

## Annotation

# Survey of the specializing doctor training in orthopedics and traumatology across university hospitals in Finland

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This annotation describes the results from national audit of the orthopedics and traumatology specialization program and specializing physicians' skills across all 5 university hospitals in Finland (Helsinki University Hospital, HUH; Kuopio University Hospital, KUH; Tampere University Hospital, TAYS; Turku University Hospital, TYKS; and Oulu University Hospital, OYS).

Competency-based training in surgical specialties is gathering more interest worldwide (Nousiainen et al. 2018, Gustafsson et al. 2019, LaPorte et al. 2019). In Finland, at the end of 2018, a reform of specializing physician training and also of the whole specialist training in surgery was launched, aiming at taking steps towards competency-based education (Paananen 2017, Seppänen 2018). The previous specialization curriculum was time dependent, taking 6 years of surgical training at minimum. It included 9 months in primary healthcare service, a minimum of 2 years and 3 months of general surgical training at a central hospital, after which more focused specialty training (such as orthopedics and traumatology) took place in a university hospital (3 years or more). The competency of a consultant orthopedic surgeon was then granted after finalizing the national specialization exam, consisting of 5 freely formulated questions concerning orthopedics and traumatology.

As a result of the reform in Finland, the narrower specialty of surgery must currently already be decided at the application phase. The actual specialization includes a 12-month surgical orientation period in various areas of surgery, followed by a 6-month trial period in a narrower specialty, such as orthopedics and traumatology. After the trial period, there is 9–12 months of competency-based general education in a narrower specialty and then a 3-year differentiating phase. At least 1 year of train-

ing must be completed at a university hospital and at least 1 year at a central hospital. Therefore, differences may be found in Finnish specialist training in comparison with other countries (reviewed earlier). For an example, in the United Kingdom (UK), Trauma & Orthopedic surgery training initially includes a 2-year Foundation Training in different specialties of medicine, and after that doctors apply for a Core Surgical Training (CST) program for the next 2 years. CST includes 4- to 6-month periods in different areas of surgery. After CST, junior surgeons apply for a Specialist Surgical Training program, which typically lasts 6 years and ends with a specialty exit exam. After passing the exam a Certificate of Completion of Training is received (BOTA Collaborations and Rashid 2018).

Compared with other European countries in addition to the UK, France and a few other countries do not have any mandatory course training, in comparison with Finland where 80 hours is required. On the other hand, in Croatia and Denmark the requirement is over 300 hours of course training. The highest minimum numbers of required surgical procedures are in the UK and Ireland—1800 procedures—whereas in Finland there are no specified requirements. In Finland there is a final written exam, but for example in Sweden there is no exam at all (Madanat et al. 2017). The present annotation provides extensive information on the different areas of specialization training in orthopedics and traumatology.

### Electronic survey

The electronic audit questionnaire (Supplement 1) was compiled for specializing physicians (registrars) in orthopedics and traumatology using the SurveyMonkey tool. The questionnaire was sent by e-mail link to all specializing physicians (n = 61) at the time of the audit, i.e., April to June 2019. All

of these specializing physicians had completed the common trunk of their surgical training at the time of the audit. They are also part of the old system of specialist training before the reform at the end of 2018, when specialist training was time dependent, taking 6 years minimum, and general surgical training in various fields of surgery was 15 months in duration. Since the reform at the end of 2018, specialist training includes a 12-month orientation period in various fields of surgery and after that is focused only on the narrower specialty, for example orthopedics and traumatology, and is more competency-based than time dependent. The questionnaire included around 100 questions regarding surgical skills and education, clinical and scientific work, and other aspects of specializing physician training. The data was pseudonymized and the respondents gave permission to use the answers for research purposes.

The audit included 2 questions on the amount of and competency in orthopedic and traumatological procedures performed. These numbers were a subjective estimate made by the specializing physicians themselves. 9 respondents gave indefinite, non-numerical answers and were eliminated. 14 respondents gave answers such as “100–200” or “100+,” in which case we considered the mean of the range as the definite answer or the lowest reported number.

### **Educational views (Supplement 2)**

36 (mean age 35 years, 23 male) of 61 submitted surveys were answered. 3 respondents answered only the first question and were eliminated from the analyses.

22 respondents considered job description to be the most important factor when choosing a future job. Interestingly, all respondents intend to work as an orthopedist in a public hospital or facility in the future after the specialization program rather than the private sector.

26 respondents consider that university hospitals have a good or very good opportunities for accessing leadership training. However, 10 respondents consider the opportunities to be poor or very poor. According to the respondents, leadership training is offered for an average of 0–30 credits and is free of charge. Almost all (32) respondents have calendar time set aside for meeting-type training (approximately 3 hours per week). However, no working time is set aside for preparation of meeting presentations.

### **Surgical skills training (Supplement 3)**

When considering the traumatological procedures done by specializing physicians, all respondents have operated on a hip fracture with a trochanteric nail, operated on an ankle fracture, and 33 respondents have done a plate fixation of a wrist fracture independently in some way. In contrast, one-third have operated on a proximal humerus fracture and one-fifth have operated a vertebral fracture independently.

When considering the orthopedic procedures performed by specializing physicians independently, none of the respon-

dents have operated on a knee cruciate ligament or collateral ligament with a graft and only 1 has done medial patellofemoral ligament reconstruction independently. One-fourth have done shoulder decompression independently and 5 respondents have operated on a rotator cuff rupture. In contrast, 34 respondents have removed osteosynthesis material independently and 33 have done carpal canal release independently.

### **Synthesis of the survey**

In this study, we audited the content of the specialist training program in Finland before the reform at the end of 2018. In this way, it will be possible to evaluate the success of renewed training in the future by implementing the survey again after 3–4 years. Most likely there will be changes in the duration of the specialization. Also, the number of independently performed surgical procedures may increase as the narrower specialty of surgery is already decided in the application phase and because the training is more competency oriented.

According to the present audit, all of the respondents intend to work as a specialist at a public hospital or facility in the future and none of the respondents are considering working in the private sector. In many countries, it is common to enter a fellowship after specialization in orthopedics and traumatology. This is not the case in Finland, and the interest in working in the public sector might be due to fact that the respondents want to gather more experience after graduation before working in the private sector. In Finland, specialization in orthopedics and traumatology does not officially include a working period in the private sector. Accordingly, this may influence reluctance to consider a private hospital as a future employer.

Specializing physicians gave a self-estimated number of how many independently performed procedures they have done already. A common logbook at the national level is paramount to obtain more exact information on the true number of procedures. At present, steps at the national level have been taken to introduce such a uniform logbook.

Recent evidence favors a nonoperative treatment line for several orthopedic conditions. As an example, the number of independently performed surgeries on proximal humerus fractures was quite low, which may reflect treatment policies. Also, the number of arthroscopic procedures was low, reflecting recent evidence.

The overall response rate was modest. Two-thirds of the specializing physicians in Finland responded to the survey, but this sample can be considered quite representative as all university hospitals were included.

This audit did not include a section on pediatric orthopedics. Pediatric orthopedics is a subspecialty in Finland and is not provided in all university hospitals due to lack of resources. The purpose in this annotation was to audit basic training in orthopedics and traumatology provided at all university hospitals.

In conclusion, according to our survey of the orthopedic specialization in Finland, the number of key orthopedic procedures was found to be quite high. The survey also provides

widespread information on the general training conditions of specializing physicians in orthopedics and traumatology in Finland. In the future, auditing will be easy to extend to other areas of medical specialization too. The information can be used directly to develop the structure and content of specialist training. In the first instance, the procedures should be taught according to evidence-based medicine. According to the results of the questionnaire, the amount of arthroscopy training should be increased. Also, new audits in other countries can be compared to further develop specializing-doctor training. The effect of the renewal on specialization training remains to be seen after follow-up audits. Arthroscopy training may be improved by modern VR (virtual reality) based simulators. Also, other VR surgical training is evolving and may substantially change the training in widespread areas of orthopedics and traumatology.

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#### *Supplementary data*

Supplements 1–3 are available in the online version of this article, <http://dx.doi.org/10.1080/17453674.2021.1910772>

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## Supplementary data

### Supplement 1. University hospital training audit for orthopaedics and traumatology 2019 – specializing physicians

Q1. Do you consent to having your answers used for research purposes?

- I do
- I do not

Q2. Age (years)

Q3. Sex

- Male
- Female

Q4. Current place of work (e.g. name of hospital)

Q5. At which hospital(s) did you carry out your introductory training?

Q6. At which university hospital are you carrying out your specialty training?

- Kuopio University Hospital
- Helsinki University Hospital
- Tampere University Hospital
- Turku University Hospital
- Oulu University Hospital

Q7. Education

- Lic.Med.
- D.Med.
- Docent

Q8. Do you have a prior Specialist Degree in Medicine?

- No
- Yes, please specify: How long did it take for you to complete foundation training?

Q9. How many full years have you been in specialty training?

Q10. Permanent position

- Specialisation position
- Deputy
- Other (please specify)

Q11. Have you read your university's syllabus ("study guide") for specialty training in medicine?

- Yes
- No

Q12. Do you know where to find the study guide for specialty training?

- Yes
- No

Q13. Have you passed your medical specialist's examination?

- Yes
- No

Q14. After graduation, how long have you been working as a doctor in orthopaedics? (please round off to the nearest month, e.g. 2 years 3 months)

Q15. Of that time, how long have you worked at a regional hospital?

Q16. Of that time, how long have you worked at a central hospital?

Q17. Of that time, how long have you worked at a university hospital?

Q18. Of that time, how long have you worked elsewhere? Where? Please specify.

Q19. How much of your specialty training have you spent or how much of your specialty training has been allocated for conducting research?

Q20. How long have you worked at your current workplace?

Q21. How long have you been working as acting senior orthopaedist?

Q22. Did you consider other specialties before choosing orthopaedics?

- Yes
- No

Q23. After completing your specialty training, on what grounds will you be choosing your place to work? Please rank the following in order of importance. (1=most important, 8=least important)

- Salary
- Location
- Patient material at the workplace
- Emergency duty
- Opportunity for flexible working hours
- Job description
- Open permanent position/vacancy
- Being approached by the employer
- Other (please specify)

Q24. After having completed your specialty training, are you going to primarily work

- As an orthopaedist at a public sector hospital or institution
- In administration in the public sector
- As a researcher or teacher
- As a self-employed person
- As an expert
- As something else, please specify

- Q25. Are you aware of the contents of the core content analysis of your university's orthopaedic specialty training?  
Yes  
No
- Q26. How do you take part in training/instructing other specialising doctors, candidates of medicine, or persons in complementary specialty training?
- Q27. Are you aware of there being an annual curriculum/training plan for specialising physicians?  
Yes  
No  
If you answered 'Yes', what can you tell about its contents?
- Q28. If your clinic has an annual curriculum/training plan (e.g. rotational training), can the specialising physicians influence its contents?  
Yes  
No
- Q29. Is there a person at your clinic who has been appointed responsible for developing the medical specialty training?  
Yes  
No  
I do not know
- Q30. Do you have or have you had a personal advisor or tutor?  
Yes, at the regional hospital  
Yes, at the central hospital  
Yes, at the university hospital  
I have had the same advisor/tutor throughout my specialty training  
I have not had an advisor/tutor at any stage
- Q31. Do you and your supervisor have an annual counselling or feedback discussion?  
Yes  
No
- Q32. Do you have a personal study plan?  
Yes  
No
- Q33. How frequently is your personal study plan updated (e.g. in a performance appraisal discussion)? Please provide the answer in months.
- Q34. Do you receive oral feedback on your skills and work?  
Yes  
No  
If you answered 'Yes', how often? (monthly, every 3 months, once a year, more infrequently)
- Q35. Do you receive written feedback on your skills and work?  
Yes  
No  
If you answered 'Yes', how often? (monthly, every 3 months, once a year, more infrequently)
- Q36. Are you asked to provide regular written feedback on your training?  
Yes  
No  
If you answered 'Yes', how often? (monthly, every 3 months, once a year, more infrequently)
- Q37. Are you asked to provide regular oral feedback on your training?  
Yes  
No  
If you answered 'Yes', how often? (monthly, every 3 months, once a year, more infrequently)
- Q38. What other means of giving feedback on your training do you have?
- Q39. Have you been allocated time for preparing for your medical specialist's examination?  
Yes  
No  
I do not know
- Q40. Is it easy for you to get a leave of absence or active leave to prepare for the examination?  
Yes  
No
- Q41. Do you have a permanent timeslot in your schedule for attending meeting-type training?  
Yes  
No
- Q42. How many hours of meeting-type training does your clinic provide in a week?
- Q43. If you give meeting presentations, are you always allocated time for preparing the meeting presentations?  
Yes  
No  
I do not need to give presentations
- Q44. According to the new regulations, at least one year of training needs to be spent working at a university hospital and one year outside a university hospital. Would you find it appropriate if  
The entire specialty training took place at a university hospital  
3 months to 1 year of specialty training took place at a central hospital  
3 months to 1 year of specialty training took place at a university hospital  
Half of the specialty training took place at a central hospital and the other half at a university hospital  
The entire specialty training took place at a central hospital  
The specialty training took place somewhere else.  
Please specify why

- Q45. Was your answer to the previous question mainly influenced by your  
Living/family situation  
Training  
Some other reason (please specify)
- Q46. In my opinion, the length of the current 3-year long field-specific training is appropriate.  
Yes  
No  
If you answered 'No', what would you consider to be an appropriate length for the field-specific training?
- Q47. The current length of surgical foundation training, 2 years and 3 months, is appropriate considering the emergency and general surgical skills required by the profession.  
Yes  
No  
If you answered 'No', what would you consider to be an appropriate length for the foundation training?
- Q48. What things can only be learnt at a university hospital?
- Q49. In your opinion, is the current examination the best method for testing learning outcomes or should other potential methods be considered for assessing the ability of working as a medical specialist?  
The current examination is the best method  
The current examination could be developed in the following manner / the examination could be replaced by:
- Q50. If you answered 'The current examination is the best method', should the examination in your opinion be taken in smaller sections as the training progresses?  
Yes  
No
- Q51. Did the physician's foundation training provide you with sufficient skills to begin your specialty training in orthopaedics?  
Yes  
No  
If you answered 'No', please specify
- Q52. Does your clinic have research projects in which a specialising physician can take part?  
Yes  
No  
Do the persons conducting research have sufficient supervision during research projects?
- Q53. Does the university provide subject-appropriate researcher training?  
Yes  
No
- Q54. Are you involved in a research project?  
Yes  
No
- Q55. If you are conducting research, have you been granted paid leave for scientific work?  
From VTR (EVO) funding  
From elsewhere
- Q56. If you are conducting research, have you been granted research leave in general?  
Yes  
No
- Q57. Does your clinic have good opportunities for conducting research?
- Q58. Are you working on a doctorate?  
Yes  
No  
I have a doctorate  
If you have a doctorate, does it affect your salary?
- Q59. How many academic articles have you published? (written independently or co-written)
- Q60. Relative strain in doctors (very minor, minor, reasonable, major, significant)  
How strained are you feeling?  
How strained are the other specialising physicians at your clinic?  
How strained are the specialists at your clinic?
- Q61. The main factors contributing to the feeling of being strained (name three)
- Q62. The main factors contributing to well-being at work (name three)
- Q63. How collegial is the atmosphere at your clinic?
- Q64. Are considering specialising in something else?  
No  
Yes  
If you answered 'Yes', please specify why and mention which specialty you are considering
- Q65. Compared to my current experiences, when I initially applied to specialise in orthopaedics and traumatology, I expected it to be:  
Heavier  
Similar  
Less heavy
- Q66. In your opinion, which criteria should be prioritised when choosing someone for a specialisation position? Please rank the following in order of importance. (1=most important, 5=least important)  
Community health centre service completed  
Introductory training completed  
Scientific research merits/doctoral dissertation  
Previous experience in orthopaedics at one's own clinic  
Previous experience in orthopaedics at another hospital  
Recommendations
- Q67. How would you rate your clinic's orientation arrangements?

- Q68. For how many months is each of the following placements carried out at a university hospital during specialty training? (0, 1–2, 3–4, over 4)
- Shoulder orthopaedics
  - Knee orthopaedics
  - Foot orthopaedics
  - Back orthopaedics
  - Endoprosthesis orthopaedics
  - Traumatology
  - Tumour orthopaedics
  - Paediatric orthopaedics
  - Rheumatic orthopaedics
- Q69. How would you rate your opportunities of working at the following special clinics? (Very poor, poor, good, very good)
- Traumatology
  - Endoprosthesis orthopaedics
  - Leg orthopaedics
  - Knee joint orthopaedics
  - Shoulder joint orthopaedics
  - Back orthopaedics
  - Tumour orthopaedics
  - Paediatric orthopaedics
  - Rheumatic orthopaedics
- Q70. How would you rate your opportunities of exercising the following roles in practice? (Very poor, poor, good, very good)
- Working as a superior / group leader
  - Working as an expert
  - Getting acquainted with service chains and the role of your specialty in the health care system
  - Working as a researcher
  - Working as a supervisor/trainer
- Q71. The specialty programme of my university hospital includes a common, structured rotation through the various sub-specialties
- Yes
  - No
  - I do not know
- Q72. Select the most appropriate answer
- Are you satisfied with your placements at the clinic during your specialty training?
  - How would you rate your opportunities of influencing your placements?
- Q73. How would you describe the situation regarding office space for doctors at your hospital? (You can select several options)
- Each specialist has their own personal workstation
  - Specialists have several shared offices with shared workstations (some doctors may have their own personal workstation)
  - None of the specialists has their own personal workstation (everyone uses the shared workstations in the offices)
- Specialists do not have enough workstations
- All specialising physicians have their own personal workstation
- Some of the specialising physicians have their own personal workstation, others work on a number of shared workstations
- Specialising physicians have several shared offices with shared workstations
- Specialising physicians have one shared office with shared workstations
- Specialising physicians do not have enough workstations
- Q74. Does your university hospital have shared spaces for orthopaedists? (e.g. orthopaedic library, recreation room etc.)
- Yes
  - No
- Q75. Number of traumatological operations at the hospital (none, provided assistance, performed an operation with assistance, performed an operation independently with an estimate of the number of independently performed operations)
- Lower leg fasciotomies
  - Operative treatment of Achilles tendon rupture
  - Treatment of hip fracture with a trochanteric nail
  - Treatment of pertrochanteric fracture with a DHS
  - Treatment of fracture of the femoral neck with total arthroplasty
  - Treatment of fracture of the femoral neck with a prosthesis
  - Screw fixation of fracture of the femoral neck, cannulated screws
  - Intramedullary nailing of femur diaphysis fracture
  - Laminofixation of femur diaphysis fracture
  - Operative treatment of patella fracture
  - Intramedullary nailing of leg fracture
  - Laminofixation of leg fracture (distal/proximal)
  - Initial treatment of complex lower limb fracture with external fixation
  - Operative treatment of ankle fracture
  - Laminofixation of collarbone fracture
  - Operative treatment of proximal humerus fracture
  - Reposition of shoulder luxation
  - Fixation of olecranon fracture with tension band/plate
  - Operative treatment of antebrachium fracture
  - Treatment of wrist fracture with external fixation
  - Treatment of wrist fracture with laminofixation
  - Closed repositioning of wrist fracture + casting
  - Operative treatment of a simple finger/MC fracture
  - Suturation of finger extensor
  - Finger amputation
  - Below- and above-knee amputation
  - Operative treatment of vertebral fracture
  - External fixation of hip fracture

- Laminofixation/screw fixation of hip fracture  
 Laminofixation of acetabulum fracture  
 Initial treatment of a multitrauma patient  
 Repeat operation of nonunion  
 Revision surgery of infected osteosynthesis/fracture  
 Working as a trauma leader  
 Trauma ward rounds + responsibility for the ward
- Q76. *Number of orthopaedic procedures at the hospital (none, provided assistance, operated with assistance, operated independently and an estimate of the number of independent operations)*  
 Hallux valgus surgery (Chevron)  
 Hallux valgus, proximal procedure (TMT arthrodesis, osteotomy)  
 MTP I arthrodesis  
 Trochlear resection  
 FDL transposition  
 Correction of pes planovalgus  
 Knee arthroscopy + simple procedure (meniscal procedure, Staedmann)  
 Knee cruciate ligament / collateral ligament surgery with graft  
 Patella instability surgery, MPFL reconstruction  
 Arthroscopic lavage for purulent arthritis of the knee  
 Knee TEP  
 Hip TEP  
 Surgical treatment of prosthesis infection  
 Hip revision arthroplasty  
 Knee revision arthroplasty  
 Dorsal prolapse surgery  
 Dorsal stenosis surgery  
 Instrumented spondylodesis  
 Mobilisation of the shoulder in narcosis  
 Shoulder endoscopy, decompression  
 Corrective surgery of rotator cuff  
 Corrective instability surgery of the shoulder joint (Bankart/Latarjet)  
 Carpal canal discision  
 Ankle arthroscopy  
 Ankle arthrodesis (TC, subtalo)  
 Hip arthroscopy/labrum correction  
 Removal of osteosynthesis material  
 Rounds at elective inpatient ward
- Q77. *How would your rate the teaching of the following topics at your clinic? (Very poor, poor, good, very good)*  
 Demanding assessments and statements  
 Making a decision on starting expensive treatment  
 Giving a meeting presentation  
 Preparing a presentation for a lay audience (patients, policy-makers)
- Q78. *Have you had the opportunity to utilise literature free of charge while conducting research during your specialty training?*  
 Yes  
 No
- Q79. *Comprehensiveness of library services (very poor, poor, good, very good)*  
 Availability of e-books and text books  
 Availability of key electronic publication series in orthopaedics  
 Availability of electronic databases, such as UpTo-Date, Terveysportti etc.
- Q80. *Select the most appropriate option (very poor, poor, good, very good)*  
 Opportunity to utilise scientific literature in your clinical work  
 Opportunity to regularly participate in the internal training of the clinic  
 Opportunity to give meeting presentations  
 Range of topics covered by the meeting presentations at the clinic with regard to your objectives  
 Opportunity to attend regular training outside the establishment  
 Opportunity to attend theoretical studies during work hours
- Q81. *On how many days a year can you attend external training sessions?*
- Q82. *Select the most appropriate option (very poor, poor, good, very good)*  
 You employer's financial support for external training (course fees, travel costs, per diems, pay)  
 Your opportunities of attending training sessions abroad  
 Advice on the use your clinic's information systems  
 Your opportunities to work as a superior  
 Your opportunities to receive training in administration
- Q83. *Management training (very poor, poor, good, very good)*  
 Your opportunity to participate in management training
- Q84. *How extensive is the management training provided to you (e.g. front-line manager)? (in ECTS credits)*  
 0–10  
 11–20  
 21–30  
 over 30 ECTS
- Q85. *Is the management training provided free of charge?*  
 Yes  
 No  
 Partially (please specify)



- Q86. *Select the most appropriate option (very poor, poor, good, very good)*  
Your possibility of attending pedagogical studies  
Your possibility of getting to instruct other specialising physicians  
Range of patient material with regard to the training  
Opportunities for senior consultations in your own specialty  
Opportunities for senior consultations in preparing statements  
Opportunities for senior consultations in other specialties  
Amount and quality of theoretical training provided to you at the clinic  
Comprehensiveness and quality of the practical training  
Learning environment at your clinic
- Q87. *Does your clinic have employee time tracking?*  
Yes  
No
- Q88. *How many hours do you on average work overtime each week? (normal working hours 38.25 h/week)*
- Q89. *Do you receive overtime compensation at your clinic?*  
Yes, as overtime pay  
Yes, as extra leave  
No
- Q90. *On average, how many times a month do you work in emergency duty at the workplace?*
- Q91. *On average, how many hours of sleep do you get while working in emergency duty at the workplace?*
- Q92. *On average, how many times a month are you on emergency duty at the ward/operating room?*
- Q93. *On average, how many times a month are you on divergent duty at the workplace? (Refers to being on duty at the workplace without being on emergency duty. In divergent duty, the amount of active work is low (approximately 20 to 40 %) and the pay correspondingly lower than in regular emergency duty)*
- Q94. *On average, how many times a month are you on call-back duty?*
- Q95. *Does your unit have enough emergency duty personnel during emergency duty hours?*  
Yes  
No
- Q96. *Would you like to have fewer on-duty hours and a correspondingly smaller pay?*  
Yes  
No
- Q97. *Would you like to have more on-duty hours and a correspondingly larger pay?*  
Yes  
No
- Q98. *Would you prefer to have shorter on-duty shifts?*  
Yes  
No
- Q99. *Name three of the best features of your clinic*
- Q100. *What are the three biggest shortcomings at your clinic, and how would you fix them?*
- Q101. *How likely would you recommend your training place to your friend or colleague? (0=very unlikely, 10=very likely)*
- Q102. *If you have any comments, please write them here*

## Supplement 2. Educational views

Question	n	Mean (SD)	Missing
Respondents			
Answered all the questions	36		
Answered only the first question	3		
Age (years)	35	35.5 (3.8)	1
Sex			
Male	23		
Female	13		
Current place of work			
Helsinki University Hospital	9		
Turku University Hospital	7		
Tampere University Hospital	7		
Kuopio University Hospital	7		
Oulu University Hospital	6		
Education			
Lic.Med.	31		
D.Med.	4		
Docent	1		
Do you have a prior Specialist Degree in Medicine?			
Yes	2		
No	34		
How many full years have you been in specialty training?	34	5 (1.1)	2
After graduation, how long have you been working as a doctor in orthopaedics and traumatology (years)?	36	3.0 (1.6)	
Of that time, how long at a regional hospital	33	0.5 (0.9)	
Of that time, how long at a central hospital	35	1.3 (1.1)	
Of that time, how long at a university hospital	35	1.0 (0.9)	
How long have you worked at your current workplace (years)?	36	1.5 (1.8)	
Did you consider other specialties before choosing orthopaedics?			
Yes	20		
No	16		
After having completed your specialty training, are you going to primarily work			
As an orthopaedist at a public sector hospital or institution	36		
In administration in the public sector	0		
As a researcher or teacher	0		
As a self-employed person	0		
As an expert	0		
Do you have or have you had a personal advisor or tutor?			
Yes, at the regional hospital	0		
Yes, at the central hospital	8		
Yes, at the university hospital	19		
I have had the same advisor/tutor throughout my specialty training	5		
I have not had an advisor/tutor at any stage	4		
All specialty training should be			
Entirely at a university hospital	3		
3 months – 1 year at central hospital	1		
3 months – 1 year at university hospital	4		
Half at a central hospital and the other half at a university hospital	28		
Entirely at a central hospital	0		
Reason for previous answer			
Living or family situation	1		
Training	30		
Other: Versatility, quality and variety of education	5		
Is the current exam the best method for testing your skills?			1
Yes	21		
The current exam could be developed in the following manner:	14		
Oral test, multiple parts, assessment of clinical skills			
If the answer above is yes, should the examination be taken in smaller sections as the training progresses?			6
Yes	19		
No	11		
Are you involved in a research project?			1
Yes	16		
No	19		
Are you working on a doctorate?			1
Yes	11		
No	19		
I have a doctorate	5		

## Supplement 2. Continued

Question	n	Mean (SD)	Missing
How many academic articles have you published?	25	4.3 (8.2)	11
How would you rate your opportunities of working at the following special clinics? (1 = very poor, 4 = very good)			
Traumatology		3.4	3
Endoprosthesis orthopaedics		3.3	3
Leg orthopaedics / podiatry		3.0	6
Knee joint orthopaedics		2.9	6
Shoulder joint orthopaedics		2.7	5
Spine		3.3	4
Tumour orthopaedics		2.2	6
Pediatric orthopaedics		2.2	5
Rheumatic orthopaedics		2.1	6
How many hours do you on average work overtime each week?	33	4.6 (3.5)	3
How many times a month do you work in emergency duty?	33	3.5 (0.8)	3
How many times a month are you on emergency duty at the ward or operating room?	32	1.2 (0.8)	4
How many times a month are you on on-call duty?	36	0.8 (1.2)	
How many hours of meeting-type training does your clinic provide in a week?	36	2.8 (1.8)	

## Supplement 3A. Proportion (%) of specializing physicians who have performed or provided assistance in traumatological procedures and the amount of independently performed procedures

Traumatological procedure	Operated independently (%)	Operated with assistance (%)	Provided assistance (%)	None (%)	Operations done independently mean (SD)	Missing answers (n)
<b>Upper limb</b>						
Reposition of shoulder luxation	97	3	0	0	25 (15)	
Plate fixation of collarbone fracture	88	9	0	3	6.8 (5.2)	
Operative treatment of proximal humerus fracture	30	49	18	3	6.3 (7.2)	
Fixation of olecranon fracture with tension band/plate	91	3	3	3	14 (9.8)	
Operative treatment of antebrachium fracture	82	12	6	0	5.7 (7.6)	
Operative treatment of wrist fracture with external fixation	21	18	15	46	3.2 (3.5)	
Operative treatment of wrist fracture with plate fixation	91	9	0	0	15 (9.0)	
Closed repositioning of wrist fracture + casting	97	3	0	0	62 (31)	
Operative treatment of a simple finger or metacarpal fracture	67	21	0	12	6.8 (5.9)	
Suturing of finger extensor tendon	73	9	3	15	4.0 (3.3)	
Finger amputation	91	3	0	6	11 (11)	
<b>Hip, pelvis, and acetabulum</b>						
Operative treatment of hip fracture with trochanteric nail	100	0	0	0	36 (26)	
Operative treatment of peritrochanteric fracture with a DHS	76	18	3	3	8.0 (6.6)	
Operative treatment of fracture of the femoral neck with total arthroplasty	36	33	24	6	5.5 (7.5)	
a semi-endoprosthesis	100	0	0	0	47 (35)	
Screw fixation of fracture of the femoral neck, cannulated screws	73	18	6	3	6.6 (5.2)	
Intramedullary nailing of femur diaphysis fracture	67	27	6	0	7.4 (6.8)	
Plate fixation of femur diaphysis fracture	55	33	9	3	7.4 (6.7)	
External fixation of hip fracture	9	12	21	58	1.0 (1.0)	
Plate fixation/screw fixation of hip fracture	3	18	76	3	1.3 (0.6)	
Plate fixation of acetabulum fracture	3	12	64	21	2.0 (0.0)	
<b>Lower limb</b>						
Operative treatment of Achilles tendon rupture	49	30	15	6	3.2 (0.9)	
Lower leg fasciotomies	64	24	6	6	3.5 (4.4)	
Intramedullary nailing of leg fracture	69	28	0	3	8.5 (8.2)	1
Plate fixation of leg fracture (distal/proximal)	42	42	15	0	4.8 (4.0)	
Initial treatment of complex lower limb fracture with external fixation	82	3	6	9	6.1 (4.6)	
Operative treatment of ankle fracture	100	0	0	0	42 (29)	
Operative treatment of patella fracture	81	10	7	3	6.6 (4.6)	2
Below- and above-knee amputation	91	3	0	6	18 (12)	1
<b>Spine</b>						
Operative treatment of vertebral fracture	21	27	46	6	17 (20)	
<b>Other</b>						
Initial treatment of a multi-trauma patient	85	9	6	0	31 (35)	
Repeat operation of nonunion	27	33	39	0	5.6 (3.4)	
Revision surgery of infected osteosynthesis fracture	75	13	9	3	12 (12)	1
Working as a trauma leader	88	0	6	6	31 (34)	
Trauma ward rounds + responsibility for the ward	91	3	3	3	42 (42)	1

DHS = Dynamic hip screw

## Supplement 3B. Proportion (%) of specializing physicians who have performed or provided assistance in orthopedic procedures and the amount of independently performed procedures

Orthopedic procedure	Operated independently (%)	Operated with assistance (%)	Provided assistance (%)	None (%)	Operations done independently mean (SD)	Missing answers (n)
<b>Upper limb</b>						
Mobilization of the shoulder under narcosis	18	18	18	46	2.0 (1.4)	
Shoulder endoscopy, decompression	24	58	15	3	14 (33)	
Operative treatment of rotator cuff rupture	13	31	53	3	10 (17)	1
Operative treatment of instability of shoulder joint (Bankart or Latarjet)	0	9	82	9	0	
Carpal canal release	91	3	0	6	67 (40)	
<b>Hip, pelvis, and acetabulum</b>						
Hip arthroplasty	30	58	12	0	14 (11)	
Hip revision arthroplasty	3	18	76	3	2.0 (1.4)	
Hip arthroscopy and/or labrum correction	0	6	49	46	0	
<b>Lower limb</b>						
Knee arthroscopy and simple procedure (meniscal procedure, Staedmann)	85	9	0	6	20 (23)	
Operative treatment of knee cruciate ligament or collateral ligament with a graft	0	33	61	6	0	
Patellar instability surgery, MPFL reconstruction	3	27	64	6	3.8 (2.2)	
Arthroscopic lavage for purulent arthritis of the knee	73	9	12	6	3.6 (2.1)	
Knee arthroplasty	31	63	6	0	19 (20)	1
Knee revision arthroplasty	0	12	85	3	0	
Ankle arthroscopy	0	19	63	19	0	1
Ankle arthrodesis (TC, subtalar)	0	9	73	18	0	
Hallux valgus surgery (Chevron)	64	6	6	24	7.2 (5.4)	
Hallux valgus, proximal procedure (TMT arthrodesis, osteotomy)	27	12	33	27	4.4 (3.3)	
MTP I arthrodesis	76	12	3	9	14 (11)	
Trochlear resection	61	9	15	15	9.0 (6.9)	
FDL transposition	36	15	33	15	5.8 (5.8)	
Correction of pes plano valgus	0	6	64	30	0	
<b>Spine</b>						
Dorsal prolapse surgery	27	55	15	3	5.6 (3.9)	
Dorsal stenosis surgery	12	49	36	3	8.0 (6.5)	
Instrumented spondylodesis	3	33	61	3	5.7 (4.0)	
<b>Other</b>						
Removal of osteosynthesis material	94	3	3	0	37 (22)	
Surgical treatment of prosthesis infection	50	28	19	3	7.6 (5.7)	1
Rounds on elective inpatient ward	91	6	3	0	76 (86)	

MPFL = medial patellofemoral ligament; TC = talocalcaneal; TMT = tarsometatarsal; MTP = metatarsophalangeal; FDL = flexor digitorum longus.