Inequity in treatment of hip fractures in Norway – causes and consequences

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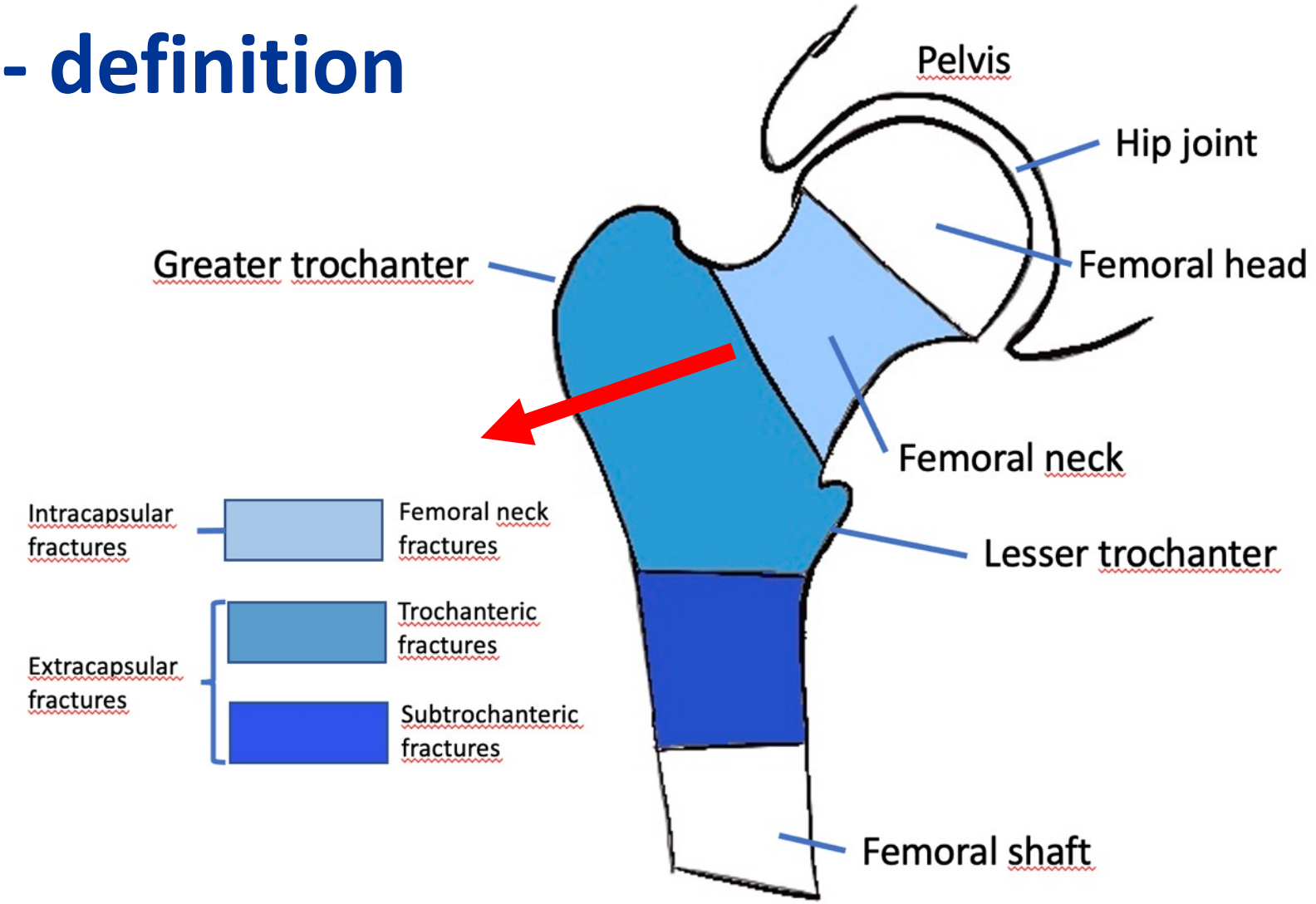
Hip fractures - definition



Who?

- Elderly
- 2/3 women
- 1/3 Cognitive impariment

- 9000 per year
- 1 every hour!

Surgical treatment

- Brought to the nearest hospital
- 4 Health Regions
- 43 hospitals in Norway
- Large variation in hospital characteristics

Background of the study

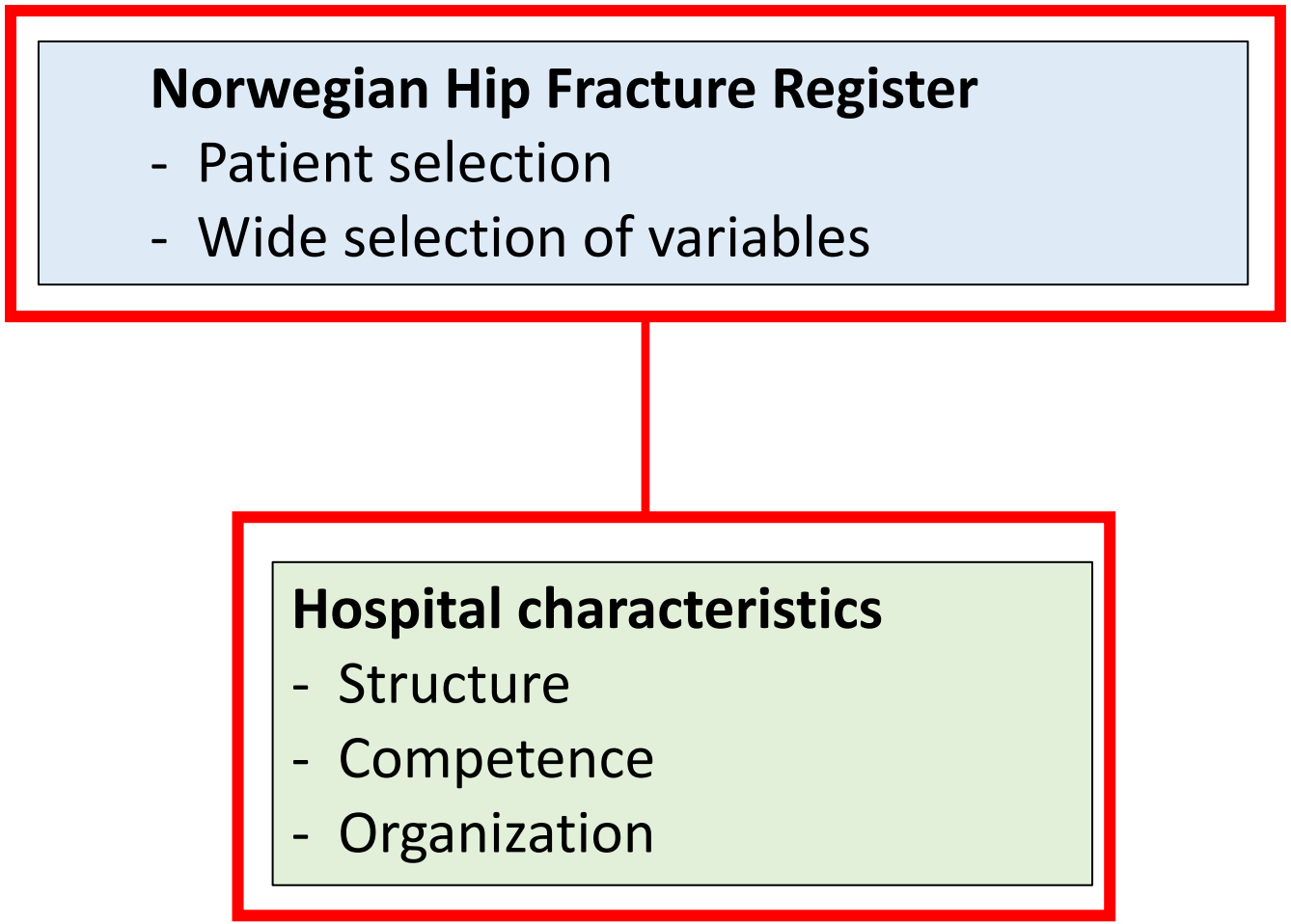
- Apparent professional consensus in hip fracture treatment
- Norwegian Hip Fracture Register (NHFR) annual reports have shown variation in hip fracture treatment

Aim of the study

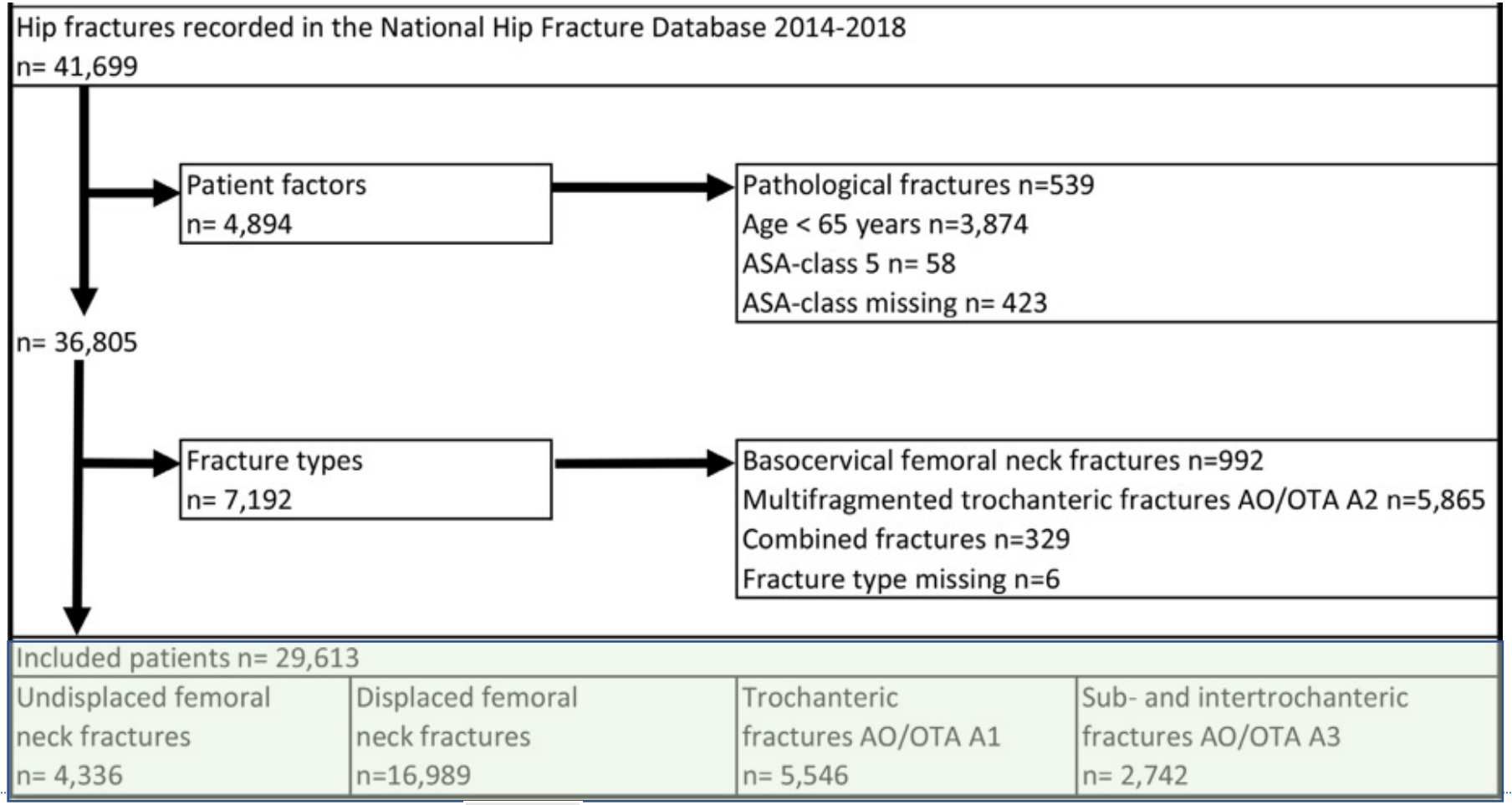
- What are the consequences for the patients if guidelines are (not) followed?
- To what extent does Norwegian hospitals adhere to the established treatment guidelines?
- What factors are associated with adherence?

Methods I

- Register based prospective study
  - Norwegian Hip Fracture Register
- Hospital characteristics



Patient selection



Methods II

- Relevant evidence based guidelines on hip fracture treatment was evaluated
  - National Institute of Care of Excellence - NICE
  - American Academy of Orthopedic Surgeons – AAOS
  - Australia and New Zealand Hip Fracture Register – ANZHFR
  - Scottish Intercollegiate Guideline Network – SIGN

- National consensus based guideline
  - Norwegian Orthopaedic Association – NOF

Table 1 - Summary of guideline reccomendations for treatment of hip fractures

	Evidence based guidelines				Concensus based guidelines	Authors conclusion	
	SIGN 2009	NICE 2011	AAOS 2014	ANZ 2014	NOF 2018	Recommendations and outcome:	
Fracture type independent							
Experienced surgeon	+	+		+	+	+	↓REOP
Timing of surgery	Same or next day	<24h <48h	<48h	Same or next day	<24h Daytime	<48 h	↓MORT, ↑PROM
Fracture type dependent							
Femoral neck							
Garden 1-2 (undisplaced)							
Screw fixation	+		+		+	+	↓MORT,↑PROM
Garden 3-4 (displaced)							
Arthroplasty	+	+	+	+	+	+	↓MORT ↓REOP,
Cemented stem	+	+	+	+	+	+	↓REOP, ↑PROM
Trochanteric							
AO/OTA A1							
Sliding hip screw	+	+	=	=	+	+	↓MORT,↓REOP, ↓LOS,↓OT
AO/OTA A2							
Sliding hip screw	+	+	=	=	=	=	
Intramedullary nail	=	=	=	=	=	=	
Intertrochanteric							
AO/OTA A3 incl reverse oblique							
Intramedullary nail	+		+	+	+	+	↓REOP
Subtrochanteric							
Intramedullary nail	+	+	+	+	+	+	↓REOP

Data available in the NHFR is highlighted in bold. The arrow in last column indicate the direction of effect if guideline is followed. The symbol + indicates a positive effect, the symbol = indicates equipoise.

Abbreviations: SIGN - Scottish Intercollegiate Guidelines Network; NICE - National Institute of Care of Excellence; AAOS - American Academy of Ortopaedic Surgeons; ANZ - Australian and New Zealand Hip Fracture Registry; NOF - Norwegian Orthopaedic Association; MORT - Mortality; REOP - Reoperations; PROM - Patient Related Outcome Measure; LOS - Length of stay; OT - Operating time; AO - Arbeitsgemeinschaft für osteosynthesefragen; OTA - Orthopaedic Trauma Association.

Outcomes

- Surgery within 48 hours
  - Reduces 1-year mortality
- Experienced surgeon
  - Reduces reoperations
- Fracture specific recommendend treatment
  - Reduces reoperations and mortality

Table VI. Treatment outcome according to seven guideline recommendations and according to the best practice.

		Mortality 30 days			Mortality 365 days			Revision 365 days		
Outcome	**Total**	**n (%)**	**OR (95% CI)**	**p-value**	**n (%)**	**OR (95% CI)**	**p-value**	**n (%)**	**OR (95% CI)**	**p-value**
Surgery within 48 hours										
Yes	23,390	1,969 (8.4)	Reference		5,860 (25.1)	Reference		1,168 (5.0)	Reference	
No	4,931	477 (9.7)	1.04 (0.93 to 1.16)	0.499	1,427 (28.9)	1.13 (1.05 to 1.22)	0.001	262 (5.3)	1.06 (0.92 to 1.22)	0.405
Surgeon has > 3 years experience										
Yes	23,815	2065 (8.7)	Reference		6,091(25.8)	Reference		1,171 (5.0)	Reference	
No	4,686	381 (8.1)	0.97 (0.86 to 1.09)	0.573	1,196 (25.5)	1.04 (0.96 to 1.12)	0.380	259 (5.5)	1.12 (0.98 to 1.29)	0.100
Screw fixation (Garden 1 to 2)										
Yes	3,747	224 (6.0)	Reference		846 (22.6)	Reference		338 (9.0)	Reference	
No	589	46 (7.8)	1.09 (0.77 to 1.55)	0.619	160 (27.2)	1.05 (0.84 to 1.29)	0.687	19 (3.2)	0.34 (0.21 to 0.55)	<0.001
Arthroplasty (Garden 3 to 4)										
Yes	16,219	1,328 (8.2)	Reference		3,805 (23.5)	Reference		678 (4,2)	Reference	
No	770	111 (14.4)	1.29 (1.03 to 1.62)	0.030	276 (35.8)	1.45 (1.22 to 1.72)	<0.001	124 (16,1)	4.61 (3.73 to 5.71)	<0.001
Cemented stem if arthroplasty										
Yes	13,017	1,097 (8.4)	Reference		3,128 (24.0)	Reference		523 (4.0)	Reference	
No	3,202	231 (7.2)	0.90 (0.77 to 1.05)	0.184	677 (21.1)	0.91 (0.83 to 1.01)	0.082	155 (4.8)	1.23 (1.02 to 1.48)	0.030
SHS (Trochanteric AO/OTA A1)										
Yes	3,783	348 (9.2)	Reference		1,091 (28.8)	Reference		96 (2.5)	Reference	

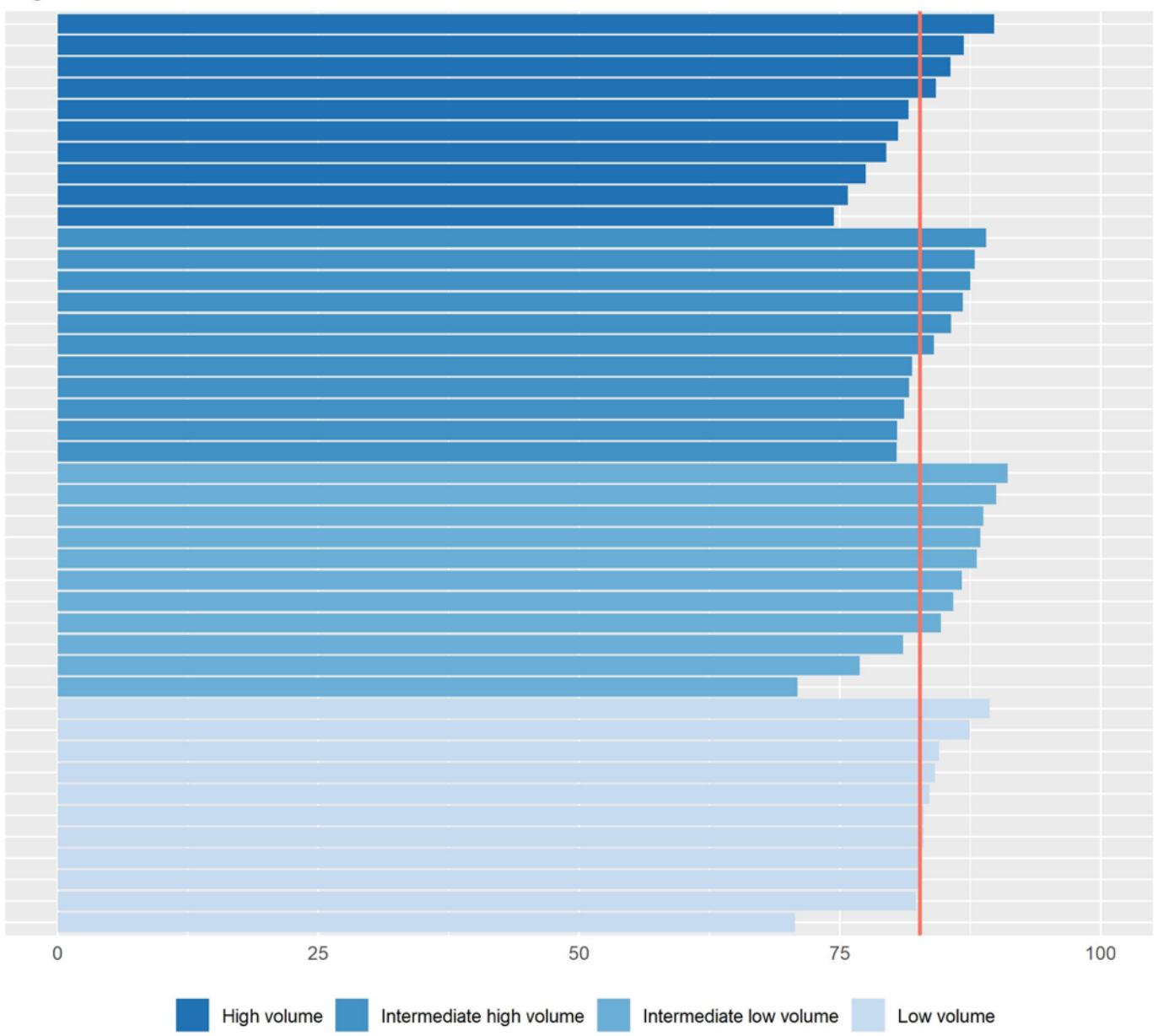
Do as you are told!

"If all variation were bad, solutions would be easy. The difficulty is in reducing the bad variation, which reflects the limits of professional knowledge and failures in its application, while preserving the good variation that makes care patient centred."

A G Mulley (2010)

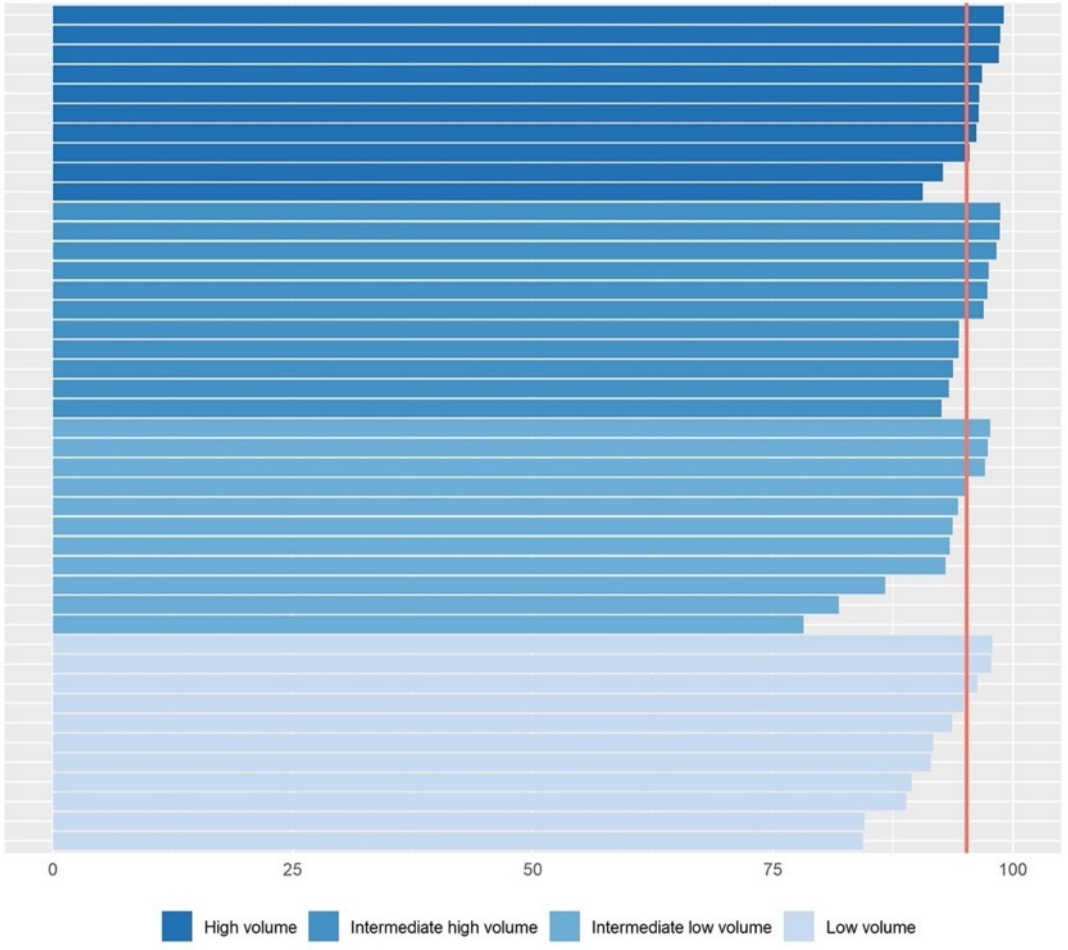
Surgery <48h

- Mean 83%
- Range 71%-91%



Arthroplasty in displaced fremoral neck fractures

- Mean 96%
- Range 79%-99%



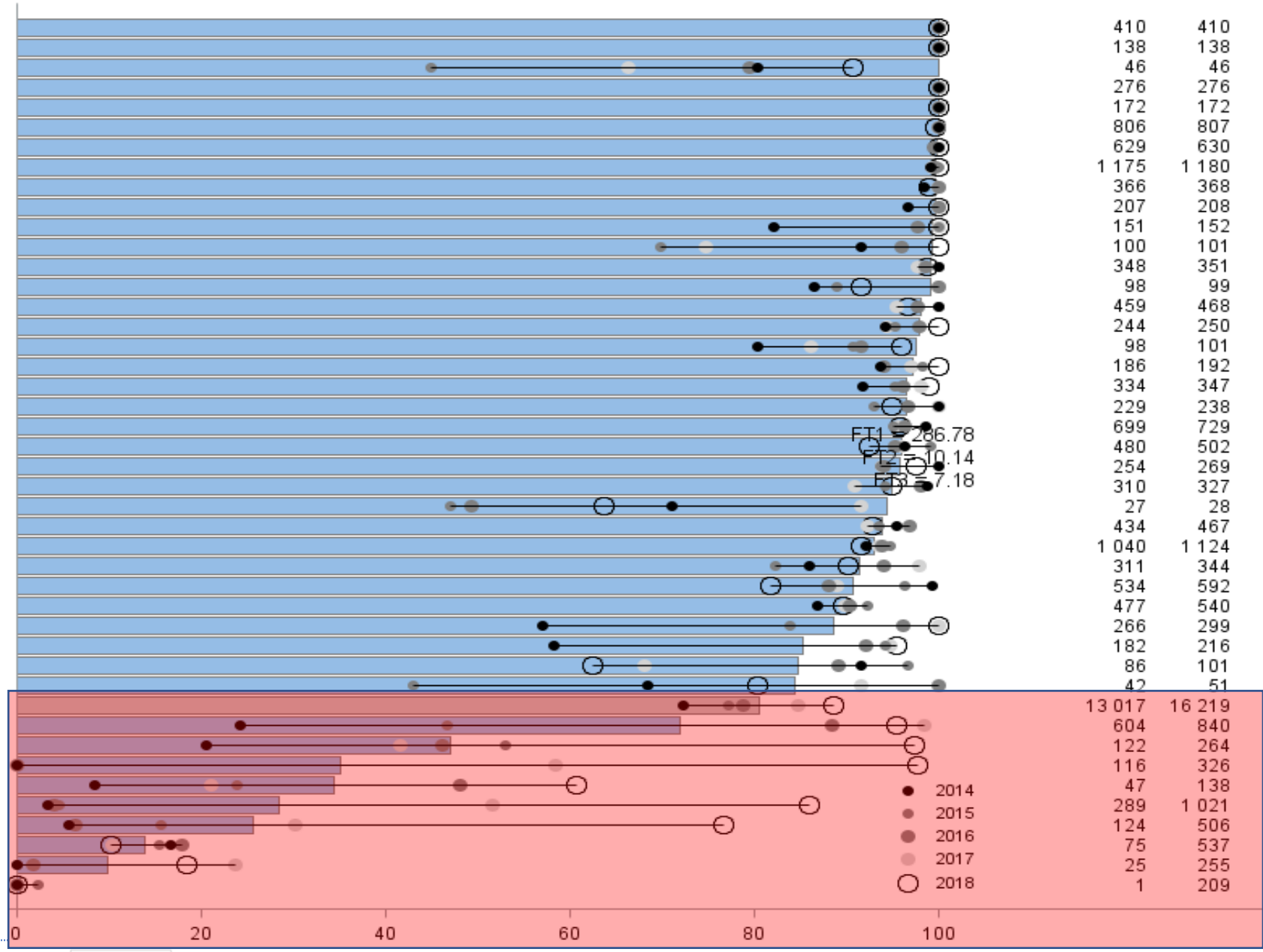
Cemented stem in arthroplasties

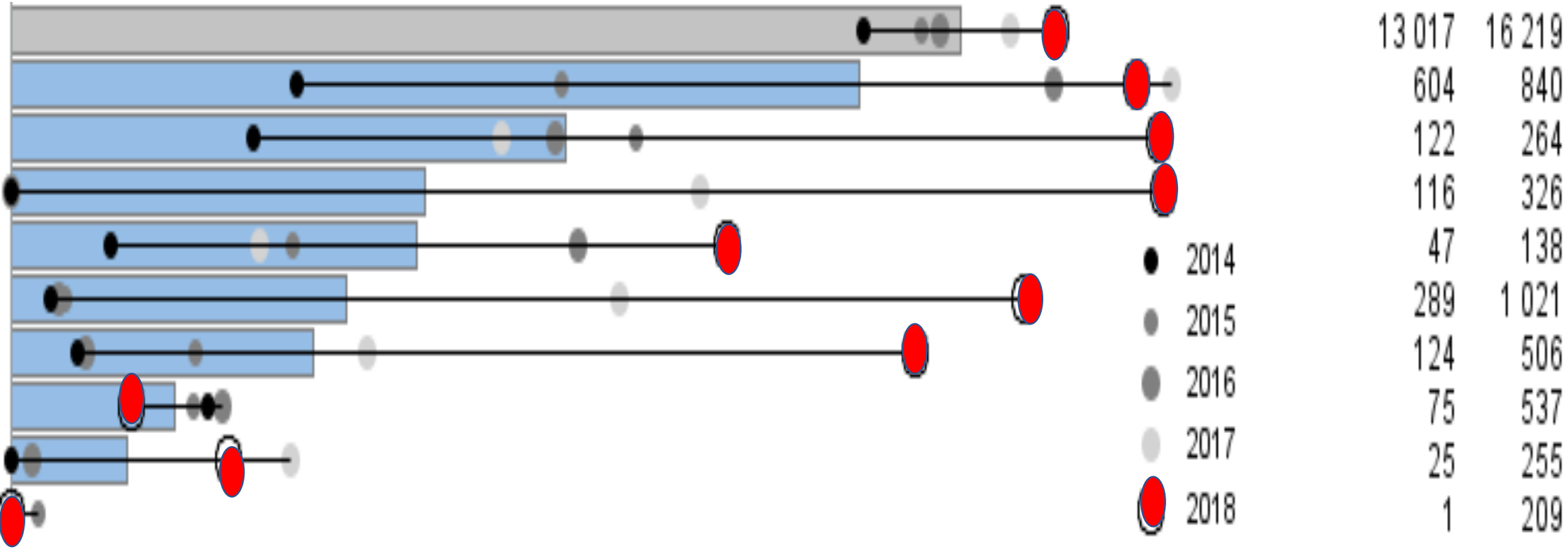
- Mean 80%
- Range 0.3%-100%

Change over time

Trend towards more cemented stems
2014 – 72,2 %
2015 – 77,2 %
2016 – 78,7 %
2017 – 84,8 %
2018 – 88,6 %

Quality improvement project - NHFR

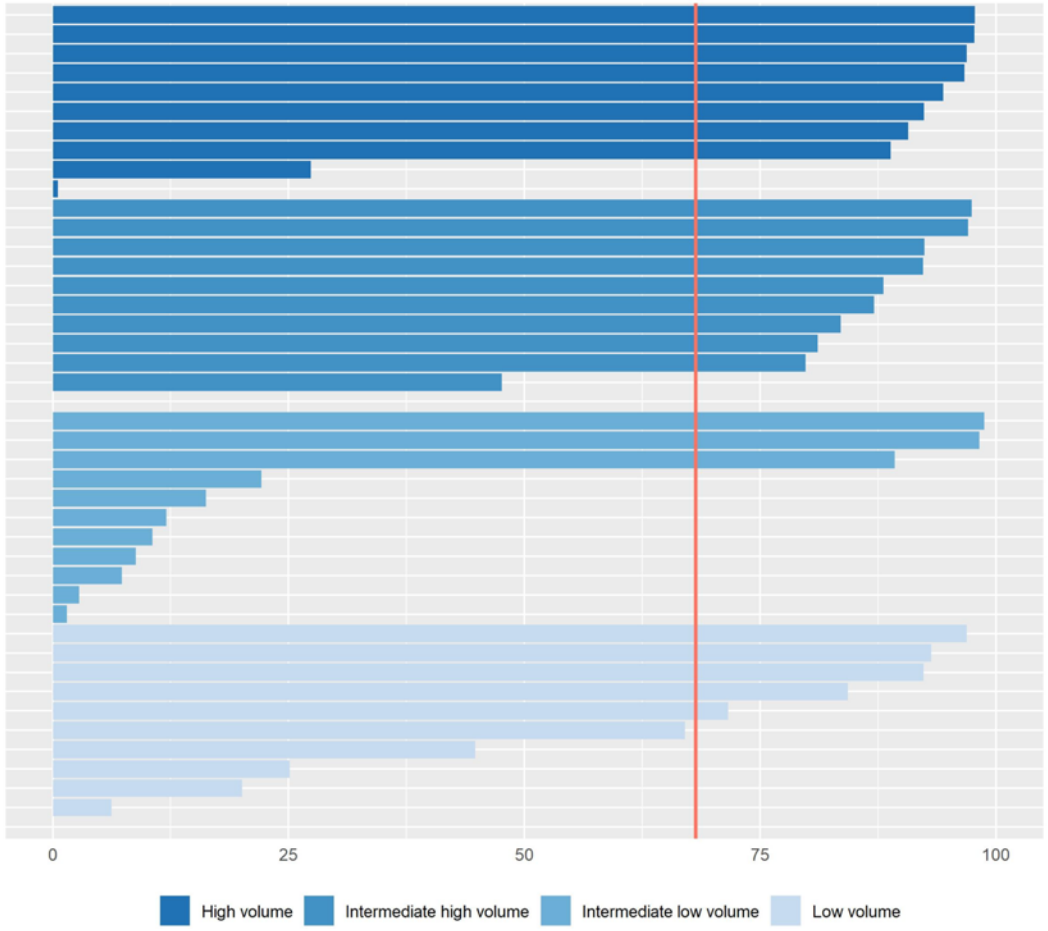




13 017	16 219
604	840
122	264
116	326
47	138
289	1 021
124	506
75	537
25	255
1	209

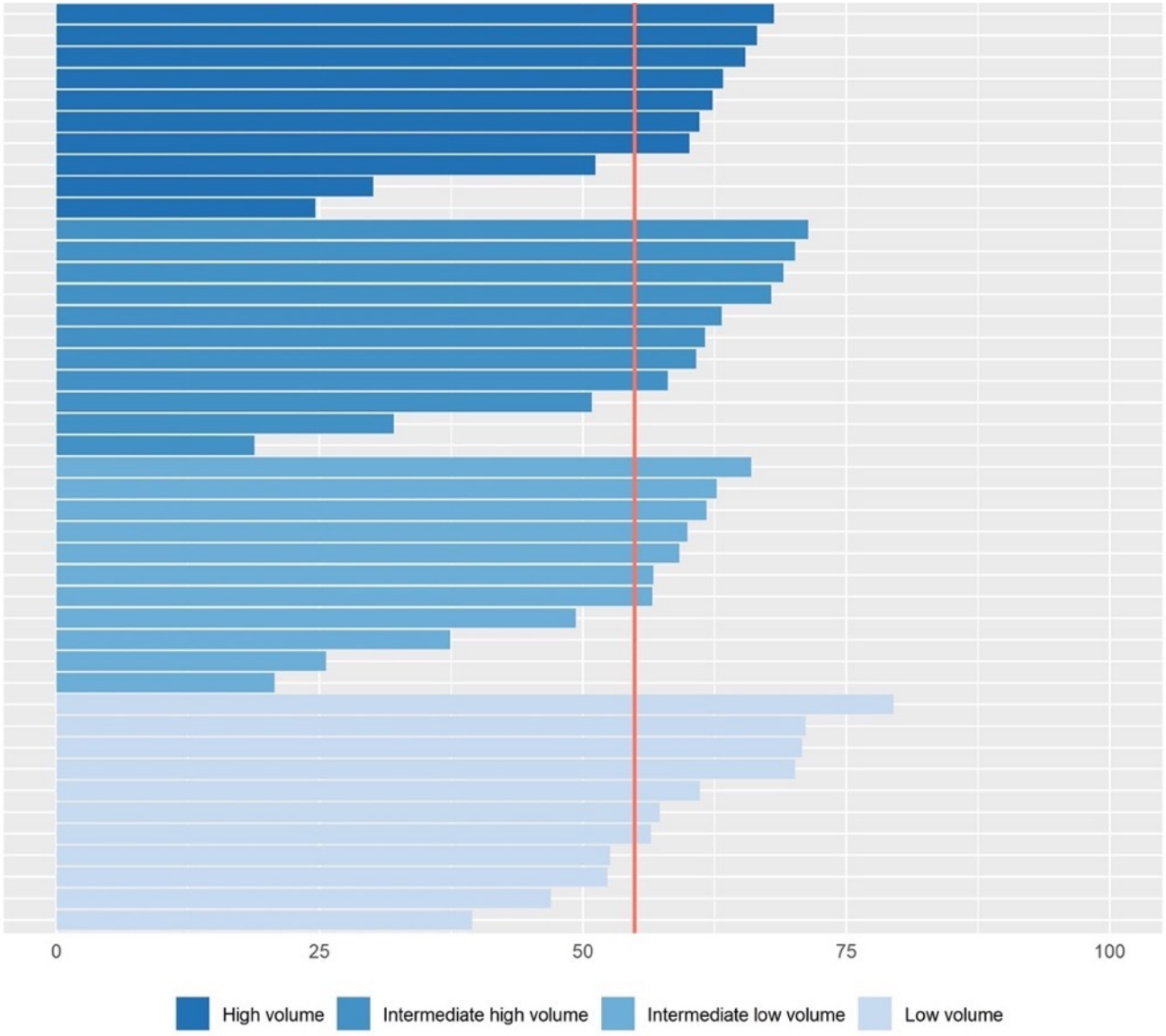
SHS in trochanteric AO A1 fractures

- Mean 68%
- Range 0%-99%

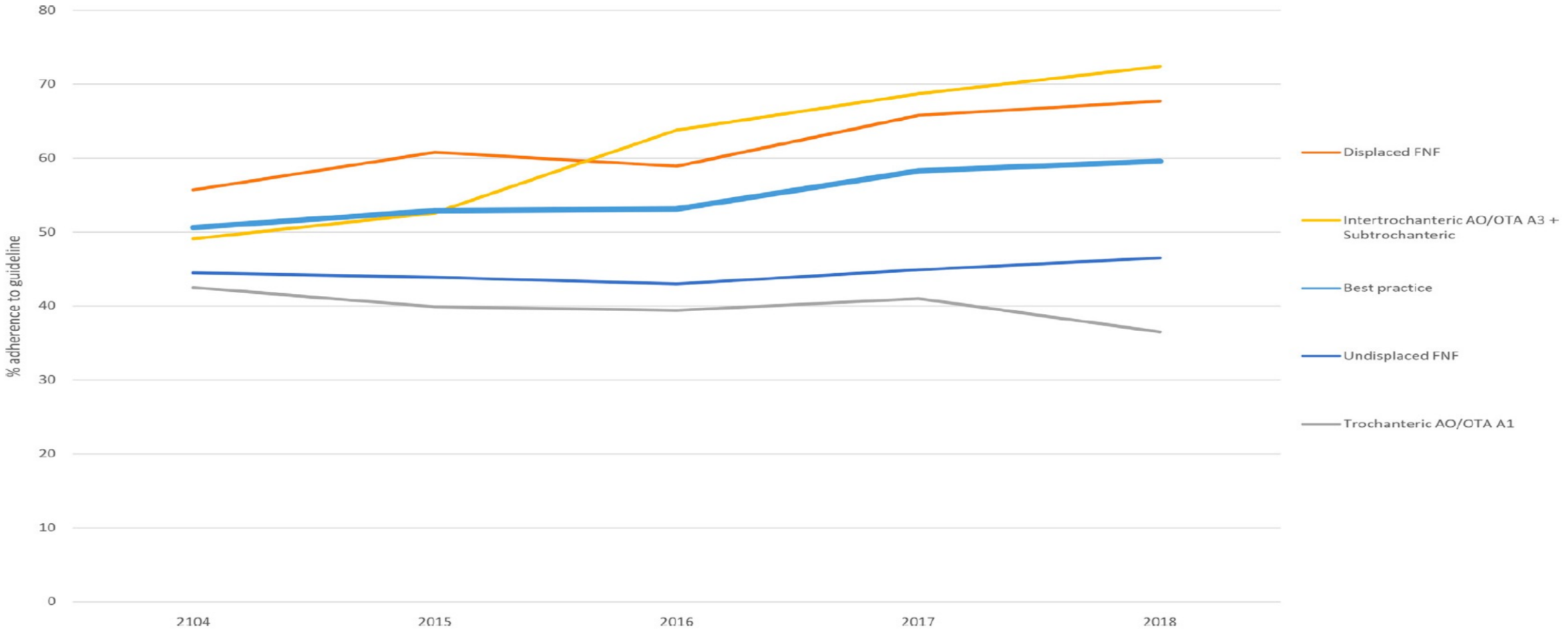


Best practice

- Within 48 hours
- Experienced surgeon
- Fracture type specific treatment
- Mean 55% (Range 18-81%)



Best practice



What factors are associated with

- Hip fracture program
- Volume effect
  - Small and intermediate high better
- Regional differences
  - Central and Western better
- Year
  - Improvement during the study period

- No obvious pattern!

Table V. Factors influencing best practice.

Factor			% CI)	p-value
Orthogeriatric service				
Yes			(0.96 to 1.06)	0.740
No			rence	
Dedicated hip fracture unit				
Yes			1.06 (1.01 to 1.11)	0.025
No			Reference	
Separate orthopaedic ward				
Yes			0.94 (0.88 to 1.01)	0.086
No			Reference	
Hospital hip fracture prog				
Yes			.1)	1.16 (1.06 to 1.27)	0.002
No			.5)	Reference	
Total hip fracture volu				
High (868 to 2,025)			(55.0)	Reference	
Intermediate high (551			.2 (56.8)	1.08 (1.02 to 1.14)	0.010
Intermediate low (373			,40 (49.8)	0.82 (0.76 to 0.87)	< 0.001
Low volume (66 to 2			,230 (59.2)	1.19 (1.08 to 1.31)	< 0.001
Year of surgery				
2014	2,850 (50.6)	Reference		
2015	3,036 (52.9)	1.10 (1.02 to 1.18)	0.013	
2016	3,085 (53.1)	1.11 (1.04 to 1.20)	0.004	
2017	3,276 (58.3)	1.38 (1.28 to 1.49)	< 0.001	
2018	3,291 (59.6)	1.45 (1.35 to 1.57)	< 0.001	
RHA				
South-Ea	8,692 (53.2)	Reference		
Westerr	2,877 (55.4)	1.09 (1.03 to 1.16)	0.006	
Centra	2,594 (62.5)	1.50 (1.39 to 1.60)	< 0.001	
Nort	1,375 (52.3)	0.97 (0.89 to 1.06)	0.488	

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What affects clinical practice?

- Clinical autonomy takes precedence over guidelines?
  - Timmermans S. From autonomy to accountability: the role of clinical practice guidelines in professional power. Perspect Biol Med. 2005;48(4):490–501.
- Decisions are driven by social interaction?
  - Grove A, Johnson RE, Clarke A, Currie G. Evidence and the drivers of variation in orthopaedic surgical work: a mixed method systematic review. Health Policy and Policy Research. 2016;3:1.

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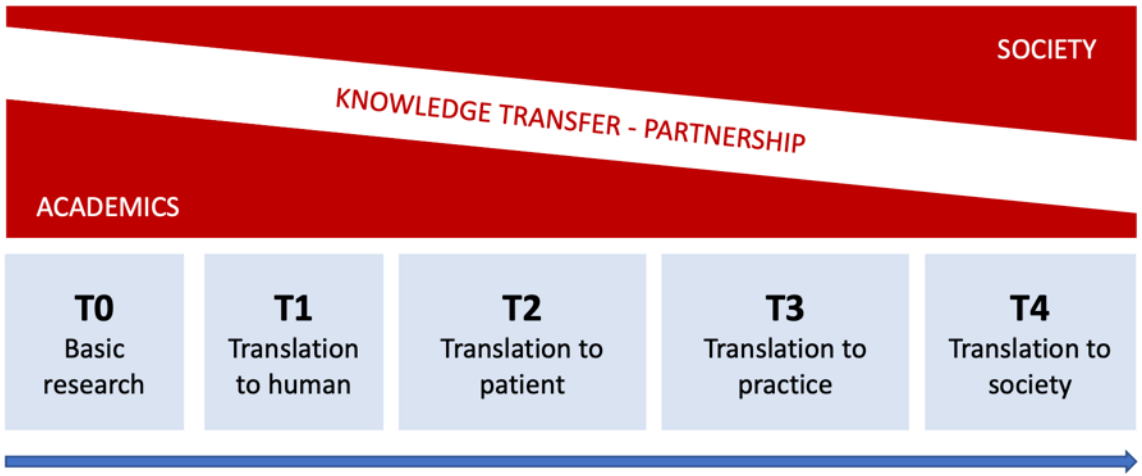
Take home message

- Substantial variation in hip fracture treatment in Norway,despite established evidence-based guidelines.
- Deviation from best practice has negative consequences for patient outcomes.
- Dissemination of information on best practice through guidelines is challenging.



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TRAUMA

Hip fracture treatment in Norway

DEVIATION FROM EVIDENCE-BASED TREATMENT GUIDELINES: DATA FROM THE NORWEGIAN HIP FRACTURE REGISTER, 2014 TO 2018

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Aims

The aim of this study was to describe variation in hip fracture treatment in Norway expressed as adherence to international and national evidence-based treatment guidelines, to study factors influencing deviation from guidelines, and to analyze consequences of non-adherence.

Methods

https://online.boneandjoint.org.uk/doi/full/10.1302/2633-1462.110.BJO-2020-0124.R1

Thank you for your attention