Whitehouse, M., Berstock, J. R., Kelly, M., Gregson, C., Judge, A., Sayers, A., & Chessser, T. J. (2019). Higher 30-day mortality associated with the use of intramedullary nails compared with sliding hip screws for the treatment of trochanteric hip fractures: a prospective national registry study. *Bone and Joint Journal*, 101-B(1), 83-91. <https://doi.org/10.1302/0301-620X.101B1.BJJ-2018-0601.R2>

Peer reviewed version

Link to published version (if available):
[10.1302/0301-620X.101B1.BJJ-2018-0601.R2](https://doi.org/10.1302/0301-620X.101B1.BJJ-2018-0601.R2)

[Link to publication record in Explore Bristol Research](#)
PDF-document

This is the author accepted manuscript (AAM). The final published version (version of record) is available online via SBJs at <https://online.boneandjoint.org.uk/doi/full/10.1302/0301-620X.101B1.BJJ-2018-0601.R2> . Please refer to any applicable terms of use of the publisher.

University of Bristol - Explore Bristol Research

General rights

This document is made available in accordance with publisher policies. Please cite only the published version using the reference above. Full terms of use are available:
<http://www.bristol.ac.uk/red/research-policy/pure/user-guides/ebr-terms/>

Supplementary Material

Supplementary material; Table 1: Deciles of Income Deprivation

Country	Decile	Alive at 30 Days								Dead at 30 days							
		SHS		IM Long Nail		IM Short Nail		All		SHS		IM Long Nail		IM Short Nail		All	
		N	(%)	N	(%)	N	(%)	N	(%)	N	(%)	N	(%)	N	(%)	N	(%)
England	1	4,412	(7.6)	455	(9.2)	360	(9.2)	5,227	(7.8)	360	(7.4)	54	(11.6)	30	(8.5)	444	(7.8)
	2	5,495	(9.4)	503	(10.1)	399	(10.2)	6,397	(9.5)	467	(9.6)	63	(13.5)	42	(12.0)	572	(10.1)
	3	5,896	(10.1)	499	(10.0)	375	(9.6)	6,770	(10.1)	572	(11.8)	39	(8.4)	37	(10.5)	648	(11.4)
	4	6,219	(10.7)	556	(11.2)	421	(10.8)	7,196	(10.7)	544	(11.2)	45	(9.7)	36	(10.3)	625	(11.0)
	5	6,229	(10.7)	497	(10.0)	412	(10.6)	7,138	(10.6)	542	(11.1)	58	(12.4)	37	(10.5)	637	(11.2)
	6	6,391	(11.0)	528	(10.6)	405	(10.4)	7,324	(10.9)	508	(10.4)	55	(11.8)	44	(12.5)	607	(10.7)
	7	6,283	(10.8)	510	(10.3)	411	(10.5)	7,204	(10.7)	524	(10.8)	38	(8.2)	38	(10.8)	600	(10.6)
	8	6,075	(10.4)	472	(9.5)	393	(10.1)	6,940	(10.3)	517	(10.6)	38	(8.2)	32	(9.1)	587	(10.3)
	9	5,763	(9.9)	423	(8.5)	378	(9.7)	6,564	(9.8)	425	(8.7)	36	(7.7)	29	(8.3)	490	(8.6)
	10	5,480	(9.4)	526	(10.6)	351	(9.0)	6,357	(9.5)	408	(8.4)	40	(8.6)	26	(7.4)	474	(8.3)
Wales	1	286	(7.6)	34	(7.9)	9	(14.3)	329	(7.8)	27	(9.6)	3	(7.9)	2	(28.6)	32	(9.8)
	2	368	(9.8)	52	(12.0)	7	(11.1)	427	(10.1)	28	(10.0)	6	(15.8)	2	(28.6)	36	(11.1)
	3	373	(10.0)	45	(10.4)	5	(7.9)	423	(10.0)	30	(10.7)	3	(7.9)	0	(0.0)	33	(10.2)
	4	423	(11.3)	50	(11.5)	7	(11.1)	480	(11.3)	38	(13.6)	4	(10.5)	0	(0.0)	42	(12.9)
	5	376	(10.0)	37	(8.5)	5	(7.9)	418	(9.9)	19	(6.8)	2	(5.3)	0	(0.0)	21	(6.5)
	6	431	(11.5)	50	(11.5)	5	(7.9)	486	(11.5)	31	(11.1)	4	(10.5)	0	(0.0)	35	(10.8)
	7	398	(10.6)	33	(7.6)	4	(6.3)	435	(10.3)	27	(9.6)	5	(13.2)	2	(28.6)	34	(10.5)
	8	382	(10.2)	33	(7.6)	9	(14.3)	424	(10.0)	24	(8.6)	3	(7.9)	0	(0.0)	27	(8.3)
	9	410	(10.9)	49	(11.3)	8	(12.7)	467	(11.0)	35	(12.5)	3	(7.9)	0	(0.0)	38	(11.7)
	10	298	(8.0)	50	(11.5)	4	(6.3)	352	(8.3)	21	(7.5)	5	(13.2)	1	(14.3)	27	(8.3)
Missing	0	4 452	(6.7)	571	(9.6)	208	(5.0)	5 231	(6.8)	339	(6.2)	40	(7.4)	13	(3.5)	392	(6.1)

Supplementary material; Table 2: Multiple Imputation via Chained Equations Model (MICE) model specification

Outcome	Link function	Predictors										
		i.Death	c.Age at event	c.Pre-op AMTS	i.Admitted From	i.Pre-op mobility	i.Fracture type	i.Pathology	i.ASA Grade	i.prosthesis	i.Dow of admission	
Pre-op AMTS	linear	✓	✓			✓		✓	✓	✓		
Pre-op mobility	ologit	✓	✓	✓	✓			✓	✓	✓		
Pathology	mlogit	✓	✓	✓	✓	✓			✓	✓		
ASA Grade	ologit	✓	✓	✓	✓	✓		✓		✓		
Falls Assessment	logit	✓	✓	✓		✓			✓	✓	✓	
MDT	logit	✓	✓			✓			✓	✓	✓	
Anaesthetic	mlogit	✓	✓	✓			✓		✓	✓		

AMTS = Abbreviated Mental Test Score, DOW = Day of the week, MDT = Multi-disciplinary Team, i. = indicator variable parameterisation, c. = continuous parameterisation

Supplementary material; Table 3: Sensitivity analyses for 3 exposure groups defined by the implants used

Model	Exposure	<u>Complete Cases</u>			<u>Multiple Imputation</u>		
		OR	(95% CI)	P=	OR	(95% CI)	P=
5	Sliding hip screw	1			1		
	Intramedullary short nail	1.191	(1.029, 1.379)	0.019	1.116	(0.995, 1.251)	0.060
	Intramedullary long nail	1.147	(1.013, 1.300)	0.031	1.109	(1.006, 1.222)	0.038
6	Sliding hip screw	1			1		
	Intramedullary short nail	1.188	(1.027, 1.375)	0.020	1.115	(0.994, 1.250)	0.062
	Intramedullary long nail	1.145	(1.011, 1.297)	0.033	1.110	(1.007, 1.223)	0.036

Supplementary material; Table 4: Sensitivity analyses for 2 exposure groups defined by the implants used (sliding hip screw, intramedullary nail). Model 5 - elapsed month parameterisation; Model 6 - trigonometric regression; Fourier series seasonal specification.

Model	Exposure	<u>Complete Cases</u>			<u>Multiple Imputation</u>		
		OR	(95% CI)	P=	OR	(95% CI)	P=
5	Sliding hip screw	1			1		
	Intramedullary nail	1.165	(1.056, 1.286)	0.0023	1.112	(1.029, 1.201)	0.0069
6	Sliding hip screw	1			1		
	Intramedullary nail	1.163	(1.054, 1.283)	0.0027	1.112	(1.030, 1.201)	0.0068

Supplementary material; Table 5: Crude 30-day mortality rates (%) by ASA grade for subsets of trochanteric fractures with complete case data

	ASA	Sliding Hip Screw (SHS)	Intramedullary Nail (IMN)	Total
All	I & II	2.51 (n=13,445)	3.31 (n=1,962)	2.62 (n=15,407)
	III	7.27 (n=26,536)	8.01 (n=3,907)	7.37 (n=30,443)
	IV & V	18.38 (n=45,693)	19.80 (n=919)	18.58 (n=6,631)
Trochanteric fractures excluding pathological (malignancy) & atypical	I & II	2.53 (n=13,344)	3.30 (n=1,907)	2.62 (n=15,251)
	III	7.23 (n= 26,248)	7.89 (n=3,753)	7.31 (n=30,001)
	IV & V	18.29 (n=5,614)	19.04 (n=851)	18.39 (n=6,465)