion of doctors
6 working more than 48 hours per week, our criterion for a suboptimal work-home balance,
7 decreased among junior doctors from 26 (17.5 to 34.4)% to 14.6 (10.6 to 19.8)% and increased
8 among senior doctors from 23.9 (18.1 to 29.7)% to 30.7 (26.5 to 35.3)%.

9
10 In a multivariate logistic regression model, sub-optimal work-home balance in 2012 (n=670),
11 controlled for age associated significantly with being senior doctor (2.18, 1.25-3.81), being male
12 (1.51, 1.01-2.25) and working in the surgical domain (OR=1) vs. laboratory medicine (0.37,
13 0.18-0.76), internal medicine (0.58, 0.34-0.98), psychiatry (0.37, 0.19-0.74), paediatrics (0.70,
14 0.30-1.65), anaesthesiology (0.48, 0.21-1.09), gynaecology (0.53, 0.22-1.28) and others (0.75,
15 0.17-3.31) (data not shown).

16
17 *Time for postgraduate training*

18 The majority of hospital doctors (64.2%) reported that a 45 hour work-week was sufficient for
19 securing the quality of obligatory postgraduate training for junior doctors, while a minority
20 reported that it could have been shorter (24.8%) or it could have been longer (11%) (data not
21 shown).

22
23 Table 3 shows a multivariate logistic regression model with wanting more than 45 hours a week
24 for postgraduate training as response variable. Significant associations were found with age,
25 being senior doctors and working within surgical specialty, but not with gender or total weekly
26 working hours.

Table 3.

Figure 4 shows the proportion of different hospital-based specialties in Norway who think a 45 hours' work-week is about right (blue), could have been shorter (grey) and could have been longer (red) in relation to the quality of specialist training in 2012. The variation is considerable. Doctors in most surgical specialties were more likely to report that the work-week could be longer.

Figure 4.

DISCUSSION

Main findings

Average weekly work hours for Norwegian hospital doctors have remained more or less unchanged between 1994 and 2012, and amount to approximately 46-47 hours for senior doctors and 45-46 hours for junior doctors, lower than the requirements of the EWTD, starting at 58 hours in 2004 and going down to 48 hours in 2009. In 2012, the majority of senior and junior doctors in Norway expressed that this was sufficient for the obligatory postgraduate training.

Comparison with other studies

A cross-national comparison of doctors' working hours is limited by methodological differences. However, Norwegian junior and senior doctors have clearly shorter working hours than other hospital doctors in the EU, who report between 50 and 90 hours a week during the last decade.^{6,15,16,18,19,21-23} In contrast to Norway, the weekly working hours for hospital doctors in Austria, France, Germany, and the UK all decreased after the introduction of the EWTD.^{21-24,30} Norwegian doctors also seem to have a better work-home balance. Working more than 48 hours a week was reported from 30.7% of senior and 14.6% of junior doctor in 2012, compared with 73% of German hospital doctors in 2013,²³ and 68% of UK consultants in 2005. In 2013, 36%

1 of Austrian hospital doctors worked more than 60 hours per week,²¹ compared with only 2.5%
2 in our sample in 2012.
3
4 Weekly working hours for Norwegian junior doctors is slightly shorter than for senior doctors.
5 In other European studies there is no clear pattern here.^{21,23,24} The longer working hours for male
6 doctors is more consistent.^{6,13,24,38,39} Longer work-week among seniors and male doctors is a
7 possible explanation for the significant association of sub-optimal work-home balance (defined
8 as working more than 48 hours a week) with being a male and being a senior doctor.
9
10 In comparison with most other professional groups in Norway, senior and junior doctors are
11 more likely to work longer hours, even though such a comparison must be made with caution.
12 In the OECD study from 2011 on Better Life Index, 2.8% of employed Norwegians had a
13 longer working week than 50 hours⁴⁰ compared to 28.7% of senior and 12.2% of junior doctors
14 in our sample in 2012. In a national survey from 2011,³⁶ 2% of office workers, 3% of cleaners, 4%
15 of sales and service occupations, 6% of college graduates, 7% of craftsmen, 13% of managers,
16 13% of university graduates, 13% of chauffeurs, 20% of transport workers and 42% of farmers
17 and fishermen worked more than 45 hours per week, compared to 55% of senior and 35% of
18 junior doctors in our 2012 sample.
19
20 Interestingly, the total weekly working hours in Norway for full time employed junior and
21 senior doctors that are subject to national legislations^{9,10} are similar to those of GPs and private
22 practice specialists who decide their own working hours. No comparative studies were found on
23 this issue.
24
25 In 2012, the majority of senior and junior doctors in Norway felt that the present 45 hours
26 working week is sufficient for postgraduate training. This is in accordance with a review by
27 Temple of the impact of the EWTD on the quality of training for doctors showing that a high

quality of training can be delivered within the framework of a 48 hour working week.³⁰ That doctors in most surgical domains in our study were more likely to report that the work-week could have been longer in relation to the quality of obligatory specialist training for juniors is in line with a number of studies discussing the effect of working time reduction on the performance of surgeons.^{29,32}

Our findings that senior doctors were more inclined than junior doctors to have more than 45 hours a week for postgraduate training, confirm previous studies.²⁹

Why is Norway different?

Hospital doctors' work conditions are of course closely associated with work organisation⁴¹ and national directives.⁵

One of the main differences between the European and the Norwegian directives on doctors' working time is the effectuation date. In Norway, a significant reduction of working hours for doctors took place already between 1960 and 1988.^{8,36} Today, the contracted basic working week in full time employment in Norway (35.5-40 hours) is lower than the maximum weekly working week in the EWTD (48 hours). However, both the European and the Norwegian directives include an opt-out option allowing for longer hours with the employee's consent. It is also worth noting that working hours for junior and senior hospital doctors in Norway since 1985 have been decided through annual deliberations between the relevant employer and employee organisations.^{7,8}

Hospital doctor density and workload influence working hours. OECD data from 2012 show a density of practising doctors per 1,000 inhabitants in Norway of 3.7, higher than in most other European countries, e.g. UK (2.8), Belgium (2.9), Finland (3.2), Denmark (3.5).⁴² Norwegian doctor workforce statistics indicates a significant increase in practising junior doctors, from 2,558 in 1994 to 5,063 in 2012, and senior doctors from 3,700 in 1994 to 6,892 in 2012 (Table 2).³⁷ According to Statistics Norway, the number of doctors from 1990 to 2009 increased faster

1 than in any other European country, particularly hospital doctors.⁴³ Furthermore, a study of staff
2 and productivity in somatic specialist health care in 2008 suggested a lower workload for
3 hospital doctors due to more hospital doctors and less clinical productivity (measured by
4 numbers of hospital dismissals and outpatient consultations and treatments) in Norway than in
5 Denmark, Finland, Germany, and Scotland.⁴⁴

6
7 The family friendly Norwegian welfare system should also be mentioned. The Norwegian
8 legislations grant the mothers a year's leave with full pay in connection with childbirth or
9 adoption, and the fathers are entitled to an additional three months. This in itself is a strong
10 driver for shorter work-weeks.

11
12 Adherence to mandatory regulations of hospital doctors' work time varies considerably within
13 the European countries. A study on UK junior doctors' working arrangements from 2008 to
14 2010 shows that over half of the junior doctors experienced pressure to work unofficially
15 beyond the work time limit.²⁰ A survey by the Royal College of Physicians in 2004 found that
16 many junior doctors were forced to work over ninety hours during seven-night rotas.¹⁹
17 According to surveys by the German Doctors Union and the Norwegian Medical Association,
18 59% of German hospitals doctors complained about the renege on stipulated maximum working
19 hours, while only 30% of the Norwegian hospital doctors reported a pressure from the hospital
20 administrations to deviate from actual work time agreements.^{22,45} Only very few senior (2-4%)
21 and junior (1-3%) doctors in Norway ever exceed the 60 hours per week maximum (data not
22 shown).

23
24 We have shown that the difference in weekly working hours between senior and junior doctors
25 in Norway was not statistically significant, with exception of 2000. This may partly be due to
26 small differences in remuneration between senior and junior doctors. In a study from 2007,
27 immigrant German doctors in Norwegian hospitals reported better collegial teamwork and no or

1 flat hierarchy between seniors and doctors in training as reasons for coming to and staying in
2 Norway.⁴⁶ In a study with data from 2006 we have shown how Norwegian doctors compared
3 with their colleagues in German hospitals were significantly more satisfied with working hours
4 and payment.¹²

5
6 Adherence to working time regulations and a good balance between professional and private life
7 are important cultural values in Norway. In the Fourth European Working Conditions Survey,
8 Norway was found to have the second-lowest average weekly work time (39.4 hours vs. 43.2
9 hours in the UK, 41.9 hours in EU), and the lowest percentage of employees with a work-week
10 exceeding 48 hours (6% vs. 13% in the UK, 15% in the EU).^{35,47}

11
12 Even if the majority of Norwegian hospital doctors are satisfied with the present situation in
13 terms of postgraduate training, significantly more senior doctors and those doctors working in
14 the surgical domain would like longer work hours. That senior doctors were more inclined than
15 junior doctors to express the view that longer working week had benefit junior doctors might
16 suggest a “generational shift”.²⁹ According to differences between doctors in different
17 specialties, previous studies show that surgeons compared to non-surgeons have higher
18 workload, longer working hours, more night’s on-calls and stronger professional interest.^{6,11,25,48}

19 A recent study on Norwegian doctors in specialisation with data from 1999 to 2010 found the
20 highest number of working hours per week in surgery, orthopaedics, anaesthesiology and
21 internal medicine.²⁵ According to a literature review on the impact of the working time
22 regulations on medical education and training in European studies, doctors in the surgical
23 domain perceive the work week limitation largely negative on surgical training.²⁹ Important
24 elements in surgical training are based on being present and available in emergency situations,
25 which cannot always be planned. It is also often a question of having taken part in a number of
26 defined but not necessarily frequent procedures. If the training comes to a point where the junior
27 doctors too often miss important acute or emergency operations simply because they are not

1 present, the only remedy is more presence. In a study among surgical residents and surgical
2 consultants in Switzerland, 60% of surgical consultants felt that surgical residents should be
3 present longer than the work-week limitation.¹⁷ Therefore, it should be considered whether
4 Norwegian junior doctors in surgical training should practice longer hours, at least for parts of
5 their training.

6
7 *Strengths and limitations*

8 The study's main strength is the representative cohort with repeated data that allows for
9 generalisation to the whole population of hospital doctors in Norway. The response rates are
10 fairly good, ranging from 67% to 95%, which is higher than in a number of similar studies,^{6,18,20-}
11 ²³ but do not rule out the possibility of non-response bias. Self-reported working hours may of
12 course deviate from the actual number of hours worked, but it is not easy to judge whether the
13 respondents are likely to overestimate or underestimate their own hours. The expanded
14 specification of different elements of weekly work hours - secondary positions mentioned
15 explicitly from 2006 and on-call time and professional update from 2008 - should not affect the
16 total number of hours worked since the questions have consistently focused on eliciting the total
17 number of hours worked per week. The inclusions and exclusions of respondents over time, and
18 the exchange between junior and senior doctors, is a reason for caution. Over a period of 18
19 years some doctors will also work in functions other than that hospital doctor. Some doctors
20 may leave the panel due to retirement, death or voluntary withdrawal, and a few senior doctors
21 become junior doctors if they embark on sub specialisation or want a second specialty.

22
23 *Conclusion*

24 The average weekly working hours and the proportion with sub-optimal work-home balance did
25 not change significantly among Norwegian junior and senior doctors from 1994 to 2012. No
26 differences were found in weekly working hours of employed hospital doctors and self-
27 employed GPs or private practice specialists. Junior and senior hospital doctors in Norway

1 enjoy a shorter work-week than hospital doctors in several other countries. National work time
2 regulations based on deliberations, cultural values and the high and growing doctor density are
3 important causes. When the majority of Norwegian junior and senior hospital doctors report that
4 sufficient postgraduate training schemes can be executed within a 45 hour working week, it
5 lends support to the EWTD of maximum 48 hours. However, the speciality differences may call
6 for more flexibility in working time regulations, particularly among surgeons.

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DECLARATIONS

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Contributors JR and OGA designed the study and did the statistical analysis. JR undertook the literature review and wrote the first draft. OGA made critical revisions. Both authors had full access to all of the data (including statistical reports and tables) and are jointly responsible for the integrity of the data and the accuracy of the data analysis.

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Competing interest None declared.

Ethics approval According to the Regional Committee for Medical Research Ethics, the study based on “Norwegian Physician Survey - A bi-annual prospective questionnaire survey to a representative sample of Norwegian physicians” is exempt from review in Norway, cf. §§ 4 of The Act. The project can be implemented without the approval by the Regional Committee for Medical Research Ethics (IRB 0000 1870). Additionally, approval for data protection of the bi-annual prospective survey among Norwegian doctors was obtained from the Norwegian Social Science Data Service (Reference 19521).

Data sharing statement The authors may be able to provide aggregated data on which the analysis is based, on request. No additional data available.

Figure captions

Figure 1. Sample characteristics

Figure 2. Average weekly working hours for senior (blue) and junior (green) hospital doctors in full time, with a 95 per cent confidence interval, from 1994 to 2012 , and in relation to the requirements of the EWTD (red).

Figure 3. Average weekly working hours for female (yellow) and male (black) hospital doctors in full time, with a 95 per cent confidence interval, from 1994 to 2012, and in relation to the requirements of the EWTD (red).

Figure 4. Proportion of different hospital-based specialties in Norway who think a 45 hour working week is about right (blue), could have been shorter (grey) and could have been longer (red) in relation to the quality of specialist training in 2012

Specialties marked* are surgical subspecialties, that require 3 extra years of training after authorization in general surgery. Specialties marked** are medical subspecialties that require 3 extra years of training after authorization in general (internal) medicine. Numbers of respondents are in parentheses.

1 **Table 1. The numbers, response rates and composition of the 11 waves of the survey**

2

	sample	respondents	response rate	hospital seniors	hospital juniors	other doctors
1994	1272	1209	95.0	371	179	659
1995	1258	1145	91.0	372	166	607
1996	1287	965	75.0	374	130	461
1997	1260	951	75.5	322	86	543
2000*)	1606	1321	82.3	389	226	706
2002	1608	1174	73.0	205	104	865
2004	1499	1004	67.0	194	91	719
2006	1400	966	69.0	375	71	520
2008*)	1649	1072	65.0	405	176	491
2010	1520	1014	66.7	415	116	483
2012*)	1792	1279	71.4	436	246	597

3

4 *) young doctors added to the cohort

5

6

Table 2. Sample characteristics and representativeness of the sample with regard to seniority, gender and age in 1994 and 2012.

	Study samples		Norway	
	1994	2012	1994	2012
All doctors (n)	1,209	1,272	11,847	23,260
Seniority (n)				
junior doctors	179	246	2,558	5,063
senior doctors	371	436	3,700	6,892
Seniority (%)				
junior doctors	14.5 (12.5 - 16.5)	19.3 (17.4 - 21.8)	22.6	21.8
senior doctors	30.7 (28.1 - 33.3)	34.3 (31.8 - 37.0)	31.2	29.6
Females (%)				
junior doctors	43.0 (40.2 - 45.8)	65.4 (62.8 - 68.0)	40.2	59.2
senior doctors	18.3 (14.4 - 22.2)	39.2 (34.6 - 43.8)	15.8	37.2
Mean age (years)				
junior doctors	36.4 (35.4 - 37.5)	34.4 (33.4 - 35.5)	35.4	35.4
senior doctors	48.9 (48.2 - 49.7)	50.7 (50.0 - 51.5)	49.3	51.2

Table 3. Logistic regression with wanting more than 45 hours a week for postgraduate training in 2012 as response variable, N= 628

	OR	95% CI for OR	P
Age in years	1.04	1.01-1.08	0.014
Female (vs. male)	0.57	0.31-1.07	0.083
Total weekly working hours	1.77	0.73-4.29	0.203
Senior doctors (vs. junior doctors)	1.07	1.04-1.11	0.0001
Medical specialty, ref. surgeons			
laboratory medicine	0.03	0.00-0.25	0.001
internal medicine	0.31	0.17-0.58	0.0001
psychiatry	0.12	0.04-0.36	0.0001
pediatrics	0.36	0.12-1.07	0.066
anaesthesiology	0.08	0.02-0.39	0.002
gynaecology	0.07	0.01-0.56	0.012
other	0.39	0.04-3.56	0.401

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Weekly working hours for Norwegian hospital doctors since 1994 with special attention to postgraduate training, work-home balance and the European Working Time Directive. A panel study

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8 3 **Weekly working hours for Norwegian hospital doctors since 1994 with special attention to**
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10 4 **postgraduate training, work-home balance and the European Working Time Directive.**

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16 7 **A panel study**

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ABSTRACT

Objectives: To examine the weekly working hours of Norwegian hospital doctors from 1994 to 2012 with special emphasis on the quality of postgraduate training and work-home balance, and in relation to the requirements of the European Working Time Directive (EWTD).

Design: Panel study based on postal questionnaires.

Setting: Norway.

Participants: Unbalanced cohort of 1,300 to 1,600 doctors in 1994, 1995, 1996, 1997, 2000, 2002, 2004, 2006, 2008, 2010 and 2012.

Outcome measures: Self-reported total weekly working hours and whether 45 weekly working hours are too short, sufficient, or too long to meet the quality requirements of obligatory postgraduate training for junior doctors.

Results: From 1994 to 2012, the number of weekly working hours was stable for senior (46-47 hours) and junior (45-46 hours) hospital doctors. In 2012, significantly more senior (27-35%) than junior (11-20%) doctors reported sub-optimal work-home balance, defined as working more than 48 hours a week. The majority perceived the present situation with an average of 45 hours per week for juniors as sufficient for obligatory postgraduate specialist training, but doctors of higher age (OR 1.04, 95% CI 1.01-1.08), senior doctors (1.07, 1.04-1.11) and doctors working in surgical specialties (OR 1 vs. laboratory medicine 0.03, 0.01-0.25, internal medicine 0.31, 0.17-0.58, psychiatry 0.12, 0.04-0.36, paediatrics 0.36, 0.12-1.07, anaesthesiology 0.08, 0.02-0.39, gynaecology 0.07, 0.01-0.56 and others 0.39, 0.04-3.56) were more likely to want the work-week to be longer.

Conclusions: The weekly working hours of Norwegian hospital doctors were always below the EWTD requirements. A significant growth of hospital doctor density over the past two decades, national regulations and cultural values might be important factors. Speciality differences in perception of sufficient training time may call for more flexibility in working time regulations.

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1 **Strengths and limitations of this study**

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3 • The study documents that working hours among Norwegian hospital doctors have always
4 been below the EWTD requirements.

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6 • The representative cohort with repeated data allows for generalisation to the whole
7 population of hospital doctors in Norway.

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9 • Self-reported working hours may deviate from the actual number of hours worked, but it is
10 not easy to judge whether the respondents are likely to overestimate or underestimate their
11 own hours.

12

13

INTRODUCTION

The question of doctors' work hours is an important public health issue. Too long hours may reduce the quality of health care, threaten patient safety and influence and affect the doctors' own health and work-home balance.^{1,2} In 2000 the European Working Time Directive (EWTD)³ signalled a gradual reduction in weekly work hours for junior doctors from a maximum of 58 hours in August 2004 to 56 hours in August 2007 and to 48 hours in August 2009. Member states could apply for further postponement of introduction of the 48 hour work-week until August 2012 at the latest, but it is still possible for member states to apply their national legislation, also when it allows for more than 48 hours work weeks for doctors.⁴ A number of member states have introduced rotas to restrict the number of hours worked.^{5,6}

In the non-EU member state Norway, where doctors' working hours has been a subject for annual deliberations between employers (state, counties, hospital trusts) and the doctors through The Norwegian Medical Association since 1985, a reduction in working hours for doctors had already taken place between 1960 and 1988. The contracted basic 48 working hours from 1960 was reduced to 37.5 hours for most employees in 1987, and to 35.5-37.5 hours for doctors in 1988.^{7,8} Presently all full time employed junior and senior doctors have a contracted basic working week of 35.5-37.5 hours, with the possibility of a permanent 2.5 hours extension. Doctors are not obliged to work beyond this, but they can choose to extend their weekly working time to 60 hours. The working patterns is usually day-working with on-call duties, where at least 20 hours per week must be between 7am to 5pm from Monday to Friday.^{9,10}

On this background we think a more detailed description on how Norway and Norwegian doctors get along with their long standing comparatively short working weeks might be of international interest.

1 A study based on all Norwegian hospital doctors in full time shows that the numbers of planned
2 weekly working hours plus hours from overtime increased from 43.17 hours in 2001 to 45.04
3 hours in 2003 and fell to 42.76 hours in 2007.¹¹
4
5 We have surveyed a representative cohort of Norwegian doctors regularly from 1994 to 2012,
6 and one of the most central and repeated measures has been self-reported weekly working hours.
7 Studies with data from 2006 show that hospital doctors in Norway enjoy a higher level of
8 satisfaction with working time compared with Germany hospital doctors¹² and a shorter working
9 week, respectively lower proportions of doctors exceeding a 9 hours working day (27% vs. 59%)
10 and 60 hours on-call per month (18% vs. 63%).¹³ A preliminary analysis of weekly working
11 hours in 2000 and 2010 among all hospital doctors working full and part time suggests stability
12 of 45 hours for senior doctors and a slight increase from 42 hours to 43 hours for junior
13 doctors.¹⁴
14
15 Several publications from EU member states report higher weekly working hours in groups as
16 diverse as Irish junior doctors (more than 63 hours in 2013),¹⁵ general surgical trainees in The
17 Netherlands (55 hours in 2005),¹⁶ surgical residents in Switzerland (55 hours in 2005),¹⁷ most
18 consultants (>50 hours in 2005), the majority of junior doctors (56 hours in 2010) and many of
19 the medical specialist registrars with night shifts (90 hours in 2006) in the UK.¹⁸⁻²⁰ Two cross-
20 sectional studies show that weekly working hours declined but remained high in Austria (59
21 hours in 2006, 54 hours in 2013)²¹ and in Germany (57 hours in 2007, 55 hours in 2010, >48
22 hours 74% of doctors in 2013).^{22,23} A study among doctors in France demonstrates a decline in
23 working hours from 53 hours in 1977 to 48 hours in 2007.²⁴
24
25 A good balance between professional and private life is of increasing importance in modern
26 society, also for doctors. Many hospital doctors try to reduce their working hours by choosing
27 family friendly specialties with less on-call or shift duties – particularly female doctors.^{11,25-28}

1 In Norway, the majority of doctors start their postgraduate training shortly after the internship
2 period, by applying to hospital trusts for training positions. Junior doctors in hospitals have both
3 the right and duty to receive teaching and vocational training leading to their specialist
4 accreditation. According to specialty 100 to 300 course hours are also required. The content of
5 the undergone training is usually documented through course exams, procedures and skills
6 requirements, attestation forms, checklists etc., plus documented participation of at least 2 hours
7 per week in the hospital teaching program. The training typically takes 5 to 7 years. According
8 to a study of junior doctors in Norway from 1999 to 2010,²⁵ 67.9% of females and 78.7% of
9 males completed their specialization by the end of study. Hospital factors such as more
10 supervision, lower workload related to routine patient treatment and working in university
11 hospital or central hospitals reduced the time to attain the specialist qualification.

12
13 The impact of EWTD on educational opportunities for junior doctors has been widely debated
14 over the last decade.²⁹⁻³¹ Two recent publications in the UK setting suggest that doctors are
15 critical of the implementations of the EWTD. In the study with data from 2010, no doctor
16 reported that the EWTD improved training opportunities for junior doctors.³² In another study
17 with data from 2012, the majority of doctors felt that the EWTD had neither benefited junior nor
18 senior doctors. More negative views were reported by doctors in surgical specialities.³³ How
19 doctors in Norway perceive the relationship between the quality of postgraduate training for
20 junior doctors and the actual work-week, is unknown.

21
22 The main aim of the study is to describe the weekly working hours for junior hospital doctors in
23 specialisation (interns and residents) and senior hospital doctors (consultants) in Norway based
24 on panel data from 1994 to 2014, and in relation to the requirements of the EWTD. The study
25 also looks at the work-home balance and the perceived quality of postgraduate training within
26 the actual working week.

METHODS

Design and participants

Since 1994 the Institute for Studies of the Medical Profession at the Norwegian Medical Association has regularly surveyed a representative panel of active Norwegian doctors with mailed questionnaires. The original panel was based on an invitation to 2,000 active Norwegian doctors, randomly selected in 1993 from the master file of the Norwegian Medical Association, which includes almost all doctors in Norway. The 1,272 doctors who agreed to participate were representative of the total doctor work force in terms of age, sex, specialty and place of work. Whenever new younger members were to be included, a group of randomly selected doctors were invited. The number of invitees was estimated according to the age composition of all active doctors, taking into account that only about 50% would agree to participate. In this way the unbalanced cohort has remained representative, with only negligible deviations. The cohort was supplemented with approximately 400 young doctors in 2000, 250 young doctors in 2008, and 300 in 2012. Over the same period 470 doctors have left the panel due to retirement, death, or voluntary withdrawal. The 2012 sample comprised 1,792 doctors. The response rates ranged from 67% to 95%. The present study is based mainly on responses from junior and senior hospital doctors. The numbers of junior and senior doctors in the 11 waves of the survey were different (Table 1).

Table 1.

As shown in Figure 1, there is a rather considerable attrition and renewal in the groups of junior and senior doctors between each round. This is because some respondents retire, withdraw from the panel or change their profession or position (for example GP, specialist in private practice, researcher or doctor in administrative function). Few senior doctors (n=4) became junior doctors, when they develop their professional career on a subspecialty or a second specialty.

Figure 1.

1 *Measurements*

2 *Weekly working hours*

3 The following question was asked at all 11 points in time: “In an average working week,
4 approximately how many hours do you spend on: Working with patients, meetings, paperwork,
5 telephones, other tasks.” Graphically the time components were ordered vertically, and the
6 respondents themselves should calculate their own total number of hours. Based on respondents
7 feedback, the 2006 questionnaire was slightly revised to also single out secondary position, and
8 from 2008 to also specified time spent on on-call work and professional update like reading or
9 attending courses.

10 The questionnaire lay-out in 2012 was:

	Hours per
In an average working week, including on-call duties and any secondary position,	week
approximately how many hours do you spend on:	
Patient work (all direct patient or peer contacts, including telephones etc.)	<input type="text"/> <input type="text"/>
Meetings (team meetings, supervision etc.)	<input type="text"/> <input type="text"/>
Paper work, telephones, e-mails, etc.	<input type="text"/> <input type="text"/>
Professional update	<input type="text"/> <input type="text"/>
Other job-related tasks	<input type="text"/> <input type="text"/>
Sum: total number of hours per week	<input type="text"/> <input type="text"/>

12 *Work-home balance*

13 Work-home balance can be measured by different methods.^{28,34} We define working more than
14 48 hours a week on a regular basis as a sub-optimal work-home balance.³⁵

16 *Perceived quality of postgraduate training*

17 In 2012 the following question was asked: The average work-week for junior doctors is
18 approximately 44.9 hours. How do you perceive these hours in relation to the quality of

1 postgraduate medical training within your specialty? The response alternatives were: “could be
2 shorter”, “about right”, and “could be longer”. This question was answered both by junior and
3 senior doctors.

4
5 *Job situation and specialty*

6 In all waves of the survey we asked about job situation and medical specialty. Job situation is
7 grouped into hospital doctors (seniors and juniors), general practitioners, private practice
8 specialists, researchers, doctors in administrative positions and others. In the present article we
9 concentrate on the seniority level: senior and junior hospital doctors. Senior doctors are
10 specialists permanently employed by the hospital trusts. Junior doctors are specialists in training
11 with limited contracts with the hospital trusts. Specialists in general surgery or general internal
12 medicine usually continue on a subspecialist career, which may imply going back to junior
13 status until the subspecialty authorization is acquired.

14
15 In 2012 there were 43 different medical specialties in Norway, including five subspecialties
16 under general surgery (cardiothoracic surgery, gastroenterological surgery, paediatric surgery,
17 urology and vascular surgery) and eight under general (internal) medicine (cardiology,
18 communicable diseases, endocrinology, geriatrics, gastroenterology, haematology, renal
19 diseases and respiratory medicine). For the purpose of this study the 43 specialties are collapsed
20 into eight specialist categories: surgery, internal medicine (plus neurology), anaesthesiology,
21 gynaecology, paediatrics, psychiatry, laboratory medicine (including radiology and pathology)
22 and others.

23
24 *Analysis*

25 Proportions were compared with 95% confidence intervals. General linear modelling (GLM)
26 with age as co-variate and gender and seniority level as fixed factors (ANCOVA) was used to
27 estimate weekly working hours at different points in time. Separate analyses for gender were

also performed. Full time work was defined as 37 hours or more per week.³⁶ Based on cross sectional data in 2012, two multivariate logistic regression models were used. One model assessed the association of sub-optimal work-home balance (defined more than 48 hours per week) with gender, age, seniority and medical speciality. Another model estimated the simultaneous effect of gender, age, total weekly working hours, medical specialty and seniority level on the perceived quality of the postgraduate training. Units with missing data were excluded. Predictive Analytics Software Statistics 19 was used for the analyses.

RESULTS

Sample characteristics

Table 2 shows the sample characteristics and the representativeness of the sample with regard to age, gender and seniority level in 1994 and 2012.³⁷ The proportion of females increased significantly from 1994 to 2012, both in our samples and in the general hospital doctor population. The proportion of junior doctors among our respondents compared to all hospital doctors was significantly lower in 1994, while it did not differ significantly in 2012. The proportion of senior doctors was comparable in our sample and all hospital doctors in 1994, but significantly higher in our sample 2012. These differences are consequences of the unbalanced cohort design.

Table 2.

Average work-weeks

From 1994 to 2012, the majority of hospital doctors worked in full time, but the proportion of part time working doctors (with 95% CI) increased slightly among seniors (from 5.2%, 2.9-7.5 to 6.5%, 4.2-8.8) and significantly among juniors (from 3.4%, 0.8-6.1 to 10.2%, 6.4-14.0).

Figure 2 shows the estimated average number of weekly working hours for full time working senior and junior doctors controlled for gender and age. The work-week is stable over the 18 year period. Senior doctors report slightly longer hours (46-47 hours) than junior doctors (45-46 hours), but the difference is not statistically significant as judged from the 95% confidence intervals (except for 2000).

Figure 2.

Figure 3 shows that full time working female hospital doctors in Norway over the whole period have worked significantly fewer hours (43-45 hours) than their male colleagues (47-48 hours) (except for 2004). However, this difference is decreasing over time.

Figure 3.

We also looked at the inter-specialty differences in an average work-week (with 95% CI, controlled for gender, age and seniority) for hospital doctors in 2000 and 2012 respectively, before and after the effectuation data of the EWTD. The number of weekly working hours remained unchanged for all specialist groups: surgical domain (47.1, 46.0-48.3 vs. 47.7, 46.3-49.0), laboratory medicine (44.7, 43.4-45.9 vs. 44.7, 43.1-46.2), internal medicine (46.1, 45.3-46.9 vs. 46.7, 44.9-46.5), psychiatry (43.4, 42.2-44.6 vs. 44.3, 43.1-45.6), paediatrics (45.2, 43.6-46.8 vs. 46.5, 44.4-48.6), anaesthesiology (46.1, 44.5-47.8 vs. 45.9, 44.1-47.7), gynaecology (45.6, 43.7-47.5 vs. 46.1, 44.2-48.1) and others (45.7, 43.5-47.8 vs. 42.9, 39.8-46.0). Doctors in the surgical domain had longer working weeks than doctors in other specialist groups in 2000 as well as in 2012 (data not shown).

In 2012, the estimated average work-week (with 95% CI) for different categories of full time working doctors in Norway, controlled for age and gender, was 44.7 (43.6-45.8) hours for junior hospital doctors, 46.4 (45.6-47.1) for senior hospital doctors, 47.4 (45.7-49.1) for full time

researchers, 44.3 (42.2-46.3) for doctors in administrative positions, 47.5 (46.6-48.3) for general practitioners, and 45.0 (43.2-46.9) for private practice specialists. No significant changes were found from 2000 to 2012 (data not shown).

Work-home balance

From 2002 to 2012 (before and after the effectuation date of EWTD), the proportion of doctors working more than 48 hours per week (with 95% CI), our criterion for a sub-optimal work-home balance, decreased among junior doctors from 26% (17.5 to 34.4) to 14.6% (10.6 to 19.8) and increased among senior doctors from 23.9% (18.1 to 29.7) to 30.7% (26.5 to 35.3).

In a multivariate logistic regression model, sub-optimal work-home balance in 2012 (n=670), controlled for age was significantly associated with being senior doctor (OR 2.18, 95% CI 1.25-3.81), being male (1.51, 1.01-2.25) and working in the surgical domain (OR=1) vs. laboratory medicine (0.37, 0.18-0.76), internal medicine (0.58, 0.34-0.98), psychiatry (0.37, 0.19-0.74), paediatrics (0.70, 0.30-1.65), anaesthesiology (0.48, 0.21-1.09), gynaecology (0.53, 0.22-1.28) and others (0.75, 0.17-3.31) (data not shown).

Time for postgraduate training

The majority of hospital doctors (64.2%) reported that a 45 hour work-week was sufficient for securing the quality of obligatory postgraduate training for junior doctors, while a minority reported that it could have been shorter (24.8%) or it could have been longer (11%) (data not shown).

Table 3 shows a multivariate logistic regression model with wanting more than 45 hours a week for postgraduate training as response variable. Significant associations were found with age, being senior doctor and working within surgical specialty, but not with gender or total weekly working hours.

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7 Table 3.
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10 4 Figure 4 shows the proportion of different hospital-based specialties in Norway who think a 45
11 5 hours` work-week is about right (blue), could have been shorter (grey) and could have been
12 6 longer (red) in relation to the quality of specialist training in 2012. The variation is considerable.
13 7 Doctors in most surgical specialties were more likely to report that the work-week could be
14 8 longer.
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17 Figure 4.
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26 11 **DISCUSSION**

27 12 *Main findings*

28 13 Average weekly working hours for Norwegian hospital doctors have remained more or less
29 14 unchanged between 1994 and 2012, and amount to approximately 46-47 hours for senior
30 15 doctors and 45-46 hours for junior doctors, lower than the requirements of the EWTD, starting
31 16 at 58 hours in 2004 and going down to 48 hours in 2009. In 2012, the majority of senior and
32 17 junior doctors in Norway expressed that this was sufficient for the obligatory postgraduate
33 18 training.
34 19

35 20 *Comparison with other studies*

36 21 A cross-national comparison of doctors` working hours is limited by methodological differences.
37 22 However, Norwegian junior and senior doctors have clearly shorter working hours than other
38 23 hospital doctors in the EU, who report between 50 and 90 hours a week during the last
39 24 decade.^{6,15,16,18,19,21-23} In contrast to Norway, the weekly working hours for hospital doctors in
40 25 Austria, France, Germany, and the UK all decreased after the introduction of the EWTD.^{21-24,30}
41 26 Norwegian doctors also seem to have a better work-home balance. Working more than 48 hours
42 27 a week was reported from 30.7% of senior and 14.6% of junior doctor in 2012, compared with
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73% of German hospital doctors in 2013,²³ and 68% of UK consultants in 2005. In 2013, 36% of Austrian hospital doctors worked more than 60 hours per week,²¹ compared with only 2.5% in our sample in 2012 (data not shown).

Weekly working hours for Norwegian junior doctors is slightly shorter than for senior doctors. In other European studies there is no clear pattern here.^{21,23,24} The longer working hours for male doctors is more consistent.^{6,13,24,38,39} Longer work-week among seniors and male doctors is a possible explanation for the significant association of sub-optimal work-home balance (defined as working more than 48 hours a week) with being a male and being a senior doctor.

In comparison with most other professional groups in Norway, senior and junior doctors are more likely to work longer hours, even though such a comparison must be made with caution.

In the OECD study from 2011 on Better Life Index, 2.8% of employed Norwegians had a longer working week than 50 hours⁴⁰ compared to 28.7% of senior and 12.2% of junior doctors in our sample in 2012 (data not shown). In a national survey from 2011,³⁶ 2% of office workers, 3% of cleaners, 4% of sales and service occupations, 6% of college graduates, 7% of craftsmen, 13% of managers, 13% of university graduates, 13% of chauffeurs, 20% of transport workers and 42% of farmers and fishermen worked more than 45 hours per week, compared to 55% of senior and 35% of junior doctors in our 2012 sample (data not shown).

Interestingly, the total weekly working hours in Norway for full time employed junior and senior doctors that are subject to national legislations^{9,10} are similar to those of GPs and private practice specialists who decide their own working hours. No comparative studies were found on this issue.

In 2012, the majority of senior and junior doctors in Norway felt that the present 45 hours working week is sufficient for postgraduate training. This is in accordance with a review by

1 Temple of the impact of the EWTD on the quality of training for doctors showing that a high
2 quality of training can be delivered within the framework of a 48 hour working week.³⁰ That
3 doctors in most surgical domains in our study were more likely to report that the work-week
4 could have been longer in relation to the quality of obligatory specialist training for juniors is in
5 line with a number of studies discussing the effect of working time reduction on the
6 performance of surgeons.^{29,32} Our findings that senior doctors were more inclined than junior
7 doctors to have more than 45 hours a week for postgraduate training, confirm previous studies.²⁹

9 *Why is Norway different?*

10 Hospital doctors' work conditions are of course closely associated with work organisation⁴¹ and
11 national directives.⁵

13 One of the main differences between the European and the Norwegian directives on doctors'
14 working time is the effectuation date. In Norway, a significant reduction of working hours for
15 doctors took place already between 1960 and 1988.^{8,36} Today, the contracted basic working
16 week in full time employment in Norway (35.5-40 hours) is lower than the maximum weekly
17 working week in the EWTD (48 hours). However, both the European and the Norwegian
18 directives include an opt-out option allowing for longer hours with the employee's consent. It is
19 also worth noting that working hours for junior and senior hospital doctors in Norway since
20 1985 have been decided through annual deliberations between the relevant employer and
21 employee organisations.⁷

23 Hospital doctor density and workload influence working hours. OECD data from 2012 show a
24 density of practising doctors per 1,000 inhabitants in Norway of 3.7, higher than in most other
25 European countries, e.g. UK (2.8), Belgium (2.9), Finland (3.2), Denmark (3.5).⁴² Norwegian
26 doctor workforce statistics indicates a significant increase in practising junior doctors, from
27 2,558 in 1994 to 5,063 in 2012, and senior doctors from 3,700 in 1994 to 6,892 in 2012 (Table

2).³⁷ According to Statistics Norway, the number of doctors from 1990 to 2009 increased faster than in any other European country, particularly hospital doctors.⁴³ Furthermore, a study of staff and productivity in somatic specialist health care in 2008 suggested a lower workload for hospital doctors due to more hospital doctors and less clinical productivity (measured by numbers of hospital dismissals and outpatient consultations and treatments) in Norway than in Denmark, Finland, Germany, and Scotland.⁴⁴

The family friendly Norwegian welfare system should also be mentioned. The Norwegian legislations grant the mothers a year's leave with full pay in connection with childbirth or adoption, and the fathers are entitled to an additional three months. This in itself is a strong driver for shorter work-weeks.

Adherence to mandatory regulations of hospital doctors' work time varies considerably within the European countries. A study on UK junior doctors' working arrangements from 2008 to 2010 shows that over half of the junior doctors experienced pressure to work unofficially beyond the work time limit.²⁰ A survey by the Royal College of Physicians in 2004 found that many junior doctors were forced to work over ninety hours during seven-night rotas.¹⁹ According to surveys by the German Doctors Union and the Norwegian Medical Association, 59% of German hospitals doctors complained about the renege on stipulated maximum working hours, while only 30% of the Norwegian hospital doctors reported a pressure from the hospital administrations to deviate from actual work time agreements.^{22,45} Only very few senior (2-4%) and junior (1-3%) doctors in Norway ever exceed the 60 hours per week maximum (data not shown).

We have shown that the difference in weekly working hours between senior and junior doctors in Norway was not statistically significant, with exception of 2000. This may partly be due to small differences in remuneration between senior and junior doctors. In a study from 2007,

1 immigrant German doctors in Norwegian hospitals reported better collegial teamwork and no or
2 flat hierarchy between seniors and doctors in training as reasons for coming to and staying in
3 Norway.⁴⁶ In a study with data from 2006 we have shown how Norwegian doctors compared
4 with their colleagues in German hospitals were significantly more satisfied with working hours
5 and payment.¹²

6
7 Adherence to working time regulations and a good balance between professional and private life
8 are important cultural values in Norway. In the Fourth European Working Conditions Survey,
9 Norway was found to have the second-lowest average weekly work time (39.4 hours vs. 43.2
10 hours in the UK, 41.9 hours in EU), and the lowest percentage of employees with a work-week
11 exceeding 48 hours (6% vs. 13% in the UK, 15% in the EU).^{35,47}

12
13 Even if the majority of Norwegian hospital doctors are satisfied with the present situation in
14 terms of postgraduate training, significantly more senior doctors and those doctors working in
15 the surgical domain would like longer work hours. That senior doctors were more inclined than
16 junior doctors to express the view that longer working week had benefit junior doctors might
17 suggest a “generational shift”.²⁹ According to differences between doctors in different
18 specialties, previous studies show that surgeons compared to non-surgeons have higher
19 workload, longer working hours, more night’s on-calls and stronger professional interest.^{6,11,25,48}

20 A recent study on Norwegian doctors in specialisation with data from 1999 to 2010 found the
21 highest number of working hours per week in surgery, orthopaedics, anaesthesiology and
22 internal medicine.²⁵ According to a literature review on the impact of the working time
23 regulations on medical education and training in European studies, doctors in the surgical
24 domain perceive the work-week limitation largely negative on surgical training.²⁹ Important
25 elements in surgical training are based on being present and available in emergency situations,
26 which cannot always be planned. It is also often a question of having taken part in a number of
27 defined but not necessarily frequent procedures. If the training comes to a point where the junior

doctors too often miss important acute or emergency operations simply because they are not present, the only remedy is more presence. In a study among surgical residents and surgical consultants in Switzerland, 60% of surgical consultants felt that surgical residents should be present longer than the work-week limitation.¹⁷ Therefore, it should be considered whether Norwegian junior doctors in surgical training should practice longer hours, at least for parts of their training.

Strengths and limitations

The study's main strength is the representative cohort with repeated data that allows for generalisation to the whole population of hospital doctors in Norway. The response rates are fairly good, ranging from 67% to 95%, which are higher than in a number of similar studies,^{6,18,20-23} but do not rule out the possibility of non-response bias. Self-reported working hours may of course deviate from the actual number of hours worked, but it is not easy to judge whether the respondents are likely to overestimate or underestimate their own hours. The expanded specification of different elements of weekly work hours - secondary positions mentioned explicitly from 2006 and on-call time and professional update from 2008 - should not affect the total number of hours worked since the questions have consistently focused on eliciting the total number of hours worked per week. The inclusions and exclusions of respondents over time, and the exchange between junior and senior doctors, is a reason for caution. Over a period of 18 years some doctors will also work in functions other than that hospital doctor. Some doctors may leave the panel due to retirement, death or voluntary withdrawal, and a few senior doctors become junior doctors if they embark on sub-specialisation or want a second specialty.

Conclusion

The average weekly working hours and the proportion with sub-optimal work-home balance did not change significantly among Norwegian junior and senior doctors from 1994 to 2012. No

1 differences were found in weekly working hours of employed hospital doctors and self-
2 employed GPs or private practice specialists. Junior and senior hospital doctors in Norway
3 enjoy a shorter work-week than hospital doctors in several other countries. National working
4 time regulations based on deliberations, cultural values and the high and growing doctor density
5 are important causes. When the majority of Norwegian junior and senior hospital doctors report
6 that sufficient postgraduate training schemes can be executed within a 45 hour working week, it
7 lends support to the EWTD of maximum 48 hours. However, the speciality differences may call
8 for more flexibility in working time regulations, particularly among surgeons.

DECLARATIONS

Acknowledgements The authors wish to thank all doctors who have supported this study by participating in the survey.

Contributors JR and OGA designed the study and did the statistical analysis. JR undertook the literature review and wrote the first draft. OGA made critical revisions. Both authors had full access to all of the data (including statistical reports and tables) and are jointly responsible for the integrity of the data and the accuracy of the data analysis.

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Competing interest None declared.

Ethics approval According to the Regional Committee for Medical Research Ethics, the study based on “Norwegian Physician Survey - A bi-annual prospective questionnaire survey to a representative sample of Norwegian physicians” is exempt from review in Norway, cf. §§ 4 of The Act. The project can be implemented without the approval by the Regional Committee for Medical Research Ethics (IRB 0000 1870). Additionally, approval for data protection of the bi-annual prospective survey among Norwegian doctors was obtained from the Norwegian Social Science Data Service (Reference 19521).

Data sharing statement The authors may be able to provide aggregated data on which the analysis is based, on request. No additional data available.

1 **Figure captions**

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8 **Figure 1.** Sample characteristics

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13 **Figure 2.** Average weekly working hours for senior (blue) and junior (green) hospital doctors in

14 full time, with a 95 per cent confidence interval, from 1994 to 2012, and in relation to the

15 requirements of the EWTD (red).

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20 **Figure 3.** Average weekly working hours for female (yellow) and male (black) hospital doctors

21 in full time, with a 95 per cent confidence interval, from 1994 to 2012, and in relation to the

22 requirements of the EWTD (red).

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28 **Figure 4.** Proportion of different hospital-based specialties in Norway who think a 45 hour

29 working week is about right (blue), could have been shorter (grey) and could have been longer

30 (red) in relation to the quality of specialist training in 2012.

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Specialties marked* are surgical subspecialties, that require 3 extra years of training after authorization in general surgery. Specialties marked** are medical subspecialties that require 3 extra years of training after authorization in general (internal) medicine. Numbers of respondents are in parentheses.

Table 1. The numbers, response rates and composition of the 11 waves of the survey

	Sample (n)	Respondents (n)	Response rate (%)	Hospital seniors (n)	Hospital juniors (n)	Other doctors (n)
1994	1,272	1,209	95.0	371	179	659
1995	1,258	1,145	91.0	372	166	607
1996	1,287	965	75.0	374	130	461
1997	1,260	951	75.5	322	86	543
2000*)	1,606	1,321	82.3	389	226	706
2002	1,608	1,174	73.0	205	104	865
2004	1,499	1,004	67.0	194	91	719
2006	1,400	966	69.0	375	71	520
2008*)	1,649	1,072	65.0	405	176	491
2010	1,520	1,014	66.7	415	116	483
2012*)	1,792	1,279	71.4	436	246	597

*) young doctors added to the cohort

1 **Table 2.** **Sample characteristics and representativeness of the sample with regard to**
2 **seniority, gender and age in 1994 and 2012.**
3

	Study samples		Norway	
	1994	2012	1994	2012
All doctors (n)	1,209	1,272	11,847	23,260
Seniority (n)				
junior doctors	179	246	2,558	5,063
senior doctors	371	436	3,700	6,892
Seniority (%)				
junior doctors	14.5 (12.5 - 16.5)	19.3 (17.4 - 21.8)	22.6	21.8
senior doctors	30.7 (28.1 - 33.3)	34.3 (31.8 - 37.0)	31.2	29.6
Females (%)				
junior doctors	43.0 (40.2- 45.8)	65.4 (62.8 - 68.0)	40.2	59.2
senior doctors	18.3 (14.4 - 22.2)	39.2 (34.6 - 43.8)	15.8	37.2
Mean age (years)				
junior doctors	36.4 (35.4 - 37.5)	34.4 (33.4 - 35.5)	35.4	35.4
senior doctors	48.9 (48.2 - 49.7)	50.7 (50.0 - 51.5)	49.3	51.2

Table 3. Logistic regression with wanting more than 45 hours a week for postgraduate training in 2012 as response variable, N= 628

	OR	95% CI for OR	P-value
Age in years	1.04	1.01-1.08	0.014
Females (vs. males)	0.57	0.31-1.07	0.083
Total weekly working hours	1.77	0.73-4.29	0.203
Senior doctors (vs. junior doctors)	1.07	1.04-1.11	0.0001
Medical specialty, ref. surgery			
laboratory medicine	0.03	0.01-0.25	0.001
internal medicine	0.31	0.17-0.58	0.0001
psychiatry	0.12	0.04-0.36	0.0001
pediatrics	0.36	0.12-1.07	0.066
anaesthesiology	0.08	0.02-0.39	0.002
gynaecology	0.07	0.01-0.56	0.012
other	0.39	0.04-3.56	0.401

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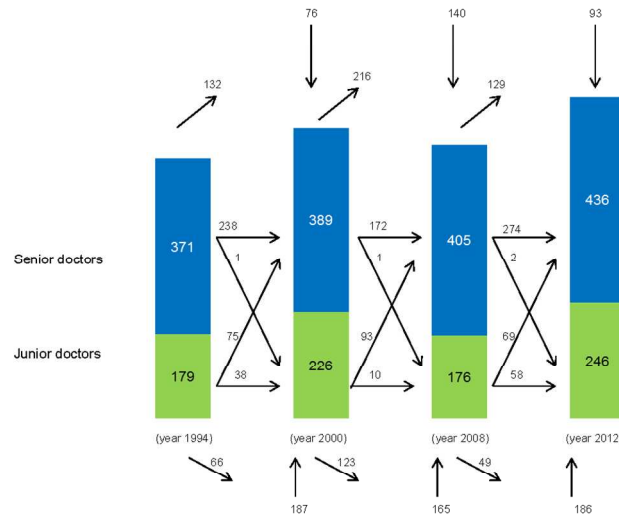
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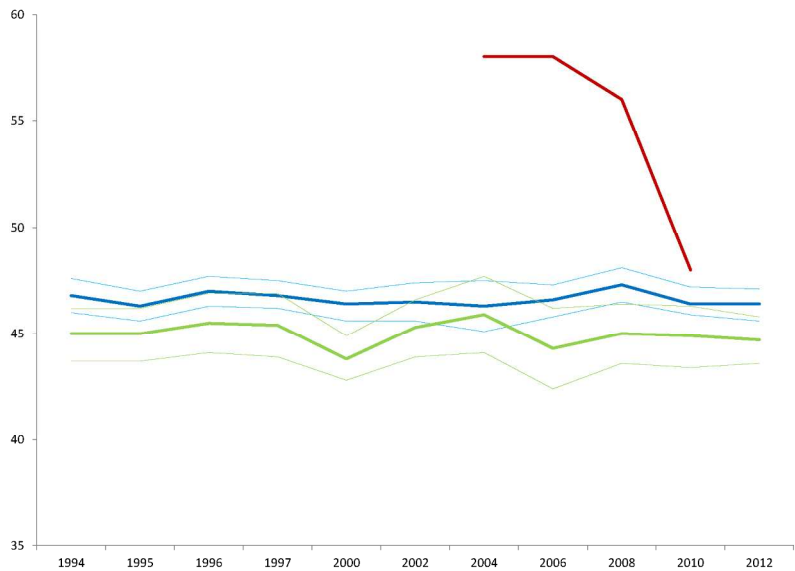
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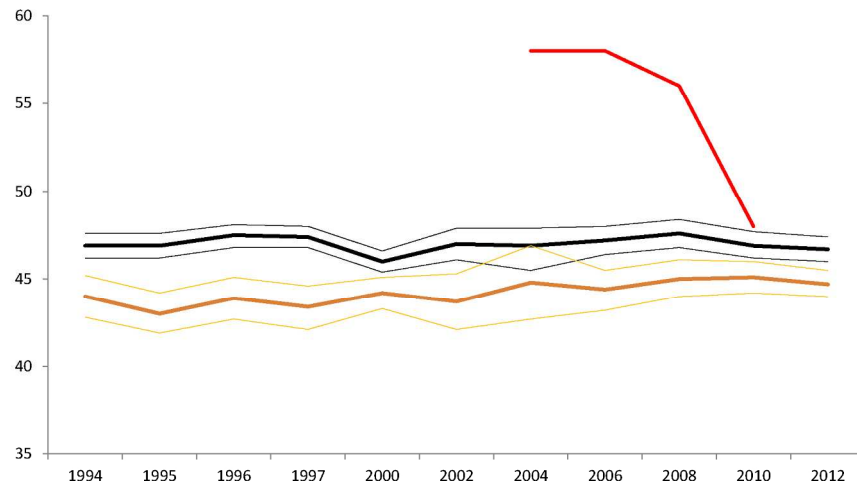
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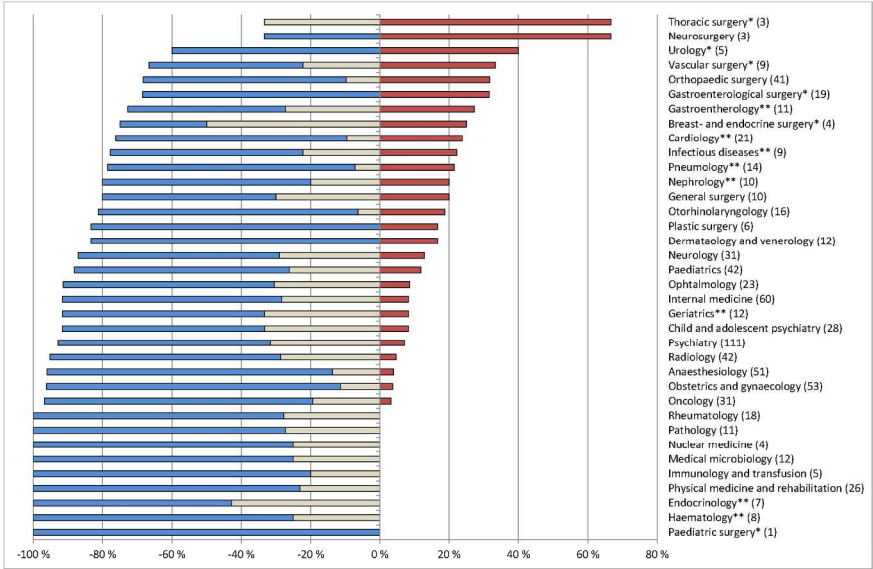
Sample characteristics
127x95mm (300 x 300 DPI)



Average weekly working hours for senior (blue) and junior (green) hospital doctors in full time, with a 95 per cent confidence interval, from 1994 to 2012 , and in relation to the requirements of the EWTD (red).
198x140mm (300 x 300 DPI)



Average weekly working hours for female (yellow) and male (black) hospital doctors in full time, with a 95 per cent confidence interval, from 1994 to 2012, and in relation to the requirements of the EWTD (red).
198x140mm (300 x 300 DPI)



Proportion of different hospital-based specialties in Norway who think a 45 hour working week is about right (blue), could have been shorter (grey) and could have been longer (red) in relation to the quality of specialist training in 2012

Specialties marked* are surgical subspecialties, that require 3 extra years of training after authorization in general surgery. Specialties marked** are medical subspecialties that require 3 extra years of training after authorization in general (internal) medicine. Numbers of respondents are in parentheses.

STROBE Statement—Checklist of items

Submission to BMJ Open

Original research article

Weekly working hours for Norwegian hospital doctors since 1994 with special attention to postgraduate training, work-home balance and the European Working Time Directive. A panel study

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	Item No	Recommendation	Research article Page
Title and abstract	1	(a) Indicate the study's design with a commonly used term in the title or the abstract	1-2
		(b) Provide in the abstract an informative and balanced summary of what was done and what was found	2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	4-6
Objectives	3	State specific objectives, including any prespecified hypotheses	6
Methods			
Study design	4	Present key elements of study design early in the paper	7
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	7
Participants	6	(a) Give the eligibility criteria, and the sources and methods of selection of participants	7
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	7
Data sources/measurement	8	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	8-9
Bias	9	Describe any efforts to address potential sources of bias	7
Study size	10	Explain how the study size was arrived at	7, and Table 1, Figure 1
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	7-9
Statistical methods	12	(a) Describe all statistical methods, including those used to control for confounding	9-10
		(b) Describe any methods used to examine subgroups and interactions	9-10
		(c) Explain how missing data were addressed	9-10
		(d) If applicable, describe analytical methods taking account of sampling strategy	N/A
		(e) Describe any sensitivity analyses	N/A

	Item Nr.	Recommendation	Page
Results			
Participants	13	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	10 and Figure 1, Table 1
		(b) Give reasons for non-participation at each stage	10, and Figure 1
		(c) Consider use of a flow diagram	N/A
Descriptive data	14	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	10, and Table 2
		(b) Indicate number of participants with missing data for each variable of interest	10, Table 2
Outcome data	15	Report numbers of outcome events or summary measures	10-11, Figure 2-3
Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	10-11
		(b) Report category boundaries when continuous variables were categorized	N/A
		(c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	N/A
Other analyses	17	Report other analyses done—eg, analyses of subgroups and interactions, and sensitivity analyses	11-13
Discussion			
Results	18	Summarise key results with reference to study objectives	13
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	18
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	13-15
Generalisability	21	Discuss the generalisability (external validity) of the study results	15-18
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	No funders

Original investigation

Weekly working hours for Norwegian hospital doctors since 1994 with special attention to postgraduate training, work-home balance and the European Working Time Directive.

A panel study

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ABSTRACT

Objectives: To examine the weekly working hours of Norwegian hospital doctors from 1994 to 2012 with special emphasis on the quality of postgraduate training and work-home balance, and in relation to the requirements of the European Working Time Directive (EWTD).

Design: Panel study based on postal questionnaires.

Setting: Norway.

Participants: Unbalanced cohort of 1,300 to 1,600 doctors in 1994, 1995, 1996, 1997, 2000, 2002, 2004, 2006, 2008, 2010 and 2012.

Outcome measures: Self-reported total weekly working hours and whether 45 weekly working hours are too short, sufficient, or too long to meet the quality requirements of obligatory postgraduate training for junior doctors.

Results: From 1994 to 2012, the number of weekly working hours was stable for senior (46-47 hours) and junior (45-46 hours) hospital doctors. In 2012, significantly more senior (27-35%) than junior (11-20%) doctors reported sub-optimal work-home balance, defined as working more than 48 hours a week. The majority perceived the present situation with an average of 45 hours per week for juniors as sufficient for obligatory postgraduate specialist training, but doctors of higher age (OR 1.04, 95% CI 1.01-1.08), senior doctors (1.07, 1.04-1.11) and doctors working in surgical specialties (OR 1 vs. laboratory medicine 0.03, 0.01-0.25, internal medicine 0.31, 0.17-0.58, psychiatry 0.12, 0.04-0.36, paediatrics 0.36, 0.12-1.07, anaesthesiology 0.08, 0.02-0.39, gynaecology 0.07, 0.01-0.56 and others 0.39, 0.04-3.56) were more likely to want the work-week to be longer.

Conclusions: The weekly working hours of Norwegian hospital doctors were always below the EWTD requirements. A significant growth of hospital doctor density over the past two decades, national regulations and cultural values might be important factors. Speciality differences in perception of sufficient training time may call for more flexibility in working time regulations.

Strengths and limitations of this study

- The study documents that working hours among Norwegian hospital doctors have always been below the EWTD requirements.
- The representative cohort with repeated data allows for generalisation to the whole population of hospital doctors in Norway.
- Self-reported working hours may deviate from the actual number of hours worked, but it is not easy to judge whether the respondents are likely to overestimate or underestimate their own hours.

INTRODUCTION

The question of doctors’ work hours is an important public health issue. Too long hours may reduce the quality of health care, threaten patient safety and influence and affect the doctors’ own health and work-home balance.^{1,2} In 2000 the European Working Time Directive (EWTD)³ signalled a gradual reduction in weekly work hours for junior doctors from a maximum of 58 hours in August 2004 to 56 hours in August 2007 and to 48 hours in August 2009. Member states could apply for further postponement of introduction of the 48 hour **work-week** until August 2012 at the latest, but it is still possible for member states to apply their national legislation, also when it allows for more than 48 hours work weeks for doctors.⁴ A number of member states have introduced rotas to restrict the number of hours worked.^{5,6}

In the non-EU member state Norway, where doctors’ working hours has been a subject for annual deliberations between employers (state, counties, hospital trusts) and the doctors through The Norwegian Medical Association since 1985, a reduction in working hours for doctors had already taken place between 1960 and 1988. The contracted basic 48 working hours from 1960 was reduced to 37.5 hours for most employees in 1987, and to 35.5-37.5 hours for doctors in 1988.^{7,8} Presently all full time employed junior and senior doctors have a contracted basic working week of 35.5-37.5 hours, with the possibility of a permanent 2.5 hours extension. Doctors are not obliged to work beyond this, but they can choose to extend their weekly working time to 60 hours. The working patterns is usually day-working with on-call duties, where at least 20 hours per week must be between 7am to 5pm from Monday to Friday.^{9,10}

On this background we think a more detailed description on how Norway and Norwegian doctors get along with their long standing comparatively short working weeks might be of international interest.

1 A study based on all Norwegian hospital doctors in full time shows that the numbers of planned
2 weekly working hours plus hours from overtime increased from 43.17 hours in 2001 to 45.04
3 hours in 2003 and fell to 42.76 hours in 2007.¹¹

4
5 We have surveyed a representative cohort of Norwegian doctors regularly from 1994 to 2012,
6 and one of the most central and repeated measures has been self-reported weekly working hours.
7 Studies with data from 2006 show that hospital doctors in Norway enjoy a higher level of
8 satisfaction with working time compared with Germany hospital doctors¹² and a shorter working
9 week, respectively lower proportions of doctors exceeding a 9 hours working day (27% vs. 59%)
10 and 60 hours on-call per month (18% vs. 63%).¹³ A preliminary analysis of weekly working
11 hours in 2000 and 2010 among all hospital doctors working full and part time suggests stability
12 of 45 hours for senior doctors and a slight increase from 42 hours to 43 hours for junior
13 doctors.¹⁴

14
15 Several publications from EU member states report higher weekly working hours in groups as
16 diverse as Irish junior doctors (more than 63 hours in 2013),¹⁵ general surgical trainees in The
17 Netherlands (55 hours in 2005),¹⁶ surgical residents in Switzerland (55 hours in 2005),¹⁷ most
18 consultants (>50 hours in 2005), the majority of junior doctors (56 hours in 2010) and many of
19 the medical specialist registrars with night shifts (90 hours in 2006) in the UK.¹⁸⁻²⁰ Two cross-
20 sectional studies show that weekly working hours declined but remained high in Austria (59
21 hours in 2006, 54 hours in 2013)²¹ and in Germany (57 hours in 2007, 55 hours in 2010, >48
22 hours 74% of doctors in 2013).^{22,23} A study among doctors in France demonstrates a decline in
23 working hours from 53 hours in 1977 to 48 hours in 2007.²⁴

24
25 A good balance between professional and private life is of increasing importance in modern
26 society, also for doctors. Many hospital doctors try to reduce their working hours by choosing
27 family friendly specialties with less on-call or shift duties – particularly female doctors.^{11,25-28}

1 In Norway, the majority of doctors start their postgraduate training shortly after the internship
2 period, by applying to hospital trusts for training positions. Junior doctors in hospitals have both
3 the right and duty to receive teaching and vocational training leading to their specialist
4 accreditation. According to specialty 100 to 300 course hours are also required. The content of
5 the undergone training is usually documented through course exams, procedures and skills
6 requirements, attestation forms, checklists etc., plus documented participation of at least 2 hours
7 per week in the hospital teaching program. The training typically takes 5 to 7 years. According
8 to a study of junior doctors in Norway from 1999 to 2010,²⁵ 67.9% of females and 78.7% of
9 males completed their specialization by the end of study. Hospital factors such as more
10 supervision, lower workload related to routine patient treatment and working in university
11 hospital or central hospitals reduced the time to attain the specialist qualification.

12
13 The impact of EWTD on educational opportunities for junior doctors has been widely debated
14 over the last decade.²⁹⁻³¹ Two recent publications in the UK setting suggest that doctors are
15 critical of the implementations of the EWTD. In the study with data from 2010, no doctor
16 reported that the EWTD improved training opportunities for junior doctors.³² In another study
17 with data from 2012, the majority of doctors felt that the EWTD had neither benefited junior nor
18 senior doctors. More negative views were reported by doctors in surgical specialities.³³ How
19 doctors in Norway perceive the relationship between the quality of postgraduate training for
20 junior doctors and the actual work-week, is unknown.

21
22 The main aim of the study is to describe the weekly working hours for junior hospital doctors in
23 specialisation (interns and residents) and senior hospital doctors (consultants) in Norway based
24 on panel data from 1994 to 2014, and in relation to the requirements of the EWTD. The study
25 also looks at the work-home balance and the perceived quality of postgraduate training within
26 the actual working week.

METHODS

Design and participants

Since 1994 the Institute for Studies of the Medical Profession at the Norwegian Medical Association has regularly surveyed a representative panel of active Norwegian doctors with mailed questionnaires. The original panel was based on an invitation to 2,000 active Norwegian doctors, randomly selected in 1993 from the master file of the Norwegian Medical Association, which includes almost all doctors in Norway. The 1,272 doctors who agreed to participate were representative of the total doctor work force in terms of age, sex, specialty and place of work. Whenever new younger members were to be included, a group of randomly selected doctors were invited. The number of invitees was estimated according to the age composition of all active doctors, taking into account that only about 50% would agree to participate. In this way the unbalanced cohort has remained representative, with only negligible deviations. The cohort was supplemented with approximately 400 young doctors in 2000, 250 young doctors in 2008, and 300 in 2012. Over the same period 470 doctors have left the panel due to retirement, death, or voluntary withdrawal. The 2012 sample comprised 1,792 doctors. The response rates ranged from 67% to 95%. The present study is based mainly on responses from junior and senior hospital doctors. The numbers of junior and senior doctors in the 11 waves of the survey were different (Table 1).

Table 1.

As shown in Figure 1, there is a rather considerable attrition and renewal in the groups of junior and senior doctors between each round. This is because some respondents retire, withdraw from the panel or change their profession or position (for example GP, specialist in private practice, researcher or doctor in administrative function). Few senior doctors (n=4) became junior doctors, when they develop their professional career on a subspecialty or a second specialty.

Figure 1.

1 *Measurements*

2 *Weekly working hours*

3 The following question was asked at all 11 points in time: “In an average working week,
4 approximately how many hours do you spend on: Working with patients, meetings, paperwork,
5 telephones, other tasks.” Graphically the time components were ordered vertically, and the
6 respondents themselves should calculate their own total number of hours. Based on respondents
7 feedback, the 2006 questionnaire was slightly revised to also single out secondary position, and
8 from 2008 to also specified time spent on on-call work and professional update like reading or
9 attending courses.

10 The questionnaire lay-out in 2012 was:

	Hours per
In an average working week, including on-call duties and any secondary position,	week
approximately how many hours do you spend on:	
Patient work (all direct patient or peer contacts, including telephones etc.)	<input type="text"/> <input type="text"/>
Meetings (team meetings, supervision etc.)	<input type="text"/> <input type="text"/>
Paper work, telephones, e-mails, etc.	<input type="text"/> <input type="text"/>
Professional update	<input type="text"/> <input type="text"/>
Other job-related tasks	<input type="text"/> <input type="text"/>
Sum: total number of hours per week	<input type="text"/> <input type="text"/>

11

12 *Work-home balance*

13 Work-home balance can be measured by different methods.^{28,34} We define working more than
14 48 hours a week on a regular basis as a sub-optimal work-home balance.³⁵

15

16 *Perceived quality of postgraduate training*

17 In 2012 the following question was asked: The average work-week for junior doctors is
18 approximately 44.9 hours. How do you perceive these hours in relation to the quality of

1 postgraduate medical training within your specialty? The response alternatives were: “could be
2 shorter”, “about right”, and “could be longer”. This question was answered both by junior and
3 senior doctors.

4 5 *Job situation and specialty*

6 In all waves of the survey we asked about job situation and medical specialty. Job situation is
7 grouped into hospital doctors (seniors and juniors), general practitioners, private practice
8 specialists, researchers, doctors in administrative positions and others. In the present article we
9 concentrate on the seniority level: senior and junior hospital doctors. Senior doctors are
10 specialists permanently employed by the hospital trusts. Junior doctors are specialists in training
11 with limited contracts with the hospital trusts. Specialists in general surgery or general internal
12 medicine usually continue on a subspecialist career, which may imply going back to junior
13 status until the subspecialty authorization is acquired.

14
15 In 2012 there were 43 different medical specialties in Norway, including five subspecialties
16 under general surgery (cardiothoracic surgery, gastroenterological surgery, paediatric surgery,
17 urology and vascular surgery) and eight under general (internal) medicine (cardiology,
18 communicable diseases, endocrinology, geriatrics, gastroenterology, haematology, renal
19 diseases and respiratory medicine). For the purpose of this study the 43 specialties are collapsed
20 into eight specialist categories: surgery, internal medicine (plus neurology), anaesthesiology,
21 gynaecology, paediatrics, psychiatry, laboratory medicine (including radiology and pathology)
22 and others.

23 24 *Analysis*

25 Proportions were compared with 95% confidence intervals. General linear modelling (GLM)
26 with age as co-variate and gender and seniority level as fixed factors (ANCOVA) was used to
27 estimate weekly working hours at different points in time. Separate analyses for gender were

also performed. Full time work was defined as 37 hours or more per week.³⁶ Based on cross sectional data in 2012, two multivariate logistic regression models were used. One model assessed the association of sub-optimal work-home balance (defined more than 48 hours per week) with gender, age, seniority and medical speciality. Another model estimated the simultaneous effect of gender, age, total weekly working hours, medical specialty and seniority level on the perceived quality of the postgraduate training. Units with missing data were excluded. Predictive Analytics Software Statistics 19 was used for the analyses.

RESULTS

Sample characteristics

Table 2 shows the sample characteristics and the representativeness of the sample with regard to age, gender and seniority level in 1994 and 2012.³⁷ The proportion of females increased significantly from 1994 to 2012, both in our samples and in the general hospital doctor population. The proportion of junior doctors among our respondents compared to all hospital doctors was significantly lower in 1994, while it did not differ significantly in 2012. The proportion of senior doctors was comparable in our sample and all hospital doctors in 1994, but significantly higher in our sample 2012. These differences are consequences of the unbalanced cohort design.

Table 2.

Average work-weeks

From 1994 to 2012, the majority of hospital doctors worked in full time, but the proportion of part time working doctors (with 95% CI) increased slightly among seniors (from 5.2%, 2.9-7.5 to 6.5%, 4.2-8.8) and significantly among juniors (from 3.4%, 0.8-6.1 to 10.2%, 6.4-14.0).

Figure 2 shows the estimated average number of weekly working hours for full time working senior and junior doctors controlled for gender and age. The work-week is stable over the 18 year period. Senior doctors report slightly longer hours (46-47 hours) than junior doctors (45-46 hours), but the difference is not statistically significant as judged from the 95% confidence intervals (except for 2000).

Figure 2.

Figure 3 shows that full time working female hospital doctors in Norway over the whole period have worked significantly fewer hours (43-45 hours) than their male colleagues (47-48 hours) (except for 2004). However, this difference is decreasing over time.

Figure 3.

We also looked at the inter-specialty differences in an average work-week (with 95% CI, controlled for gender, age and seniority) for hospital doctors in 2000 and 2012 respectively, before and after the effectuation data of the EWTD. The number of weekly working hours remained unchanged for all specialist groups: surgical domain (47.1, 46.0-48.3 vs. 47.7, 46.3-49.0), laboratory medicine (44.7, 43.4-45.9 vs. 44.7, 43.1-46.2), internal medicine (46.1, 45.3-46.9 vs. 46.7, 44.9-46.5), psychiatry (43.4, 42.2-44.6 vs. 44.3, 43.1-45.6), paediatrics (45.2, 43.6-46.8 vs. 46.5, 44.4-48.6), anaesthesiology (46.1, 44.5-47.8 vs. 45.9, 44.1-47.7), gynaecology (45.6, 43.7-47.5 vs. 46.1, 44.2-48.1) and others (45.7, 43.5-47.8 vs. 42.9, 39.8-46.0). Doctors in the surgical domain had longer working weeks than doctors in other specialist groups in 2000 as well as in 2012 (data not shown).

In 2012, the estimated average work-week (with 95% CI) for different categories of full time working doctors in Norway, controlled for age and gender, was 44.7 (43.6-45.8) hours for junior hospital doctors, 46.4 (45.6-47.1) for senior hospital doctors, 47.4 (45.7-49.1) for full time

1 researchers, 44.3 (42.2-46.3) for doctors in administrative positions, 47.5 (46.6-48.3) for general
2 practitioners, and 45.0 (43.2-46.9) for private practice specialists. No significant changes were
3 found from 2000 to 2012 (data not shown).

4
5 *Work-home balance*

6 From 2002 to 2012 (before and after the effectuation date of EWTD), the proportion of doctors
7 working more than 48 hours per week (with 95% CI), our criterion for a sub-optimal work-
8 home balance, decreased among junior doctors from 26% (17.5 to 34.4) to 14.6% (10.6 to 19.8)
9 and increased among senior doctors from 23.9% (18.1 to 29.7) to 30.7% (26.5 to 35.3).

10
11 In a multivariate logistic regression model, sub-optimal work-home balance in 2012 (n=670),
12 controlled for age was significantly associated with being senior doctor (OR 2.18, 95% CI 1.25-
13 3.81), being male (1.51, 1.01-2.25) and working in the surgical domain (OR=1) vs. laboratory
14 medicine (0.37, 0.18-0.76), internal medicine (0.58, 0.34-0.98), psychiatry (0.37, 0.19-0.74),
15 paediatrics (0.70, 0.30-1.65), anaesthesiology (0.48, 0.21-1.09), gynaecology (0.53, 0.22-1.28)
16 and others (0.75, 0.17-3.31) (data not shown).

17
18 *Time for postgraduate training*

19 The majority of hospital doctors (64.2%) reported that a 45 hour work-week was sufficient for
20 securing the quality of obligatory postgraduate training for junior doctors, while a minority
21 reported that it could have been shorter (24.8%) or it could have been longer (11%) (data not
22 shown).

23
24 Table 3 shows a multivariate logistic regression model with wanting more than 45 hours a week
25 for postgraduate training as response variable. Significant associations were found with age,
26 being senior doctor and working within surgical specialty, but not with gender or total weekly
27 working hours.

Table 3.

Figure 4 shows the proportion of different hospital-based specialties in Norway who think a 45 hours' work-week is about right (blue), could have been shorter (grey) and could have been longer (red) in relation to the quality of specialist training in 2012. The variation is considerable. Doctors in most surgical specialties were more likely to report that the work-week could be longer.

Figure 4.

DISCUSSION

Main findings

Average weekly working hours for Norwegian hospital doctors have remained more or less unchanged between 1994 and 2012, and amount to approximately 46-47 hours for senior doctors and 45-46 hours for junior doctors, lower than the requirements of the EWTD, starting at 58 hours in 2004 and going down to 48 hours in 2009. In 2012, the majority of senior and junior doctors in Norway expressed that this was sufficient for the obligatory postgraduate training.

Comparison with other studies

A cross-national comparison of doctors' working hours is limited by methodological differences. However, Norwegian junior and senior doctors have clearly shorter working hours than other hospital doctors in the EU, who report between 50 and 90 hours a week during the last decade.^{6,15,16,18,19,21-23} In contrast to Norway, the weekly working hours for hospital doctors in Austria, France, Germany, and the UK all decreased after the introduction of the EWTD.^{21-24,30} Norwegian doctors also seem to have a better work-home balance. Working more than 48 hours a week was reported from 30.7% of senior and 14.6% of junior doctor in 2012, compared with

1 73% of German hospital doctors in 2013,²³ and 68% of UK consultants in 2005. In 2013, 36%
2 of Austrian hospital doctors worked more than 60 hours per week,²¹ compared with only 2.5%
3 in our sample in 2012 (data not shown).
4
5 Weekly working hours for Norwegian junior doctors is slightly shorter than for senior doctors.
6 In other European studies there is no clear pattern here.^{21,23,24} The longer working hours for male
7 doctors is more consistent.^{6,13,24,38,39} Longer work-week among seniors and male doctors is a
8 possible explanation for the significant association of sub-optimal work-home balance (defined
9 as working more than 48 hours a week) with being a male and being a senior doctor.
10
11 In comparison with most other professional groups in Norway, senior and junior doctors are
12 more likely to work longer hours, even though such a comparison must be made with caution.
13 In the OECD study from 2011 on Better Life Index, 2.8% of employed Norwegians had a
14 longer working week than 50 hours⁴⁰ compared to 28.7% of senior and 12.2% of junior doctors
15 in our sample in 2012 (data not shown). In a national survey from 2011,³⁶ 2% of office workers,
16 3% of cleaners, 4% of sales and service occupations, 6% of college graduates, 7% of craftsmen,
17 13% of managers, 13% of university graduates, 13% of chauffeurs, 20% of transport workers
18 and 42% of farmers and fishermen worked more than 45 hours per week, compared to 55% of
19 senior and 35% of junior doctors in our 2012 sample (data not shown).
20
21 Interestingly, the total weekly working hours in Norway for full time employed junior and
22 senior doctors that are subject to national legislations^{9,10} are similar to those of GPs and private
23 practice specialists who decide their own working hours. No comparative studies were found on
24 this issue.
25
26 In 2012, the majority of senior and junior doctors in Norway felt that the present 45 hours
27 working week is sufficient for postgraduate training. This is in accordance with a review by

1 Temple of the impact of the EWTD on the quality of training for doctors showing that a high
2 quality of training can be delivered within the framework of a 48 hour working week.³⁰ That
3 doctors in most surgical domains in our study were more likely to report that the work-week
4 could have been longer in relation to the quality of obligatory specialist training for juniors is in
5 line with a number of studies discussing the effect of working time reduction on the
6 performance of surgeons.^{29,32} Our findings that senior doctors were more inclined than junior
7 doctors to have more than 45 hours a week for postgraduate training, confirm previous studies.²⁹

9 *Why is Norway different?*

10 Hospital doctors' work conditions are of course closely associated with work organisation⁴¹ and
11 national directives.⁵

13 One of the main differences between the European and the Norwegian directives on doctors'
14 working time is the effectuation date. In Norway, a significant reduction of working hours for
15 doctors took place already between 1960 and 1988.^{8,36} Today, the contracted basic working
16 week in full time employment in Norway (35.5-40 hours) is lower than the maximum weekly
17 working week in the EWTD (48 hours). However, both the European and the Norwegian
18 directives include an opt-out option allowing for longer hours with the employee's consent. It is
19 also worth noting that working hours for junior and senior hospital doctors in Norway since
20 1985 have been decided through annual deliberations between the relevant employer and
21 employee organisations.⁷

23 Hospital doctor density and workload influence working hours. OECD data from 2012 show a
24 density of practising doctors per 1,000 inhabitants in Norway of 3.7, higher than in most other
25 European countries, e.g. UK (2.8), Belgium (2.9), Finland (3.2), Denmark (3.5).⁴² Norwegian
26 doctor workforce statistics indicates a significant increase in practising junior doctors, from
27 2,558 in 1994 to 5,063 in 2012, and senior doctors from 3,700 in 1994 to 6,892 in 2012 (Table

2).³⁷ According to Statistics Norway, the number of doctors from 1990 to 2009 increased faster than in any other European country, particularly hospital doctors.⁴³ Furthermore, a study of staff and productivity in somatic specialist health care in 2008 suggested a lower workload for hospital doctors due to more hospital doctors and less clinical productivity (measured by numbers of hospital dismissals and outpatient consultations and treatments) in Norway than in Denmark, Finland, Germany, and Scotland.⁴⁴

The family friendly Norwegian welfare system should also be mentioned. The Norwegian legislations grant the mothers a year's leave with full pay in connection with childbirth or adoption, and the fathers are entitled to an additional three months. This in itself is a strong driver for shorter work-weeks.

Adherence to mandatory regulations of hospital doctors' work time varies considerably within the European countries. A study on UK junior doctors' working arrangements from 2008 to 2010 shows that over half of the junior doctors experienced pressure to work unofficially beyond the work time limit.²⁰ A survey by the Royal College of Physicians in 2004 found that many junior doctors were forced to work over ninety hours during seven-night rotas.¹⁹ According to surveys by the German Doctors Union and the Norwegian Medical Association, 59% of German hospitals doctors complained about the renege on stipulated maximum working hours, while only 30% of the Norwegian hospital doctors reported a pressure from the hospital administrations to deviate from actual work time agreements.^{22,45} Only very few senior (2-4%) and junior (1-3%) doctors in Norway ever exceed the 60 hours per week maximum (data not shown).

We have shown that the difference in weekly working hours between senior and junior doctors in Norway was not statistically significant, with exception of 2000. This may partly be due to small differences in remuneration between senior and junior doctors. In a study from 2007,

1 immigrant German doctors in Norwegian hospitals reported better collegial teamwork and no or
2 flat hierarchy between seniors and doctors in training as reasons for coming to and staying in
3 Norway.⁴⁶ In a study with data from 2006 we have shown how Norwegian doctors compared
4 with their colleagues in German hospitals were significantly more satisfied with working hours
5 and payment.¹²

6
7 Adherence to working time regulations and a good balance between professional and private life
8 are important cultural values in Norway. In the Fourth European Working Conditions Survey,
9 Norway was found to have the second-lowest average weekly work time (39.4 hours vs. 43.2
10 hours in the UK, 41.9 hours in EU), and the lowest percentage of employees with a work-week
11 exceeding 48 hours (6% vs. 13% in the UK, 15% in the EU).^{35,47}

12
13 Even if the majority of Norwegian hospital doctors are satisfied with the present situation in
14 terms of postgraduate training, significantly more senior doctors and those doctors working in
15 the surgical domain would like longer work hours. That senior doctors were more inclined than
16 junior doctors to express the view that longer working week had benefit junior doctors might
17 suggest a “generational shift”.²⁹ According to differences between doctors in different
18 specialties, previous studies show that surgeons compared to non-surgeons have higher
19 workload, longer working hours, more night’s on-calls and stronger professional interest.^{6,11,25,48}

20 A recent study on Norwegian doctors in specialisation with data from 1999 to 2010 found the
21 highest number of working hours per week in surgery, orthopaedics, anaesthesiology and
22 internal medicine.²⁵ According to a literature review on the impact of the working time
23 regulations on medical education and training in European studies, doctors in the surgical
24 domain perceive the work-week limitation largely negative on surgical training.²⁹ Important
25 elements in surgical training are based on being present and available in emergency situations,
26 which cannot always be planned. It is also often a question of having taken part in a number of
27 defined but not necessarily frequent procedures. If the training comes to a point where the junior

1 doctors too often miss important acute or emergency operations simply because they are not
2 present, the only remedy is more presence. In a study among surgical residents and surgical
3 consultants in Switzerland, 60% of surgical consultants felt that surgical residents should be
4 present longer than the work-week limitation.¹⁷ Therefore, it should be considered whether
5 Norwegian junior doctors in surgical training should practice longer hours, at least for parts of
6 their training.

8 *Strengths and limitations*

9 The study's main strength is the representative cohort with repeated data that allows for
10 generalisation to the whole population of hospital doctors in Norway. The response rates are
11 fairly good, ranging from 67% to 95%, which are higher than in a number of similar
12 studies,^{6,18,20-23} but do not rule out the possibility of non-response bias. Self-reported working
13 hours may of course deviate from the actual number of hours worked, but it is not easy to judge
14 whether the respondents are likely to overestimate or underestimate their own hours. The
15 expanded specification of different elements of weekly work hours - secondary positions
16 mentioned explicitly from 2006 and on-call time and professional update from 2008 - should
17 not affect the total number of hours worked since the questions have consistently focused on
18 eliciting the total number of hours worked per week. The inclusions and exclusions of
19 respondents over time, and the exchange between junior and senior doctors, is a reason for
20 caution. Over a period of 18 years some doctors will also work in functions other than that
21 hospital doctor. Some doctors may leave the panel due to retirement, death or voluntary
22 withdrawal, and a few senior doctors become junior doctors if they embark on sub-
23 specialisation or want a second specialty.

25 *Conclusion*

26 The average weekly working hours and the proportion with sub-optimal work-home balance did
27 not change significantly among Norwegian junior and senior doctors from 1994 to 2012. No

1 differences were found in weekly working hours of employed hospital doctors and self-
2 employed GPs or private practice specialists. Junior and senior hospital doctors in Norway
3 enjoy a shorter work-week than hospital doctors in several other countries. National working
4 time regulations based on deliberations, cultural values and the high and growing doctor density
5 are important causes. When the majority of Norwegian junior and senior hospital doctors report
6 that sufficient postgraduate training schemes can be executed within a 45 hour working week, it
7 lends support to the EWTD of maximum 48 hours. However, the speciality differences may call
8 for more flexibility in working time regulations, particularly among surgeons.

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DECLARATIONS

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Contributors JR and OGA designed the study and did the statistical analysis. JR undertook the literature review and wrote the first draft. OGA made critical revisions. Both authors had full access to all of the data (including statistical reports and tables) and are jointly responsible for the integrity of the data and the accuracy of the data analysis.

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Competing interest None declared.

Ethics approval According to the Regional Committee for Medical Research Ethics, the study based on “Norwegian Physician Survey - A bi-annual prospective questionnaire survey to a representative sample of Norwegian physicians” is exempt from review in Norway, cf. §§ 4 of The Act. The project can be implemented without the approval by the Regional Committee for Medical Research Ethics (IRB 0000 1870). Additionally, approval for data protection of the bi-annual prospective survey among Norwegian doctors was obtained from the Norwegian Social Science Data Service (Reference 19521).

Data sharing statement The authors may be able to provide aggregated data on which the analysis is based, on request. No additional data available.

Figure captions

Figure 1. Sample characteristics

Figure 2. Average weekly working hours for senior (blue) and junior (green) hospital doctors in full time, with a 95 per cent confidence interval, from 1994 to 2012, and in relation to the requirements of the EWTD (red).

Figure 3. Average weekly working hours for female (yellow) and male (black) hospital doctors in full time, with a 95 per cent confidence interval, from 1994 to 2012, and in relation to the requirements of the EWTD (red).

Figure 4. Proportion of different hospital-based specialties in Norway who think a 45 hour working week is about right (blue), could have been shorter (grey) and could have been longer (red) in relation to the quality of specialist training in 2012.

Specialties marked* are surgical subspecialties, that require 3 extra years of training after authorization in general surgery. Specialties marked** are medical subspecialties that require 3 extra years of training after authorization in general (internal) medicine. Numbers of respondents are in parentheses.

Table 1. The numbers, response rates and composition of the 11 waves of the survey

	Sample	Respondents	Response	Hospital	Hospital	Other
	(n)	(n)	rate	seniors	juniors	doctors
	(n)	(n)	(%)	(n)	(n)	(n)
1994	1,272	1,209	95.0	371	179	659
1995	1,258	1,145	91.0	372	166	607
1996	1,287	965	75.0	374	130	461
1997	1,260	951	75.5	322	86	543
2000*)	1,606	1,321	82.3	389	226	706
2002	1,608	1,174	73.0	205	104	865
2004	1,499	1,004	67.0	194	91	719
2006	1,400	966	69.0	375	71	520
2008*)	1,649	1,072	65.0	405	176	491
2010	1,520	1,014	66.7	415	116	483
2012*)	1,792	1,279	71.4	436	246	597

*) young doctors added to the cohort

Table 2. Sample characteristics and representativeness of the sample with regard to seniority, gender and age in 1994 and 2012.

	Study samples		Norway	
	1994	2012	1994	2012
All doctors (n)	1,209	1,272	11,847	23,260
Seniority (n)				
junior doctors	179	246	2,558	5,063
senior doctors	371	436	3,700	6,892
Seniority (%)				
junior doctors	14.5 (12.5 - 16.5)	19.3 (17.4 - 21.8)	22.6	21.8
senior doctors	30.7 (28.1 - 33.3)	34.3 (31.8 - 37.0)	31.2	29.6
Females (%)				
junior doctors	43.0 (40.2 - 45.8)	65.4 (62.8 - 68.0)	40.2	59.2
senior doctors	18.3 (14.4 - 22.2)	39.2 (34.6 - 43.8)	15.8	37.2
Mean age (years)				
junior doctors	36.4 (35.4 - 37.5)	34.4 (33.4 - 35.5)	35.4	35.4
senior doctors	48.9 (48.2 - 49.7)	50.7 (50.0 - 51.5)	49.3	51.2

Table 3. Logistic regression with wanting more than 45 hours a week for postgraduate training in 2012 as response variable, N= 628

	OR	95% CI for OR	P-value
Age in years	1.04	1.01-1.08	0.014
Females (vs. males)	0.57	0.31-1.07	0.083
Total weekly working hours	1.77	0.73-4.29	0.203
Senior doctors (vs. junior doctors)	1.07	1.04-1.11	0.0001
Medical specialty, ref. surgery			
laboratory medicine	0.03	0.01-0.25	0.001
internal medicine	0.31	0.17-0.58	0.0001
psychiatry	0.12	0.04-0.36	0.0001
pediatrics	0.36	0.12-1.07	0.066
anaesthesiology	0.08	0.02-0.39	0.002
gynaecology	0.07	0.01-0.56	0.012
other	0.39	0.04-3.56	0.401

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