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Orthopaedic Care in Norway: Organization, Research, and Quality Improvement

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- Norway has a universal, publicly funded orthopaedic health-care system through a network of public hospitals serving a geographically dispersed population of 5.6 million inhabitants.
- Orthopaedic care is characterized by salaried surgeons, close collaboration between hospitals, standardized treatment pathways, and equitable access to specialist services.
- National orthopaedic quality registries and high-quality clinical research are integrated into clinical practice, enabling continuous outcome monitoring, benchmarking, and rapid implementation of evidence-based improvements.
- Orthopaedic leadership has been central to several national quality improvement initiatives, including the development of secondary fracture prevention programs and national clinical guidelines, demonstrating how clinician-led collaboration can translate research into improvements in patient care.
- The Norwegian model demonstrates how universal health care, national collaboration, orthopaedic quality registries, and clinician-led innovation can be integrated to support high-quality orthopaedic care and continuous improvement.

Orthopaedic Care Within the Norwegian Health-Care System

In this article, we describe some central aspects of orthopaedic care in Norway against the backdrop of a large geographical area, a small population, and a public health system. We outline the delivery of orthopaedic services, national orthopaedic quality registries, research infrastructure, and current quality improvement initiatives. Together, these elements illustrate how a publicly funded health-care system can support equitable access to orthopaedic care while facilitating nationwide collaboration, quality improvement, and clinical research.

Norway has a tax-funded health-care system providing universal access to medical care, with the public sector delivering most orthopaedic services. Most patients are treated within this integrated health-care system. This organization facilitates multicenter collaboration, comprehensive follow-up, and population-based clinical research. The sustainability of this health-care model is supported by Norway's strong economy, which is built on abundant natural resources, high levels of social trust, and a highly skilled workforce.

Due to a relatively small population dispersed across a vast geographical area, Norway has 44 public hospitals providing acute and elective orthopaedic care (Fig. 1). A limited number of

highly specialized services, including polytrauma care, limb replantation, bone sarcoma treatment, and treatment of selected pediatric conditions, are formally centralized. In contrast, most orthopaedic care is delivered locally, although patients with more complex conditions are commonly referred to regional and university hospitals. Most orthopaedic surgeons are employed by public hospitals, typically working 42 to 48 hours per week on fixed salaries, with some also undertaking part-time work in private outpatient clinics. Table 1 presents key demographic characteristics and orthopaedic health-care indicators for Norway.

Approximately 884,000 inhabitants (16% of the population) have private health insurance in addition to public coverage, almost exclusively through their employer. The main benefit of private insurance is shorter waiting times through access to private health-care services. There are no full-service commercial hospitals in Norway. The majority of orthopaedic procedures are performed in public hospitals or non-commercial, publicly funded, private hospitals. However, several for-profit clinics offer outpatient orthopaedic surgery. The proportion of procedures performed in commercial clinics ranges from almost none for acute trauma surgery, joint arthroplasty, and instrumented spine surgery to about one-quarter for simple hand and foot procedures¹.

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Norwegian Orthopaedic Registries: From Surveillance to Clinical Impact

The development of >60 national medical quality registries, including 5 orthopaedic registries, has been a defining feature of modern Norwegian health care. Built within a publicly funded system with universal access and unique personal identification numbers enabling longitudinal follow-up, these registries were established to monitor the quality of care and reduce unwarranted variation in treatment². Over time, they have evolved into powerful tools for clinical research, implant and graft surveillance, and national orthopaedic quality improvement. The systematic collection of data on revisions and reoperations enables the early identification of poorly performing implants and surgical techniques, facilitating timely improvements in clinical practice³⁻⁸.

Norwegian orthopaedic registries are largely clinician-driven, developed through collaboration between hospitals, professional societies, and health authorities. Strong professional engagement and loyal reporting from clinicians have enabled high national coverage and robust population-based analyses with direct clinical relevance (Table 2). Only a minority of the data are collected primarily for administrative or reimbursement purposes.

Landmark Orthopaedic Registries

The Norwegian Arthroplasty Register started to register hip arthroplasties in 1987. It was among the first nationwide orthopaedic implant registries and became an international model for arthroplasty surveillance⁹. Since 1994, arthroplasties in other joints have also been reported to the register¹⁰. The Norwegian Hip Fracture Register, established in 2005¹¹, includes primary hip fracture surgery, reoperations, and patient-reported outcomes. Since 2021, perioperative variables have been added, allowing the capture of most items in the Fragility Fracture Network's minimum common data set and enabling international collaborative research¹². The Norwegian National Knee Ligament Register, established in 2004, was the first national ligament registry globally¹³, and it has served as a model for similar initiatives elsewhere over the past 2 decades. The Norwegian Registry for Spine Surgery (NORspine), established in 2007, comprises 3 sub-registries covering degenerative lumbar and cervical spine conditions and deformity surgery (for idiopathic scoliosis)¹⁴. The Norwegian Paediatric Hip Register, established in 2010, includes all children with developmental dysplasia of the hip, Legg-Calvé-Perthes disease, and slipped capital femoral epiphysis.

It has recently expanded to include adults undergoing pelvic osteotomies and hip arthroscopy, enabling lifespan-oriented outcome evaluation².

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Registry Impacts

A key strength of the Norwegian registry model is the connection between nationwide data collection and clinical practice. Registry findings have informed implant selection, surgical techniques, and treatment recommendations across subspecialties. Importantly, the registries have fulfilled their original purpose by reducing unwarranted variation in orthopaedic care. National registry data have supported more uniform implant selection, including a marked reduction in the use of cementless hemiarthroplasties for hip fracture surgery and declining use of graft types associated with higher revision rates following anterior

cruciate ligament (ACL) reconstruction². The linkage of orthopaedic quality registries with other national data sources, including the Norwegian Patient Registry, the Norwegian Cause of Death Registry, the Norwegian Prescribed Drug Registry, and large population-based health surveys, enables comprehensive analyses of patient outcomes and health-care utilization. Furthermore, international registry collaboration has expanded research opportunities through initiatives such as the Nordic Arthroplasty Register Association (NARA); the International Society of Arthroplasty Registries (ISAR)¹⁰; and the International Society of Arthroscopy, Knee Surgery and Orthopaedic Sports Medicine (ISAKOS) Global ACL Registry initiative¹⁵, allowing analyses across larger populations and health-care systems.

The small and collaborative orthopaedic community facilitates rapid dissemination and implementation of new evidence. Despite high completeness, challenges remain, including persistent regional variation in treatment and inconsistent use of registry data for local quality improvement. Registry-based randomized trials and multicenter studies are expected to continue generating high-quality evidence to guide care¹⁶.

Beyond Fracture Fixation: The Orthopaedic Surgeon's Role in Secondary Prevention

Norway has one of the highest rates of hip fractures in the world^{17,18}, and fragility fractures represent a major public health challenge. More than 50% of women and 25% of men will sustain ≥ 1 fragility fractures during their lifetime¹⁹. However, the incidence of major osteoporotic fractures, such as hip and distal radial fractures, has declined substantially over the past decades^{20,21}. This reduction has been partly attributed to increased awareness of osteoporosis and greater use of anti-osteoporosis medications among individuals at risk for fracture¹⁸.

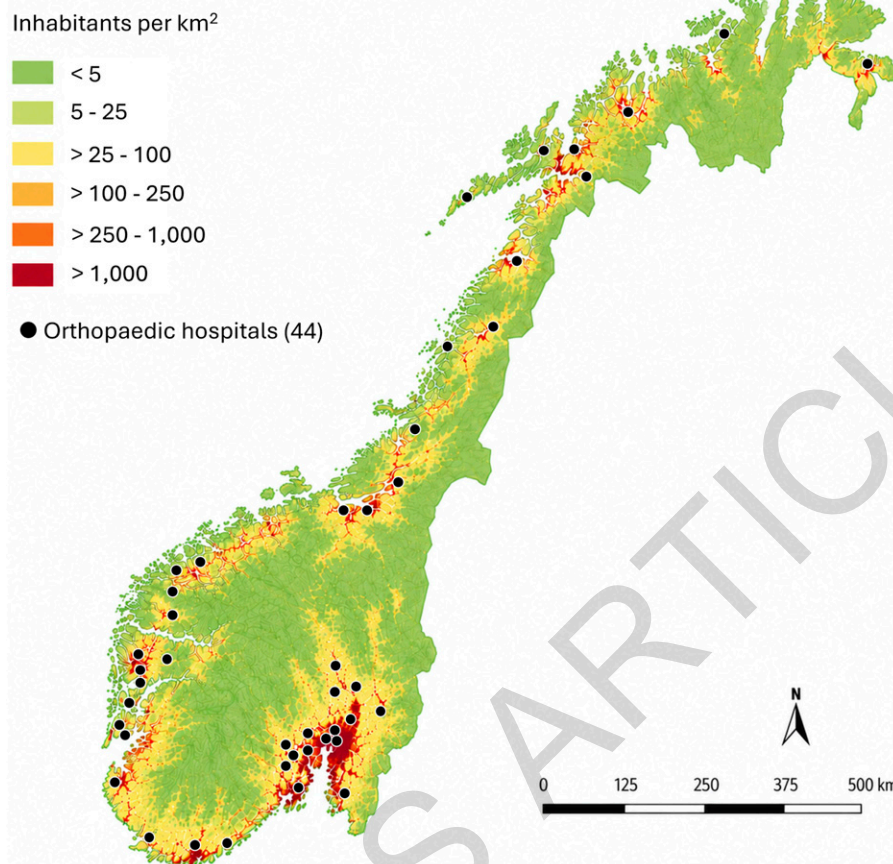


Fig. 1
Population density and distribution of orthopaedic hospitals in Norway. Population density is illustrated by a color gradient, with warmer colors indicating higher population density. Orthopaedic hospitals⁴⁰ are distributed across the country to provide equitable access to specialist orthopaedic care despite Norway's large geographic area and dispersed population. (The map was partly created using ChatGPT [GPT-5.5 model; OpenAI].)

Orthopaedic Leadership in Secondary Fracture Prevention

In 2014, the Norwegian Orthopaedic Association introduced national guidelines for the management of patients ≥ 50 years of age presenting with a fragility fracture²², inspired by the International Osteoporosis Foundation's Capture the Fracture campaign. Unlike most other international guidelines, the Norwegian recommendations emphasized the responsibility of orthopaedic surgeons to initiate anti-osteoporosis treatment during the index hospital admission for patients presenting with a hip fracture, a vertebral fracture, or multiple fragility fractures, thereby addressing the imminent fracture risk²³. Patients with other fragility fractures were recommended to undergo assessment and risk evaluation within 6 weeks. Initiation of anti-osteoporosis treatment after hip fragility fractures is a key performance indicator in the Norwegian Hip Fracture Register².

The Norwegian Capture the Fracture Initiative

Following this increased focus on secondary fracture prevention, the Norwegian Capture the Fracture Initiative (NoFRACT) was initiated in 2015²⁴. NoFRACT is the largest

pragmatic trial of systematic secondary fracture prevention conducted to date, involving 7 orthopaedic departments in 7 different Norwegian hospitals serving a catchment population of approximately 2 million people. The study evaluated whether a systematic secondary fracture prevention program (fracture liaison service [FLS]) could reduce the incidence of subsequent fragility fractures and all-cause mortality among patients ≥ 50 years of age presenting with a new fracture. Using a stepped-wedge, cluster-randomized design, the study included $>100,000$ patients with incident fractures. The study demonstrated that an FLS was associated with a 12% reduction in subsequent fragility fractures, a 24% reduction in hip fractures, and a 17% reduction in all-cause mortality²².

The NoFRACT initiative has facilitated the integration of secondary fracture prevention into orthopaedic practice. Consequently, the number of Norwegian hospitals offering a structured FLS or similar secondary fracture prevention program increased from 2 of 44 hospitals in 2013 to >25 hospitals in 2022 (unpublished data from the Norwegian Orthopaedic Association's Special Interest Group for Osteoporosis and Bone Health). Similarly, the recently revised Guidelines for Interdisciplinary Hip Fracture Care were developed under

Table 1. Key Characteristics for Norway (2025 to 2026): Populations, Geography, and Health Care*†			Comment
Population	5.6 million		121st largest population worldwide
Land area	366,000 km ²		61st largest country by area
Population density	15.6 inhabitants/km ²		Among the least densely populated countries, 182nd worldwide
Coastline	102,937 km		Second longest coastline worldwide
GDP per capita	U.S. \$105,877		Ninth highest globally
Health-care expenditure per capita	U.S. \$8,079		Third highest globally
Health-care expenditure per GDP	9.4%		Comparable with other high-income countries
Life expectancy	83.8 years		Among the highest globally (18th)
Median age	40.0 years		European mean: approximately 45 years
Population ≥65 years of age	19.0%		OECD mean: 18.5%, EU mean: approximately 22%
CEOWORLD Health Care Index (2025)	Rank 9		Overall health-care system ranking
Hospitals providing acute and elective orthopaedic surgery	44		Approximately 127,000 inhabitants per hospital (range, 11,000 to 570,000 inhabitants per hospital) ⁴⁰
Hospital beds	3.3 per 1,000 inhabitants		World mean: 3.3; European mean: 5.0
Specialist surgical workforce	67 per 100,000 inhabitants		49th worldwide ⁴¹
Orthopaedic surgeons	14.5 per 100,000 inhabitants		801 orthopaedic surgeons in total; 160 (20%) women; European mean: 10 per 100,000 (2019)†
Primary THAs	Approximately 11,000 annually		Approximately 200 primary THAs per 100,000 inhabitants ²
Primary TKAs	Approximately 9,000 annually		Approximately 160 primary TKAs per 100,000 inhabitants ²
Hip fractures sustained when patient is ≥50 years of age	Approximately 9,000 annually		Women: 640; men: 350 per 100,000 person-years ¹⁸
*GDP = gross domestic product, OECD = The Organisation for Economic Co-operation and Development, EU = European Union, THA = total hip arthroplasty, and TKA = total knee arthroplasty. †Data were compiled by the authors, primarily from Statistics Norway; other sources are indicated in the table. ‡The Norwegian Medical Association.			

orthopaedic leadership and emphasize the role of the orthopaedic surgeon.

Shifting Tasks, Smarter Care: How Nurses and Physiotherapists Unburden Orthopaedic Surgeons

Systematic secondary fracture prevention is an example of task shifting in Norwegian public health care. In many Norwegian hospitals, FLS nurses now perform tasks that were previously undertaken by physicians, including identifying patients with low-energy fractures, coordinating investigations, assessing fracture risk, initiating treatment pathways, and arranging follow-up. Similar models have also been introduced in other areas of orthopaedic practice in Norway. For example, at many hospitals, physiotherapists perform the initial assessment of patients with knee osteoarthritis and shoulder problems, allowing orthopaedic surgeons to focus on patients who are more likely to require surgery. Physiotherapists also provide routine follow-up after uncomplicated hip and knee arthroplasty, selected fractures, and lumbar spine fixation. These task shifts have improved the use of health-care resources by ensuring that patients are treated by the most appropriate health-care professional, allowing orthopaedic surgeons to focus on complex cases and surgery.

To Operate or Not: Clinical Trials in Norway and the Nordic Countries

Clinical trials from the Nordic countries are characterized by high recruitment and follow-up rates. Several factors may contribute, including the careful planning of trial design to establish surgeon engagement and maintain clinical equipoise. High levels of patient trust in the public health-care system, together with geographically defined hospital catchment areas that facilitate long-term follow-up, may also support successful trial conduct. Although many orthopaedic randomized trials compare different surgical techniques, relatively fewer trials address the more fundamental question of whether surgery is indicated at all^{25,26}. Norwegian and other Nordic investigators have contributed substantially to this field through multicenter, and often multinational, randomized trials. Many of these studies were conducted with modest budgets, were integrated into routine clinical care and follow-up, and were supported by a strong academic culture within orthopaedic training programs. Examples include randomized trials in sports medicine evaluating meniscal injuries, SLAP (superior labrum from anterior to posterior) lesions, Achilles tendon ruptures, and proximal hamstring avulsions, all demonstrating similar results following operative and nonoperative treatment²⁷⁻³⁰. From spinal surgery, a trial on chronic low back pain in degenerative disc disease found no

Table 2. Norwegian Orthopaedic Registries*

	Norwegian Arthroplasty Register	Norwegian Knee Ligament Register	Norwegian Hip Fracture Register	Norwegian Registry for Spine Surgery	Norwegian Paediatric Hip Register
Established	1987	2004	2005	2007	2010
Procedures included	Since 1987: THAs Since 1994: all arthroplasties	ACL-R PCL-R	Hip fracture surgery	Degenerative spine surgery; since 2023: deformity surgery	DDH, Legg-Calvé-Perthes disease, SCFE, joint-preserving surgery in adults
No. of procedures	THAs: 316,219 TKAs: 158,534 TSAs: 17,678 Other joints: 13,054	46,164	189,588	95,950	3,957
Completeness (2024 to 2025)	Primary: 95% Revision: 84%	Primary: 89% Revision: 88%	Primary: 85% Revision: 90%	85%	91%
No. of hospitals (2025)	Hip: 65 Knee: 62 Shoulder: 41	47	45	41	19
Coverage	98%	100%	100%	100%	100%
Available data	Demographic characteristics, type of surgery, implant data, operative details and complications, reoperations, PROMs	Demographic characteristics, injury mechanism, additional injuries, type of surgery, graft details, operative details and complications, PROMs	Demographic characteristics, type of surgery, implant data, operative details and complications, perioperative data (from 2023), reoperations, PROMs	Demographic characteristics, diagnoses, operative details and complications, reoperations, PROMs	Demographic characteristics, duration of symptoms, type of surgery, operative details, radiographs, PROMs
Types of PROMs	EQ-5D, HOOS-12, KOOS-12, WOOS, SEFAS, UCLA activity score, QuickDASH	KOOS, activity score	EQ-5D, HOOS-12	Pain NRS, ODI and NDI, work status	EQ-5D, iHOT-12, HSAS (2025)

*THA = total hip arthroplasty, ACL-R = anterior cruciate ligament reconstruction, PCL-R = posterior cruciate ligament reconstruction, DDH = developmental dysplasia of the hip, SCFE = slipped capital femoral epiphysis, TKA = total knee arthroplasty, TSA = total shoulder arthroplasty, PROM = patient-reported outcome measure, HOOS-12 = 12-item Hip disability and Osteoarthritis Outcome Score, KOOS-12 = 12-item Knee injury and Osteoarthritis Outcome Score, WOOS = Western Ontario Osteoarthritis of the Shoulder Index, SEFAS = Self-reported Foot and Ankle Score, UCLA = University of California, Los Angeles, QuickDASH = abbreviated version of the Disabilities of the Arm, Shoulder and Hand Questionnaire, NRS = Numeric Rating Scale, ODI = Oswestry Disability Index, NDI = Neck Disability Index, iHOT-12 = International Hip Outcome Tool (12 items), and HSAS = Hip Sport Activity Score.

clinically important difference between total disc replacement and multidisciplinary rehabilitation³¹. Other examples include upper-extremity fractures, on which several trials have been performed or are ongoing³²⁻³⁶, as well as ankle fractures^{37,38}.

When randomized trials demonstrate little or no advantage of operative treatment, changes in clinical practice may still be modest³⁹. Sometimes, the findings prompt a discussion of methodological quality and lead to calls for additional studies to identify groups of patients who may still benefit from surgery.

Conclusions

Despite its large geographic area and relatively small population, Norway has developed an orthopaedic health-care system that delivers equitable, high-quality care through a publicly funded model. Orthopaedic services are provided predominantly by salaried surgeons working in public hospitals, fostering collaboration rather than competition between institutions. The close integration of clinical practice, national orthopaedic quality registries, clinician-led

research, and orthopaedic surgeon-driven orthopaedic quality improvement has created a health-care system in which outcomes are continuously monitored, evaluated, and translated into clinical practice. This combination of universal access, national collaboration, and a strong culture of quality improvement represents a defining strength of Norwegian orthopaedics and provides a robust foundation for addressing future health-care challenges while continuing to contribute to international orthopaedic research and innovation. ■

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References

- Finans Norge. Health Insurance. Accessed 2026 Jul 23. <https://www.finansnorge.no/tema/statistikk-og-analyse/forsikring/helseforsikring/>
- Nasjonalt Servicemiljø for Medisinske Kvalitetsregistre. Homepage. Accessed 2026 Jul 23. <https://www.kvalitetsregistre.no>
- Havelin LI, Espehaug B, Vollset SE, Engesaeter LB. Early failures among 14,009 cemented and 1,326 uncemented prostheses for primary coxarthrosis. The Norwegian Arthroplasty Register, 1987-1992. *Acta Orthop Scand*. 1994 Feb; 65(1):1-6.
- Furnes O, Lie SA, Havelin LI, Vollset SE, Engesaeter LB. Exeter and Charnley arthroplasties with Boneloc or high viscosity cement. Comparison of 1,127 arthroplasties followed for 5 years in the Norwegian Arthroplasty Register. *Acta Orthop Scand*. 1997 Dec;68(6):515-20.
- Gjertsen JE, Dybvik E, Furnes O, Fevang JM, Havelin LI, Matre K, Engesaeter LB. Improved outcome after hip fracture surgery in Norway. *Acta Orthop*. 2017 Oct;88(5):505-11.
- Kristensen TB, Dybvik E, Kristoffersen M, Dale H, Engesaeter LB, Furnes O, Gjertsen JE. Cemented or uncemented hemiarthroplasty for femoral neck fracture? Data from the Norwegian Hip Fracture Register. *Clin Orthop Relat Res*. 2020 Jan;478(1):90-100.
- Persson A, Fjeldsgaard K, Gjertsen JE, Kjellsen AB, Engebretsen L, Hole RM, Fevang JM. Increased risk of revision with hamstring tendon grafts compared with patellar tendon grafts after anterior cruciate ligament reconstruction: a study of 12,643 patients from the Norwegian Cruciate Ligament Registry, 2004-2012. *Am J Sports Med*. 2014 Feb;42(2):285-91.
- Martin RK, Wastvedt S, Pareek A, Persson A, Visnes H, Fenstad AM, Moatshe G, Wolfson J, Engebretsen L. Predicting anterior cruciate ligament reconstruction revision: a machine learning analysis utilizing the Norwegian Knee Ligament Register. *J Bone Joint Surg Am*. 2022 Jan 19;104(2):145-53.
- Havelin LI. The Norwegian Joint Registry. *Bull Hosp Jt Dis*. 1999;58(3):139-47.
- Mäkelä KT, Furnes O, Hallan G, Fenstad AM, Rolfson O, Kärrholm J, Rogmark C, Pedersen AB, Robertsson O, W-Dahl A, Eskelinen A, Schröder HM, Äärämaa V, Rasmussen JV, Salomonsson B, Hole R, Overgaard S. The benefits of collaboration: the Nordic Arthroplasty Register Association. *EFORT Open Rev*. 2019 Jun 3;4(6):391-400.
- Gjertsen JE, Engesaeter LB, Furnes O, Havelin LI, Steindal K, Vinje T, Fevang JM. The Norwegian Hip Fracture Register: experiences after the first 2 years and 15,576 reported operations. *Acta Orthop*. 2008 Oct;79(5):583-93.
- Johansen A, Ojeda-Thies C, Poacher AT, Hall AJ, Brent L, Ahern EC, Costa ML; Global Fragility Fracture Network Hip Fracture Audit Special Interest Group. Developing a minimum common dataset for hip fracture audit to help countries set up national audits that can support international comparisons. *Bone Joint J*. 2022 Jun;104-B(6):721-8.
- Granan LP, Bahr R, Steindal K, Furnes O, Engebretsen L. Development of a national cruciate ligament surgery registry: the Norwegian National Knee Ligament Registry. *Am J Sports Med*. 2008 Feb;36(2):308-15.
- Solberg TK, Ingebrigtsen T, Olsen LR, Thyrhaug AM. The Norwegian Registry for Spine Surgery (NORspine) Annual Report 2024. Accessed 2026 Aug 7. <https://septentrio.uit.no/index.php/SapReps/en/article/view/8262>
- International Society of Arthroscopy, Knee Surgery and Orthopaedic Sports Medicine. Homepage. Accessed 2026 Jun 20. <https://www.isakos.com>
- Leta TH, Gjertsen JE, Dale H, Hallan G, Lygre SHL, Fenstad AM, Dyrhovden GS, Westberg M, Wik TS, Jakobsen RB, Aamodt A, Röhrli SM, Gøthesen OJ, Lindalen E, Heir S, Ludvigsen J, Bruun T, Hansen AK, Aune KEM, Warholm M, Skjetne JP, Badawy M, Hovding P, Husby OS, Karlsen OE, Furnes O. Antibiotic-loaded bone cement in prevention of periprosthetic joint infections in primary total knee arthroplasty: a register-based multicentre randomised controlled non-inferiority trial (ALBA trial). *BMJ Open*. 2021 Jan 28;11(1):e041096.
- Cauley JA, Chalhoub D, Kassem AM, Fuleihan GH. Geographic and ethnic disparities in osteoporotic fractures. *Nat Rev Endocrinol*. 2014 Jun;10(6):338-51.
- Kjeldgaard HK, Holvik K, Abrahamsen B, Tell GS, Meyer HE, O'Flaherty M. Explaining declining hip fracture rates in Norway: a population-based modelling study. *Lancet Reg Health Eur*. 2023 May 8;30:100643.
- Ahmed LA, Schirmer H, Bjørnerem A, Emaus N, Jørgensen L, Størmer J, Joakimsen RM. The gender- and age-specific 10-year and lifetime absolute fracture risk in Tromsø, Norway. *Eur J Epidemiol*. 2009;24(8):441-8.
- Oftebro I, Skjaker SA, Fridheim HL, Frihagen F, Meyer HE, Nordsletten L, Solberg LB. Decrease in incidence of distal radius fractures in Oslo, Norway. *Arch Osteoporos*. 2024 Apr 11;19(1):28.
- Hestnes I, Solberg LB, Meyer HE, Sundet M, Rimal R, Nordsletten L, Hakestad KA. The hip fracture incidence in the high-risk area Oslo continues to decline. *Osteoporos Int*. 2024 Sep;35(9):1615-23.
- Andreasen C, Dahl C, Frihagen F, Borgen TT, Basso T, Gjertsen JE, Figved W, Wisløff T, Hagen G, Apalset EM, Stutzer JM, Lund I, Hansen AK, Nissen FI, Joakimsen RM, Syversen U, Eriksen EF, Nordsletten L, Omsland TK, Bjørnerem Å, Solberg LB. Fracture liaison service (FLS) is associated with lower subsequent fragility fracture risk and mortality: NoFRACT (the Norwegian Capture the Fracture initiative). *Osteoporos Int*. 2025 Mar;36(3):501-12.
- Kanis JA, Harvey NC, McCloskey E, Bruyère O, Veronese N, Lorentzon M, Cooper C, Rizzoli R, Adib G, Al-Daghri N, Campusano C, Chandran M, Dawson-Hughes B, Javadi K, Jiwa F, Johansson H, Lee JK, Liu E, Messina D, Mkinsi O, Pinto D, Prieto-Alhambra D, Saag K, Xia W, Zakraoui L, Reginster J. Algorithm for the management of patients at low, high and very high risk of osteoporotic fractures. *Osteoporos Int*. 2020 Jan;31(1):1-12.
- Andreasen C, Solberg LB, Basso T, Borgen TT, Dahl C, Wisløff T, Hagen G, Apalset EM, Gjertsen JE, Figved W, Hübschle LM, Stutzer JM, Elvenes J, Joakimsen RM, Syversen U, Eriksen EF, Nordsletten L, Frihagen F, Omsland TK, Bjørnerem Å. Effect of a fracture liaison service on the rate of subsequent fracture among patients with a fragility fracture in the Norwegian Capture the Fracture initiative (NoFRACT): a trial protocol. *JAMA Netw Open*. 2018 Dec 7;1(8):e185701.
- Lim HC, Adie S, Naylor JM, Harris IA. Randomised trial support for orthopaedic surgical procedures. *PLoS One*. 2014 Jun 13;9(6):e96745.
- Lohmender LS, Roos EM. The evidence base for orthopaedics and sports medicine: scandalously poor in parts. *Br J Sports Med*. 2016 May;50(9):564-5.
- Myhrvold SB, Brouwer EF, Andresen TKM, Rydevik K, Amundsen M, Grün W, Butt F, Valberg M, Ulstein S, Hoelsbrekken SE. Nonoperative or surgical treatment of acute Achilles' tendon rupture. *N Engl J Med*. 2022 Apr 14;386(15):1409-20.
- Schröder CP, Skare Ø, Reikerås O, Mowinckel P, Brox JI. Sham surgery versus labral repair or biceps tenodesis for type II SLAP lesions of the shoulder: a three-armed randomised clinical trial. *Br J Sports Med*. 2017 Dec;51(24):1759-66.
- Pihl E, Laszlo S, Rosenlund AM, Kristoffersen MH, Schilcher J, Hedbeck CJ, Skorpil M, Micolli C, Eklund M, Sköldenberg O, Frihagen F, Jonsson KB. Operative versus nonoperative treatment of proximal hamstring avulsions. *NEJM Evid*. 2024 Aug;3(8):a2400056.
- Berg B, Roos EM, Englund M, Kise NJ, Engebretsen L, Eftang CN, Risberg MA. Arthroscopic partial meniscectomy versus exercise therapy for degenerative meniscal tears: 10-year follow-up of the OMEX randomised controlled trial. *Br J Sports Med*. 2025 Jan 2;59(2):91-8.
- Furunes H, Storheim K, Brox JI, Johnsen LG, Skouen JS, Franssen E, Solberg TK, Sandvik L, Hellum C. Total disc replacement versus multidisciplinary rehabilitation in patients with chronic low back pain and degenerative discs: 8-year follow-up of a randomized controlled multicenter trial. *Spine J*. 2017 Oct;17(10):1480-8.
- Christersson P, Karimi D, Grønhaug K, Launonen A, Brorson S, Frihagen F, Viberg B, Hailer N, Wolf O. The Scandinavian Displaced Lateral Clavicle trial (ScanDiLaC): a study protocol for a randomized clinical trial. *Trials*. 2026 Jun 13;27(1):438.
- Karimi D, Brorson S, Midtgaard KS, Fjalestad T, Paulsen A, Olerud P, Ekholm C, Wolf O, Viberg B; SHAFT Collaborators. Surgical versus non-surgical treatment of humeral SHAFT fractures compared by a patient-reported outcome: the Scandinavian Humeral diAphyseal Fracture Trial (SHAFT)-a study protocol for a pragmatic randomized controlled trial. *Trials*. 2022 Jun 2;23(1):453.
- Launonen AP, Fjalestad T, Laitinen MK, Lähdeoja T, Ekholm C, Wagle T, Mattila VM; NITEP-group. Nordic Innovative Trials to Evaluate osteoporotic Fractures (NITEP) Collaboration: the Nordic DeltaCon Trial protocol-non-operative treatment versus reversed total shoulder arthroplasty in patients 65 years of age and older with a displaced proximal humerus fracture: a prospective, randomised controlled trial. *BMJ Open*. 2019 Jan 29;9(1):e024916.
- Hassellund SS, Williksen JH, Laane MM, Pripp A, Rosales CP, Karlsen Ø, Madsen JE, Frihagen F. Cast immobilization is non-inferior to volar locking plates in relation to QuickDASH after one year in patients aged 65 years and

- older: a randomized controlled trial of displaced distal radius fractures. *Bone Joint J.* 2021 Feb;103-B(2):247-55.
36. Frihagen F. Treatment of Olecranon Fractures in the Elderly (CROFT2). 2025. Accessed 2026 Jul 23. <https://clinicaltrials.gov/study/NCT04670900>
37. Saatvedt O, Riiser M, Frihagen F, Figved W, Madsen JE, Molund M, Furunes H. Non-operative versus operative treatment of suprasyndesmotic ankle fractures: protocol for a prospective, multicentre, randomised controlled trial. *BMJ Open.* 2024 Jan 8;14(1):e075122.
38. Rydberg EM, Pilskog K, Pakarinen H, Randsborg PH, Saltzman CL, Molund M. An Acta Orthopaedica educational article: Weightbearing assessment to guide nonoperative treatment of lateral malleolar fractures: the paradigm change. *Acta Orthop.* 2025 Oct 16;96:780-7.
39. Tjomsland O, Bertilsson HM, Bjerkan G, Blomquist PJ, Brox JI, Bøe BM, Jøsendal O, Major D, Panchakulasingham K, Stensland E, Strehle M, Valdimarsson K, Thoresen C. Protocol for a national intervention programme aimed to reduce unwarranted variation and overuse of shoulder arthroscopy in Norway. *BMJ Open Qual.* 2025 Feb 20;14(1):e003099.
40. Sykehusbygg. Emergency Departments in Norway. 2026. Accessed 2026 Jul 23. <https://kunnskapsbanken.sykehusbygg.no/funksjon/2A/1/kunnskapsgrunnlag/i/aYtmS/akuttmottak-i-norge>
41. Aydingoz O. Workforce and Infrastructure. In: Verhaar JAN, Kjærsgaard-Andersen P, Limb D, Günther KP, Karachalios T, editors. *The EFFORT White Book: "Orthopaedics and Traumatology in Europe"*. Lowestoft, U.K.: Dennis Barber; 2026. Accessed 2026 Aug 25. <https://www.ncbi.nlm.nih.gov/books/NBK585935>