Metro North Health

Queensland Government

Kidney Health Service

ANZSN

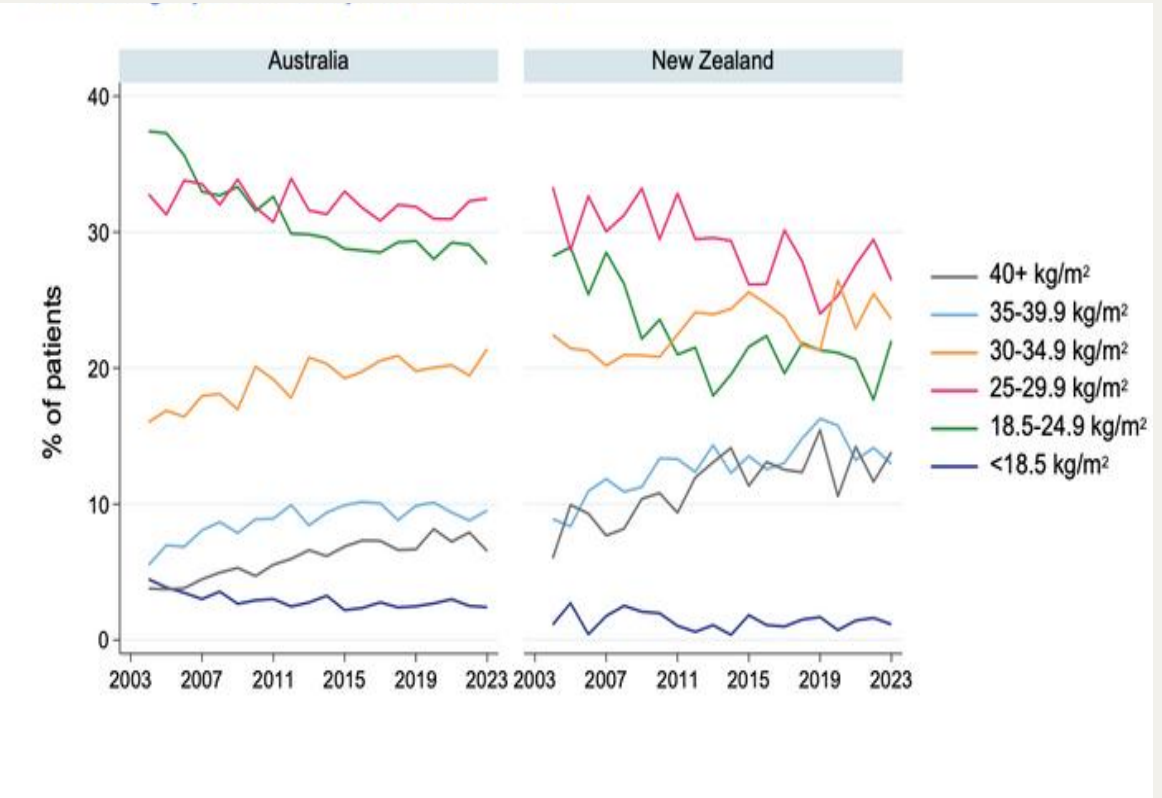
Bariatric Surgery and Its Impact on Hemodialysis

A Retrospective Cohort Analysis

Royal Brisbane Hospital
Queensland Statewide Bariatric Service

Obesity & Kidney Replacement Therapy (KRT)

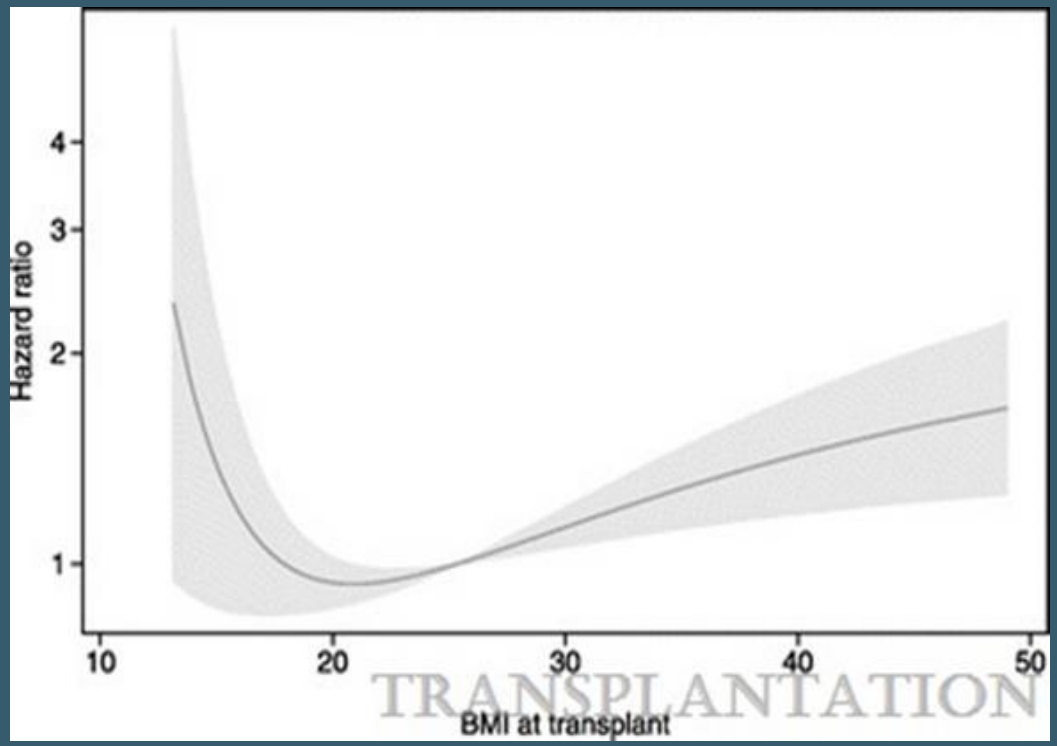
The prevalence of obesity has grown substantially over the last two decades



G Irish, C Davies, E Au, S Bateman, J Chen, K Hurst, F Kholmurodova, D Lee, H McCarthy, S McDonald, W Mulley, M Roberts, B Solomon, T Sun, P Clayton. 47th Report, Chapter 1: Incidence of Kidney Failure with Replacement Therapy. Australia and New Zealand Dialysis and Transplant Registry, Adelaide, Australia. 2024.

Obesity and Kidney Transplantation

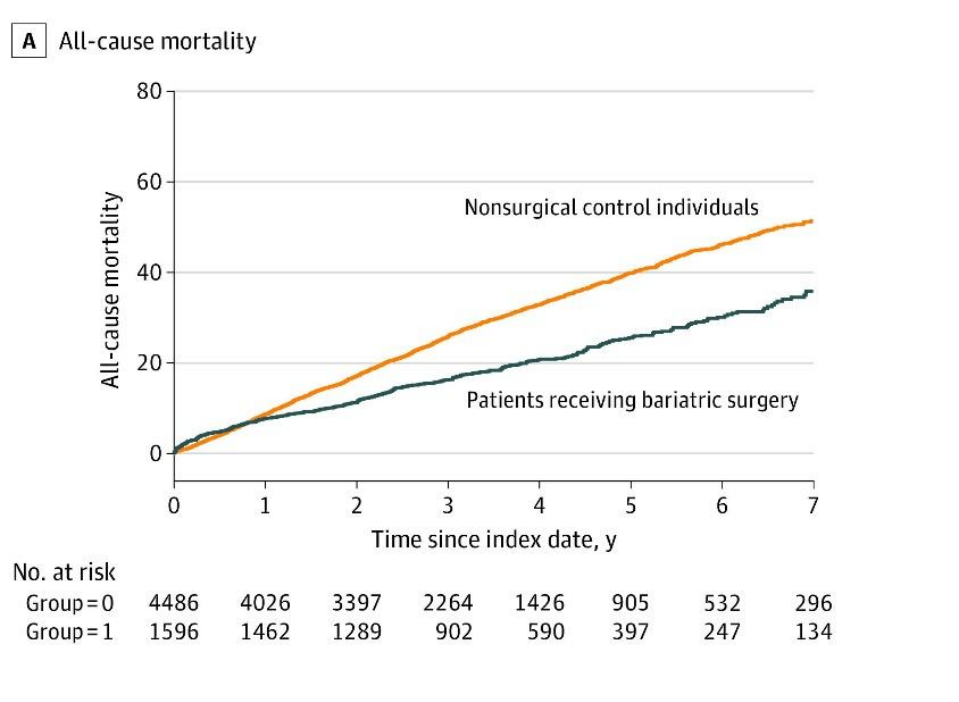
- **Kidney transplantation improves longevity and QoL[1]**
- **Obesity remains a relative contraindication:**
  - Wound breakdown (14% vs. 4%, p<0.01), (OR 1.21 95% CI 1.09-1.34, p<0.001)[1]
  - Delayed graft function (OR 1.56 95%CI (1.23 – 1.97))[2]
  - 6-month acute rejection (OR 1.25 95%CI (1.01-1.54))[2]
- Perceived risks of obese patients limits access to kidney transplantation

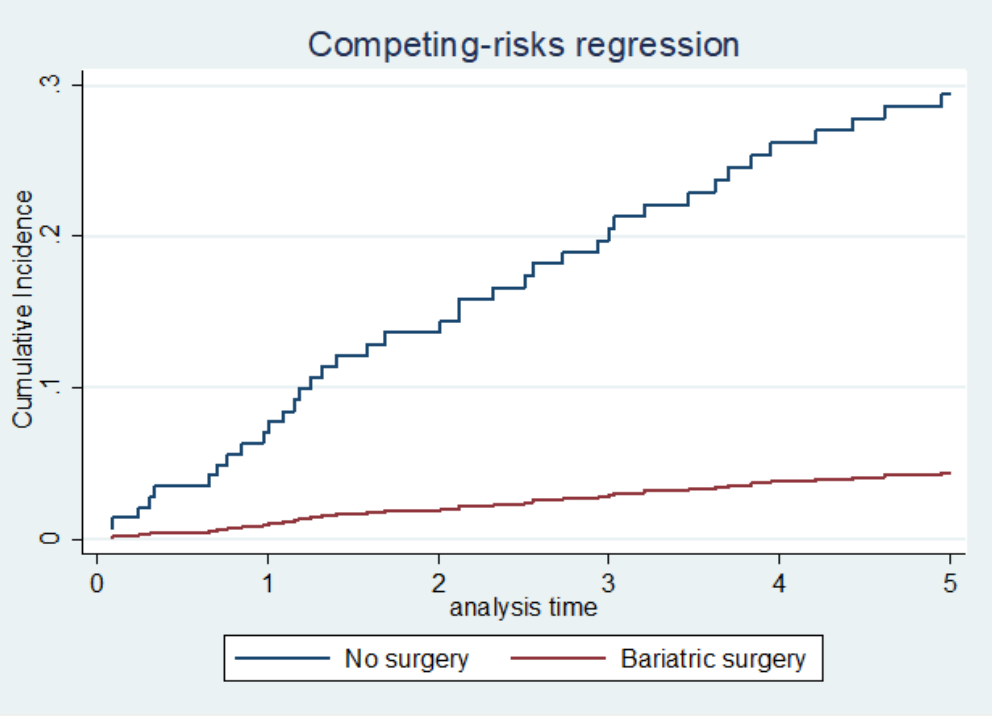


Hazard ratio for death-censored graft loss[2]

1.Johnson, D.W., et al., The effect of obesity on renal transplant outcomes. Transplantation, 2002. 74(5): p. 675-681.
2.Chang, S.H., P.T.H. Coates, and S.P. McDonald, Effects of Body Mass Index at Transplant on Outcomes of Kidney Transplantation. Transplantation, 2007. 84(8): p. 981-987.

Bariatric surgery increases access to Kidney transplantation





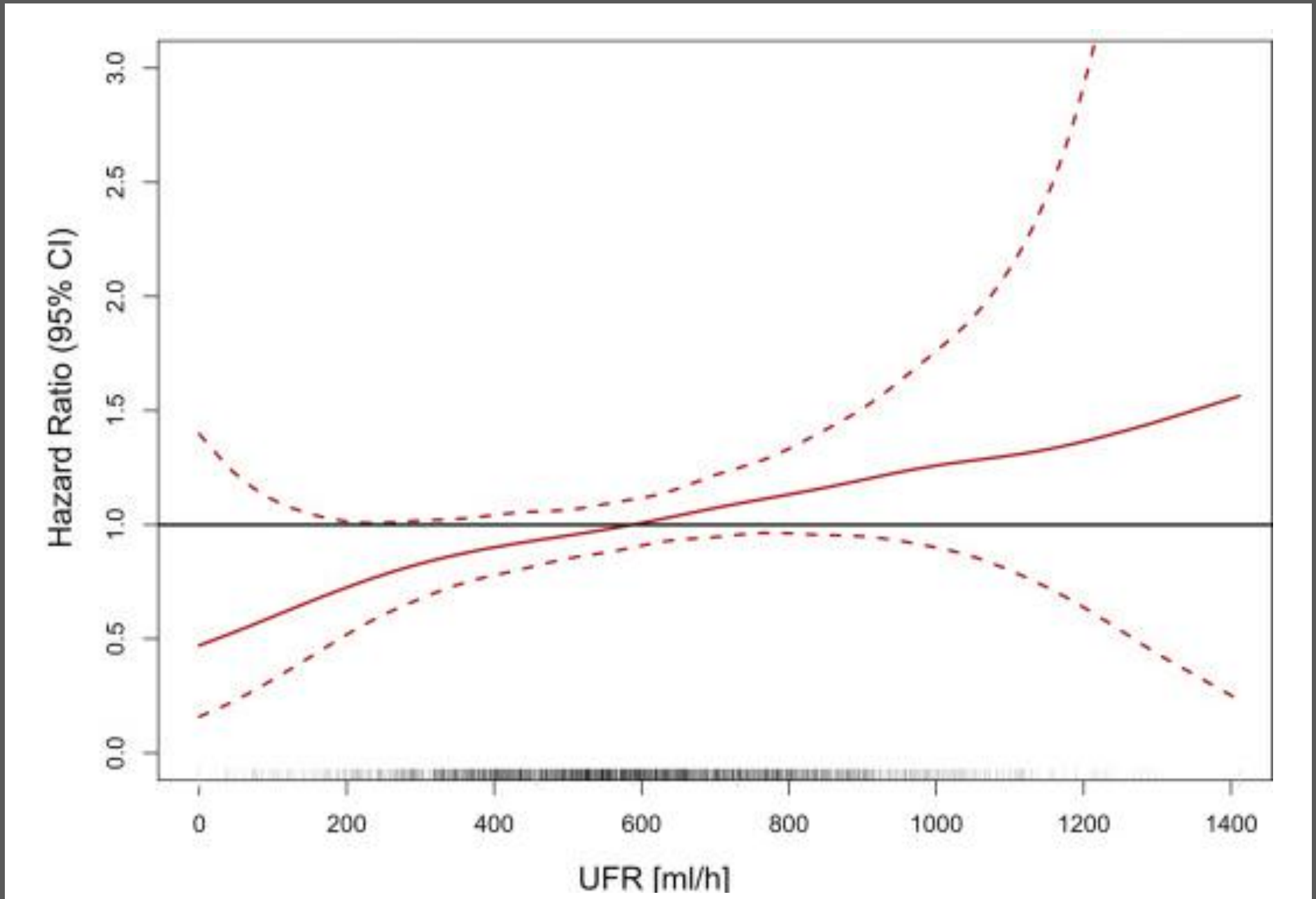
Sheetz, K.H., et al., Bariatric surgery and long-term survival in patients with obesity and end-stage kidney disease. JAMA surgery, 2020. 155(7): p. 581-588

Shaun Chandler al., Bariatric surgery outcomes in patients on chronic kidney replacement therapy in Australia and New Zealand , BJS, 2024

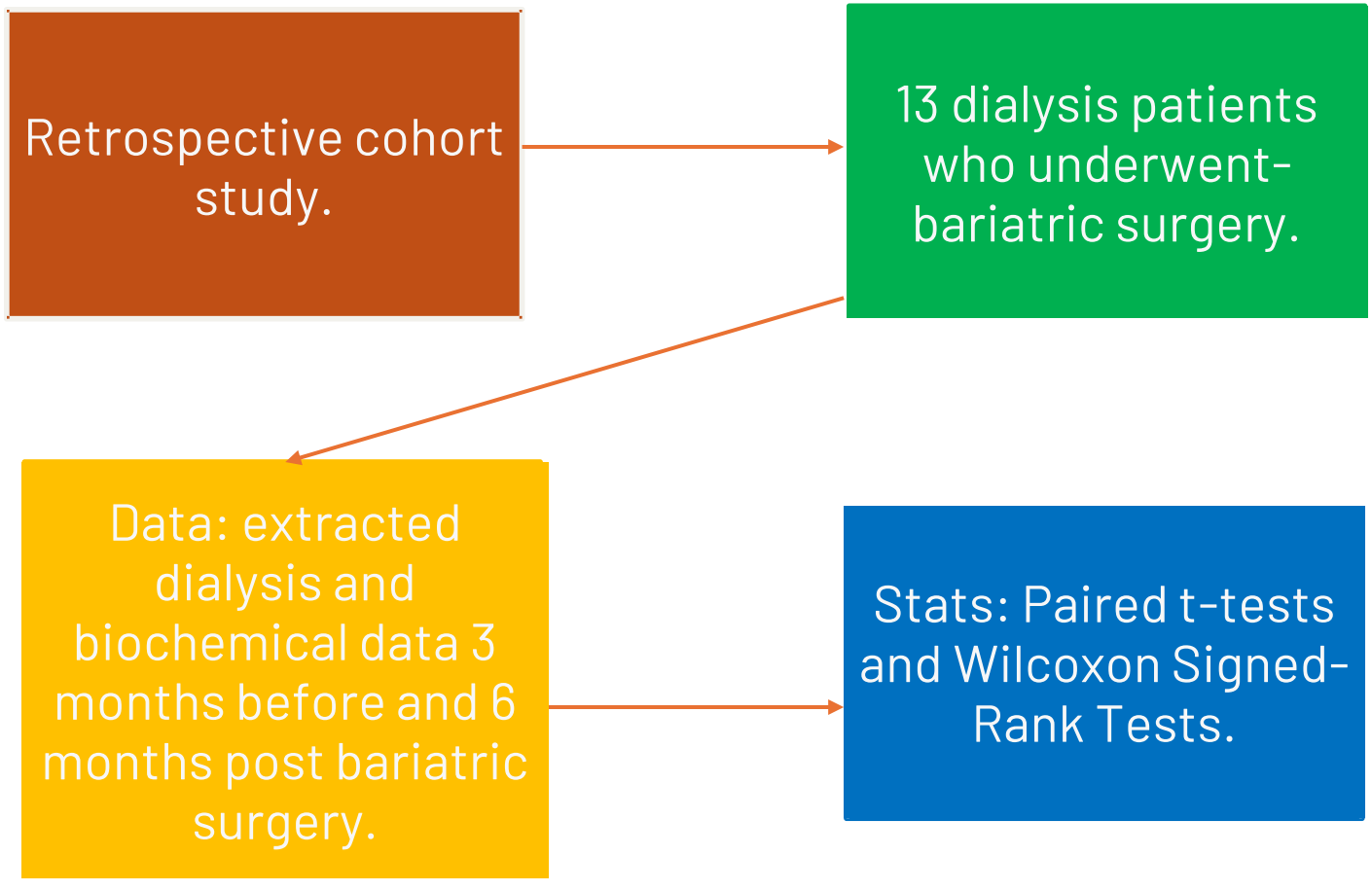
Study Aim

To evaluate changes of metabolic and dialysis parameters before and after bariatric surgery.

Hypothesis is that bariatric surgery leads to reduce intradialytic weight gain as a mean of improving overall survival


Hazard Ratio (95% CI)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
0
200
400
600
800
1000
1200
1400
UFR [ml/h]

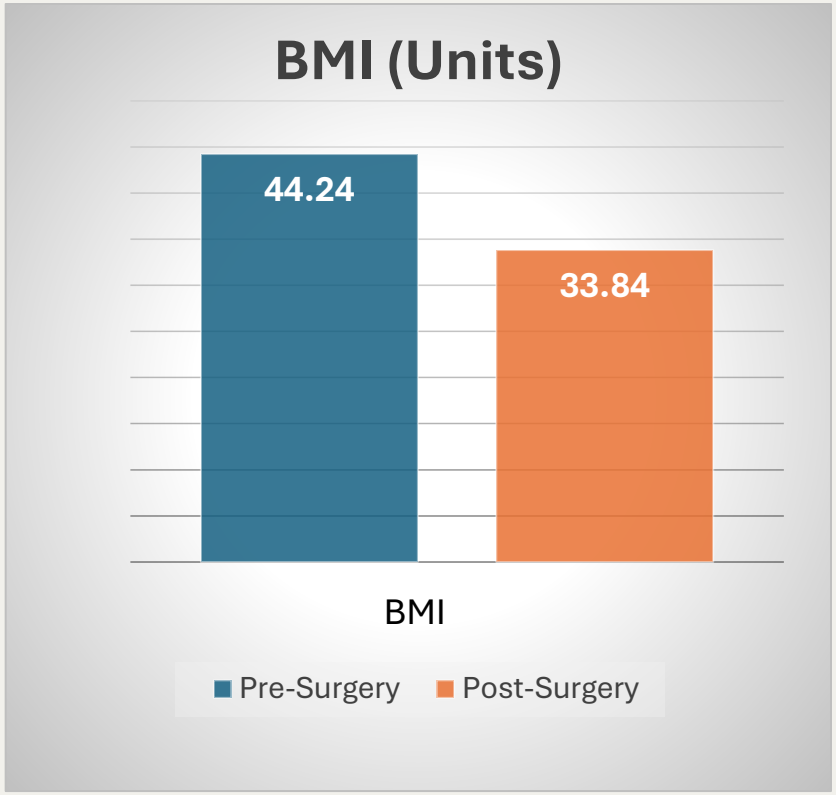
Methods

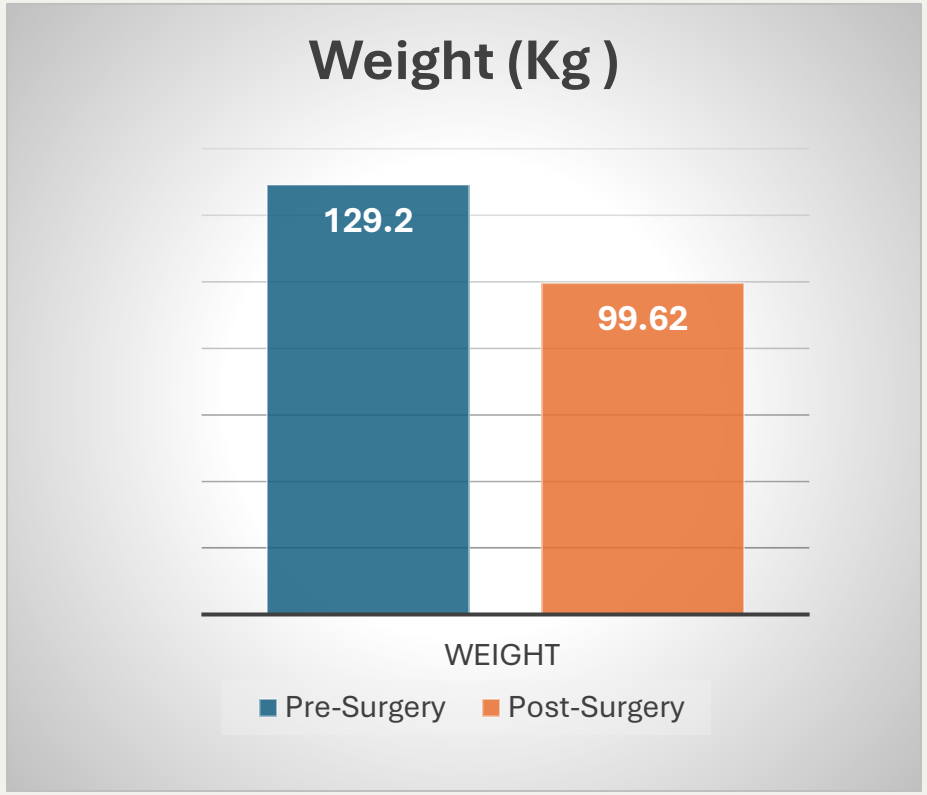

Retrospective cohort study.
13 dialysis patients who underwent- bariatric surgery.
Data: extracted dialysis and biochemical data 3 months before and 6 months post bariatric surgery.
Stats: Paired t-tests and Wilcoxon Signed-Rank Tests.

Participant Demographics and Post operative Anthropometrics

Demographic Characteristic	Number	%	Mean ±S.D.		Max	Min
Age (Years)			50.31±12.16		70	23
DM						
None	5	38.46				
T2DM	8	61.54				
IHD						
None	12	92.31				
CAD	1	7.69				
Dialysis type						
HD	8	61.54				
Home HD	5	38.46				
Weight before bariatric surgery			129.2±18.85		171.2	100
Weight after bariatric surgery			99.62±23.13		130.5	54.2
BMI before bariatric surgery			44.24±4.35	55.90	38.39	
BMI after bariatric surgery			33.85±6.02	43.60	21.17	33.85±6.02

BMI and Weight 6 months post Bariatric Surgery

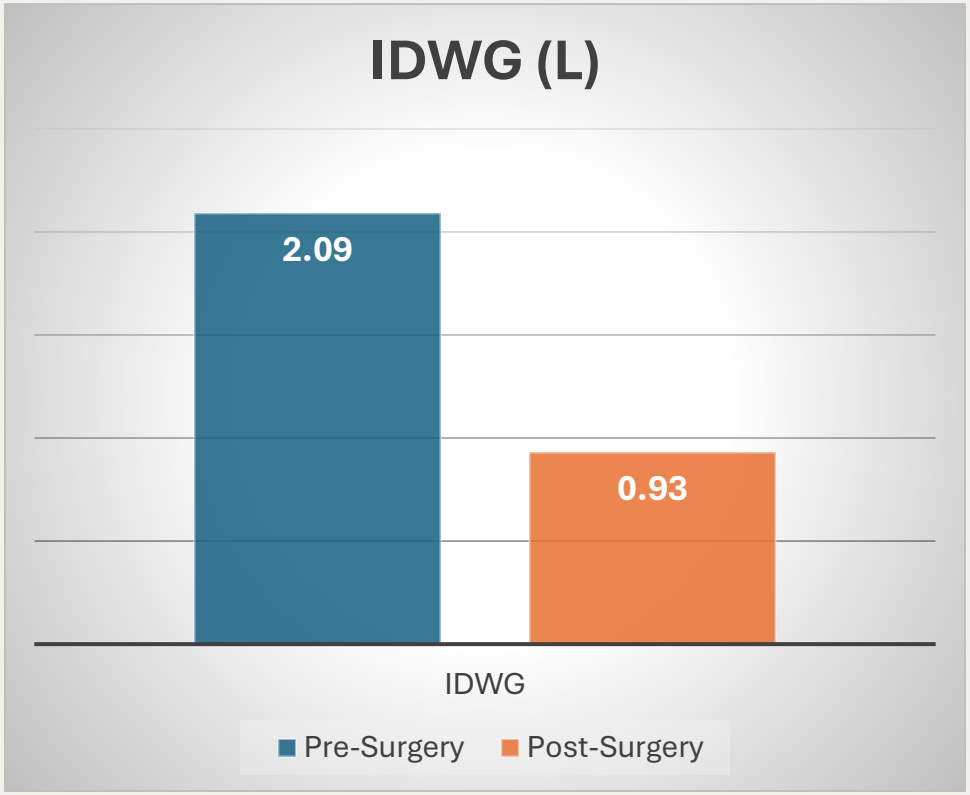


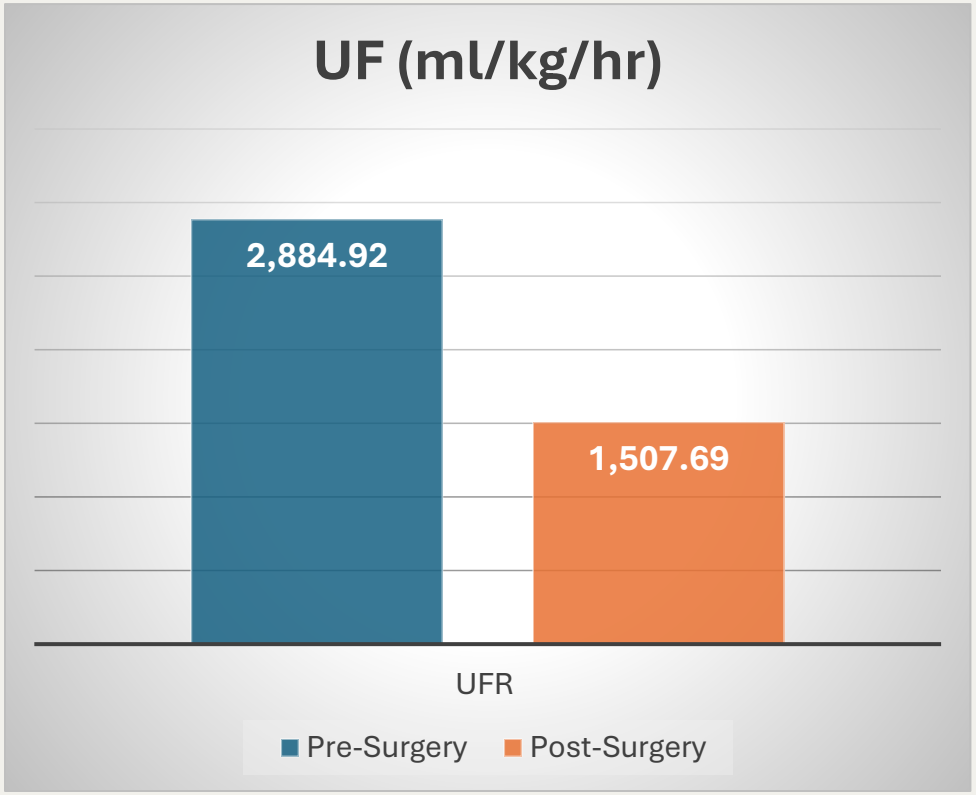


BMI decreased by 10.39 (95% CI: 6.46, 14.32, p-value < 0.001) units,
23.51% reduction.

Weight decreased by 29.58, (95% CI:19.10, 40.05, p-value < 0.001) kg
22.9% reduction

IDWG and UF 6 months post Bariatric surgery

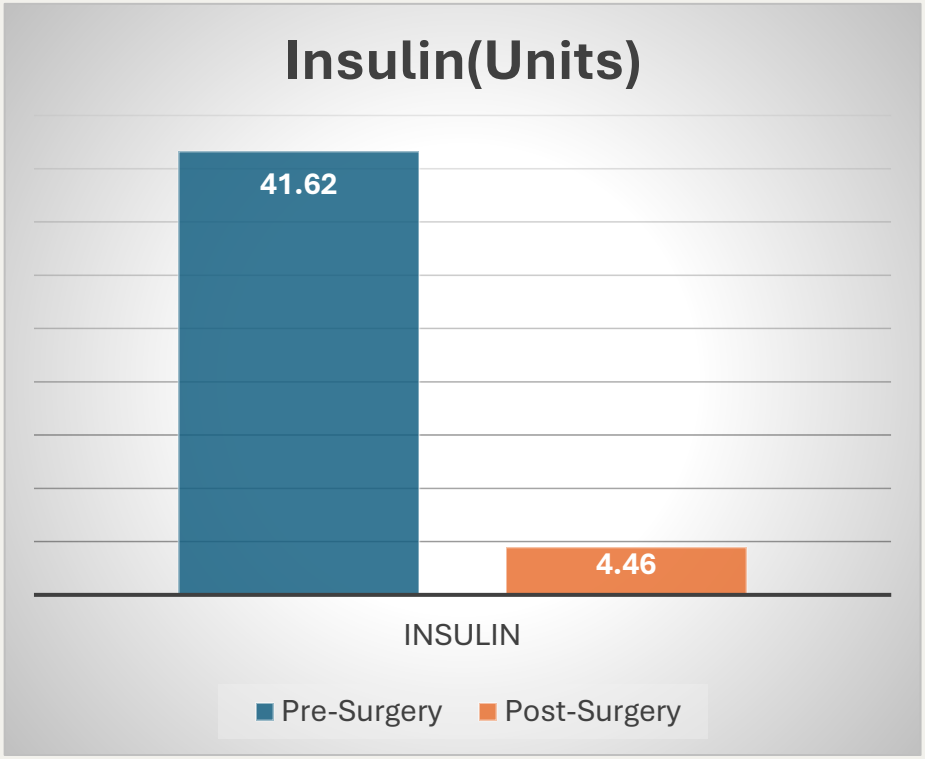


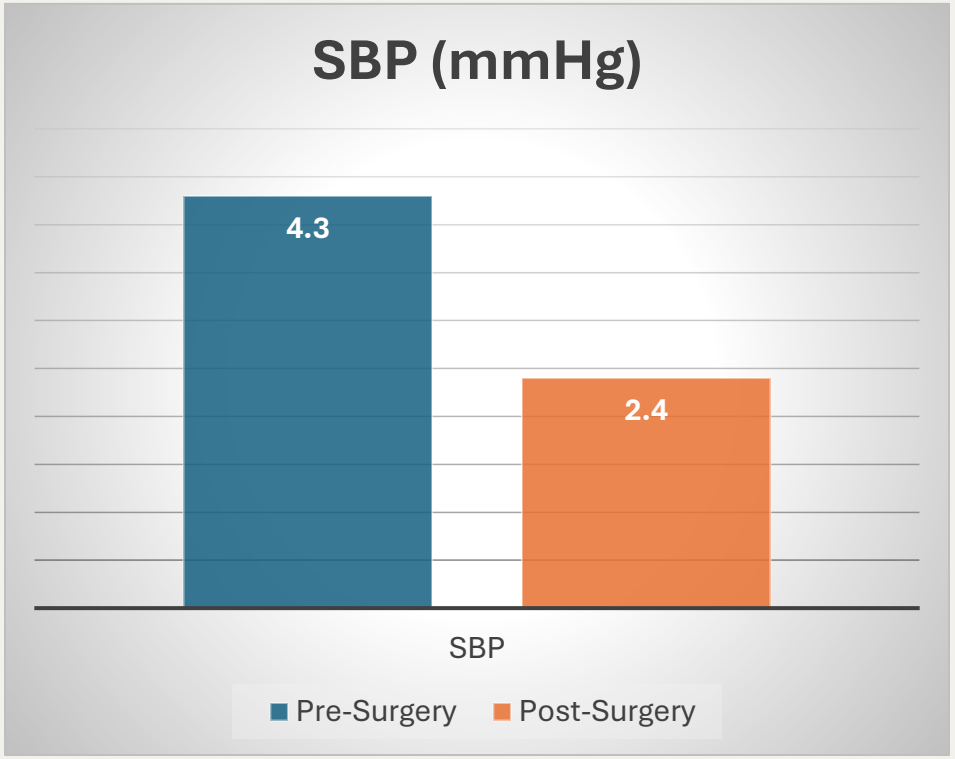


IDWG decreased by 1.16 , (95% CI: 0.78, 1.54,p-value < 0.001) L.
55.50% reduction.

UF volume decreased by 1,377.23, (95% CI: 736.55, 2017.91 ,p-value < 0.001),
47.74% reduction.

Insulin and SBP 6 months post Bariatric surgery





Insulin decreased by of 10 units (95% CI: 0.78, 1.54, p-value = 0.016), **41.62 % reduction**

The post-surgery SBP decreased by 14.19 mmHg, (95% CI: 7.41, 20.96 , p-value < 0.001), **10.34% Reduction.**

Other observations

HbA1c

Albumin

Number of Antihypertensives

Number of hospitalizations for Fluid overload

Limitations

Small sample size (n=13).

Selection bias.

The lack event rates and short period of follow

Conclusion

- Bariatric surgery in this small cohort led to:
  - ***Reduced intradialytic weight gains and Ultrafiltration***

Future Directions

Further validation of these findings is required in larger cohort studies

Acknowledgement

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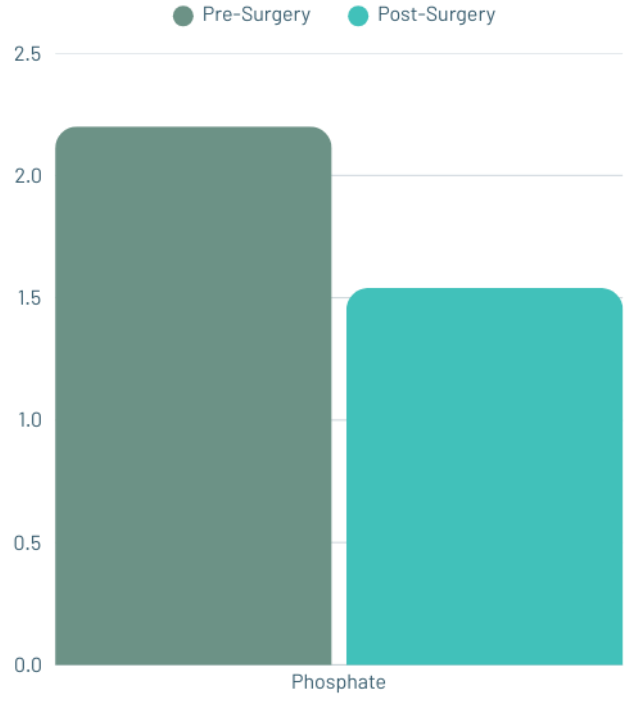
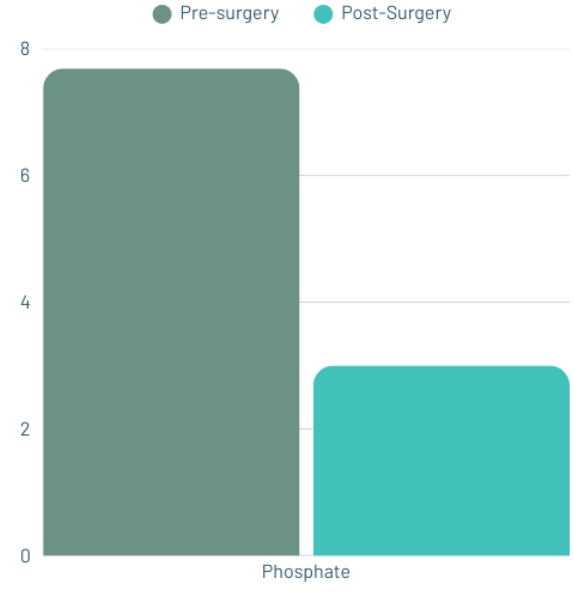
1. **Metro-north Kidney health Service, RBWH**
2. **Queensland Kidney Transplant Service Princess Alexandra Hospital**
3. **Statewide bariatric service, RBWH**

Phosphate mmol L Phosphate Binder units

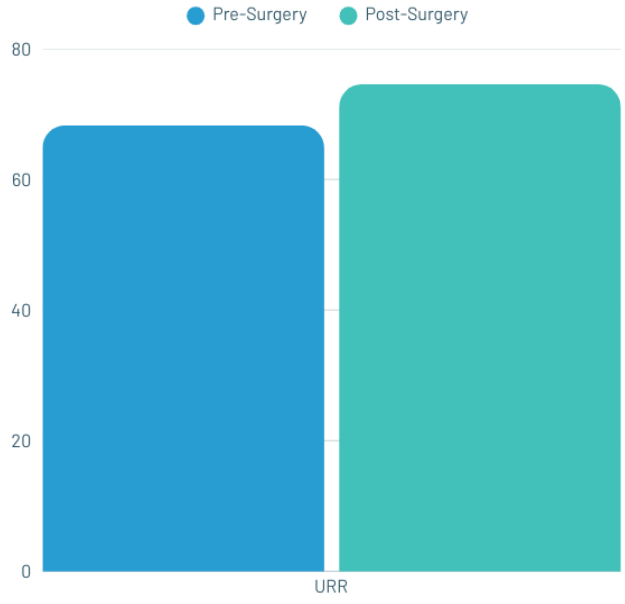




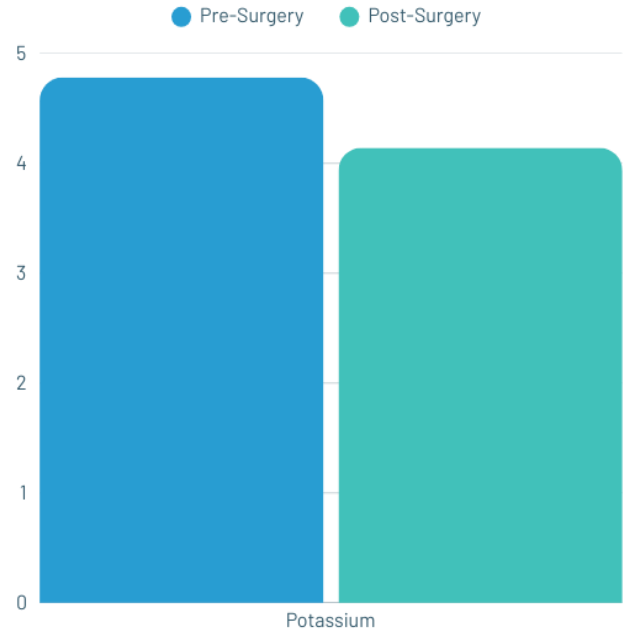
Phosphate reduced 0.66 a (**p-value = 0.002),30% reduction**

Phosphate Binder reduced 4.69 units, or (p-value = 0.0004)(95% CI: 2.61, 6.78). **60.99%reduction**

URR vs Potassium



URR of 68.27>74.57. The URR increased by an average of 6.3 units, or 9.23%. significant difference at the 5% significance level (p-value < 0.001)(95% CI: -9.13, -3.47).



a median Potassium level of 4.6 > 3.9. The comparison of median Potassium levels before and after the surgery showed a difference or a statistically significant difference at the 5% significance level (p-value = 0.006).

Post operative Anthropometrics Measures at 6 months post surgery

Demographic Characteristic	Mean±S.D.	Max	Min
Weight before bariatric surgery	129.2±18.85	171.2	100
Weight after bariatric surgery	99.62±23.13	130.5	54.2
BMI before bariatric surgery	44.24±4.35	55.90	38.39
BMI after bariatric surgery	33.85±6.02	43.60	21.17

Variables	Mean±S.D.	Median(IQR)	$\bar{d}$± S.D.	%Change	95%CI	Z	p-value
1. Weigh							
Pre-surgery	129.2±5.23	125.1(7.5)	29.58±4.81	22.9%	19.10,40.05	-	<0.001[a]
Post-surgery	99.62±6.42	104(31.3)					
2. BMI							
Pre-surgery	44.24±1.21	43.60(2.91)	10.39±1.80	23.51%	6.46,14.32	-	<0.001[a]
Post-surgery	33.84±1.67	35.001(4.72)					
3. HbA1c							
Pre-surgery	6.58±0.52	5.9(2)	0.39±0.31	6.08%	-0.27,1.06	-	0.2235[a]
Post-surgery	6.18±0.39	6.4(2)					
4. IDWG							
Pre-surgery	2.09±0.17	2.14(0.62)	1.16±0.17	55.50%	0.78,1.54	-	<0.001[a]
Post-surgery	0.93±0.12	0.84(0.61)					
5. UF							
Pre-surgery	2884.92±306.85	2936.11(1041.58)	1377.23± 294.05	47.74%	736.55, 2017.91	-	<0.001[a]
Post-surgery	1507.69±138.26	1525(529.17)					
6. SBP							
Pre-surgery	137.17±4.32	138.08(21.25)	14.19±3.11	10.34%	7.41,20.96	-	<0.001[a]
Post-surgery	122.99±3.29	124.83(21.50)					
7. HTN							
Pre-surgery	0.38±0.21	0(0)	0.08±0.08	18.42%	-0.09,0.24	1	0.317[b]
Post-surgery	0.31±0.17	0(0)					
8. Fluid							
Pre-surgery	0.46±0.27	0(0)	0.46±0.27	100%	-0.12,1.05	1.728	0.084[b]
Post-surgery	0	0(0)					

Variables	Mean±S.D.	Median(IQR)	$\bar{d}$± S.D.	%Change	95%CI	Z	p-value
1. URR							
Pre-surgery	68.27±5.64	68.53(6.25)	6.3±4.69	9.23%	-9.13, -3.47	-	0.0004[a]
Post-surgery	74.57±3.97	74.93(3.81)					
2. Serum Albumin							
Pre-surgery	34.15±3.34	34(5)	1±3.19	2.94%	-2.93,0.93	-1.757	0.079[b]
Post-surgery	35.15±4.71	35(5)					
3. Phosphate							
Pre-surgery	2.33±1.21	2.2(0.82)	0.82±0.98	35.19%	0.22,1.41	3.180	0.002[b]
Post-surgery	1.51±0.99	1.54(0.99)					
4. Potassium							
Pre-surgery	4.78±0.75	4.6(1.2)	0.64±0.75	13.39%	0.18,1.09	2.731	0.006[b]
Post-surgery	4.14±0.61	3.9(0.8)					
5. PTH level							
Pre-surgery	58.68±45.6	66(82)	14.39±25.28	24.52%	-0.88, 29.67	-	0.063[a]
Post-surgery	44.29±35.55	41(70)					
6. Insulin							
Pre-surgery	41.62±87.53	0 (32)	37.15±81.93	89.28%	-12.36, 86.67	2.418	0.016[b]
Post-surgery	4.46±8.49	0(0)					
7. Antihyperglycemics							
Pre-surgery	0.77±1.09	0(1)	0.46±0.29	59.74%	-0.17,1.1	1.414	0.158[b]
Post-surgery	0.31±0.48	0(1)					
8. Phosphate Binder							
Pre-surgery	7.69±4.23	6(5)	4.69±3.45	60.99%	2.61 ,6.78	-	0.0004[a]
Post-surgery	3±5.26	0(3)					