

Evaluating pre-operative group & save sampling against transfusion risk following surgery in elective knee and hip arthroplasty patients

Background

With improved pre-operative optimisation of anaemia and enhanced recovery strategies, blood transfusion is becoming less common in primary Total Hip Replacement (THR) and Total Knee Replacement (TKR) procedures. Significant haemorrhage and emergent transfusion from iatrogenic injury to vessels during surgery is rare (0.19% TKR, 0.12% THR)¹ and if there is catastrophic perioperative bleeding the major haemorrhage protocol is utilised.

Our local hospital policy required 2 pre-operative group & save (G&S) samples for all primary TKR & THR. In this study we evaluate the safety and cost-effectiveness of the original protocol and a proposed protocol eliminating the G&S sampling.

Patients & Methods

A total of 210 patients were studied. A retrospective analysis was performed of consecutive primary TKR (73) and THR (77) across a 6-month study period (Phase 1). A further retrospective examination was conducted following the implementation of a new G&S policy (Phase 2) on consecutive TKR (n=37) and THR (n=23) patients. Units of blood transfused, timing to transfusion and pre vs post op Hb levels were key outcome measures.

	OLD POLICY			NEW POLICY	
	PRE-OP G&S	Admission G&S		PRE-OP G&S	Admission G&S
Primary TKR	✓	✓	→	✗	✗
Primary THR	✓	✓		✓	✗

DEMOGRAPHICS

Procedure	Age	ASA	Sex (M:F)
THR (n=100)	67 (88-30)	2.3	35:65
TKR (n=110)	70 (90-49)	2.4	59:51

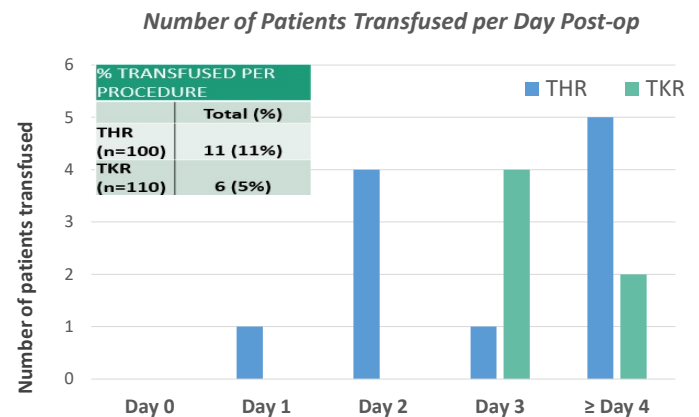
PHASE 1				PHASE 2			
Procedure	Age	ASA	Sex (M:F)	Procedure	Age	ASA	Sex (M:F)
THR (n=77)	68 (88-30)	2.3	23:54	THR (n=23)	52 (47-87)	2.2	12:11
TKR (n=73)	70 (90-51)	2.4	43:30	TKR (n=37)	69 (49-83)	2.4	16:21

Results

Blood loss

	Average Pre-op Hb mg/dL (Range)	Average Hb Decrease Day 1 mg/dL (Range)	Average Hb Decrease Day 1- Day 3 mg/dL (Range)	Average Overall Procedure Hb Decrease mg/dL (Range)
THR (n=100)	137 (174 - 100)	28 (76 - 3)	8 (39 - -13)	34 (69 - 3)
TKR (n=110)	139 (173 - 95)	20 (42 - -3)	10 (33 - -10)	30 (60 - -2)

Time to Transfusion



Projected Annual Savings

At our institution:

- Lab cost per G&S sample is £20
- Average 150 TKR & 150 THR performed annually

Old G&S Policy

- 2 x £20 x 150 TKR = £6000
- 2 x £20 x 150 THR = £6000

• Total £12000

New G&S Policy

- 5% x 150 TKR = 8
 - 2 x £20 x 8 TKR = £320
- 11% x 150 THR = 17
 - (1 x £20 x 150 THR) + (1 x £20 x 17 THR) = £3340

• Total £3660

Projected annual savings = £8340

Discussion

With low overall transfusion rates, together with our findings that the transfusions in our study were delivered in a scheduled non-emergent setting following routine post-operative blood monitoring, relevant stakeholders locally agreed upon a change in G&S policy. Following the new policy implementation we studied for post-operative complications and observed no adverse event resultant of anaemia.

The direct laboratory cost of a single G&S sample at our institution was calculated at £20. In addition to the financial savings, there is also the associated benefit to the patient avoiding an additional unpleasant and unnecessary phlebotomy procedure. With over 200 000 primary hip & knee arthroplasties performed every year across the UK^{2,3}, avoidance of unnecessary pre-operative G&S sampling could confer significant savings and benefits to patients & clinical services.

Conclusion

- Low rates of transfusion in primary TKR (5%) & THR (11%) and emergency transfusion rare
- With per patient lab costs of G&S sampling £40, avoidance of unnecessary G&S sampling could confer significant savings

1. Avisar, E., Elvey, M.H., Bar-Ziv, Y., Tamir, E. and Agar, G., 2015. Severe vascular complications and intervention following elective total hip and knee replacement: a 16-year retrospective analysis. *Journal of orthopaedics*, 12(3), pp.151-155.

2. Scottish Arthroplasty Project Annual Report 2019

3. National Joint Registry Annual Report 2019