

Parathyroid Hormone Driven Algorithms After Thyroid Surgery: Not One-size-fits-all.

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Background

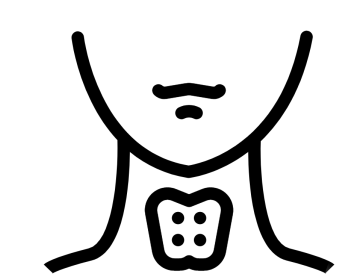
- Hypoparathyroidism is the most common complication following thyroid surgery
- Hypocalcemia ($\downarrow$ Ca) $\rightarrow$ adverse health-related outcomes, $\downarrow$ quality of life, $\uparrow$ costs of care
- Parathyroid hormone (PTH)-driven approaches are often employed to anticipate and manage $\downarrow$ Ca after thyroid surgery
- There is **significant variation in PTH assays and calibration** methods among different laboratories

Aim

To develop an **institution-specific PTH-based algorithm** to anticipate hypocalcemia after thyroid surgery with implementation of quality improvement techniques at a high volume thyroid surgery center.

Methods

PHASE 1: PRE-IMPLEMENTATION



Retrospective chart review (2016-2018)

- Inclusion:** total or completion thyroidectomy, $\pm$ central neck dissection
- Exclusion:** lateral neck dissection
- Outcomes:** $\downarrow$ Ca, LOS, Ca supplementation



Receiver-operating curve (ROC) & Area Under Curve (AUC)

- Sensitivity & specificity values for PTH to predict $\downarrow$ Ca
- 99% specificity / 96% sensitivity chosen acceptable cut-offs by surgeon consensus

PHASE 2 – POST-IMPLEMENTATION



Prospective data collection

- post algorithm implementation (2019-2020)

Results

Cohort Characteristics



Pre-implementation

n= 95
78% Female
51 $\pm$ 14 mean Age
68% Total thyroid



Post-implementation

n= 64
75% Female
54 $\pm$ 14 mean Age
49% Total thyroid

Figure 1: Receiver operating curve analysis for post-operative PTH levels and predictability of hypocalcemia occurrence

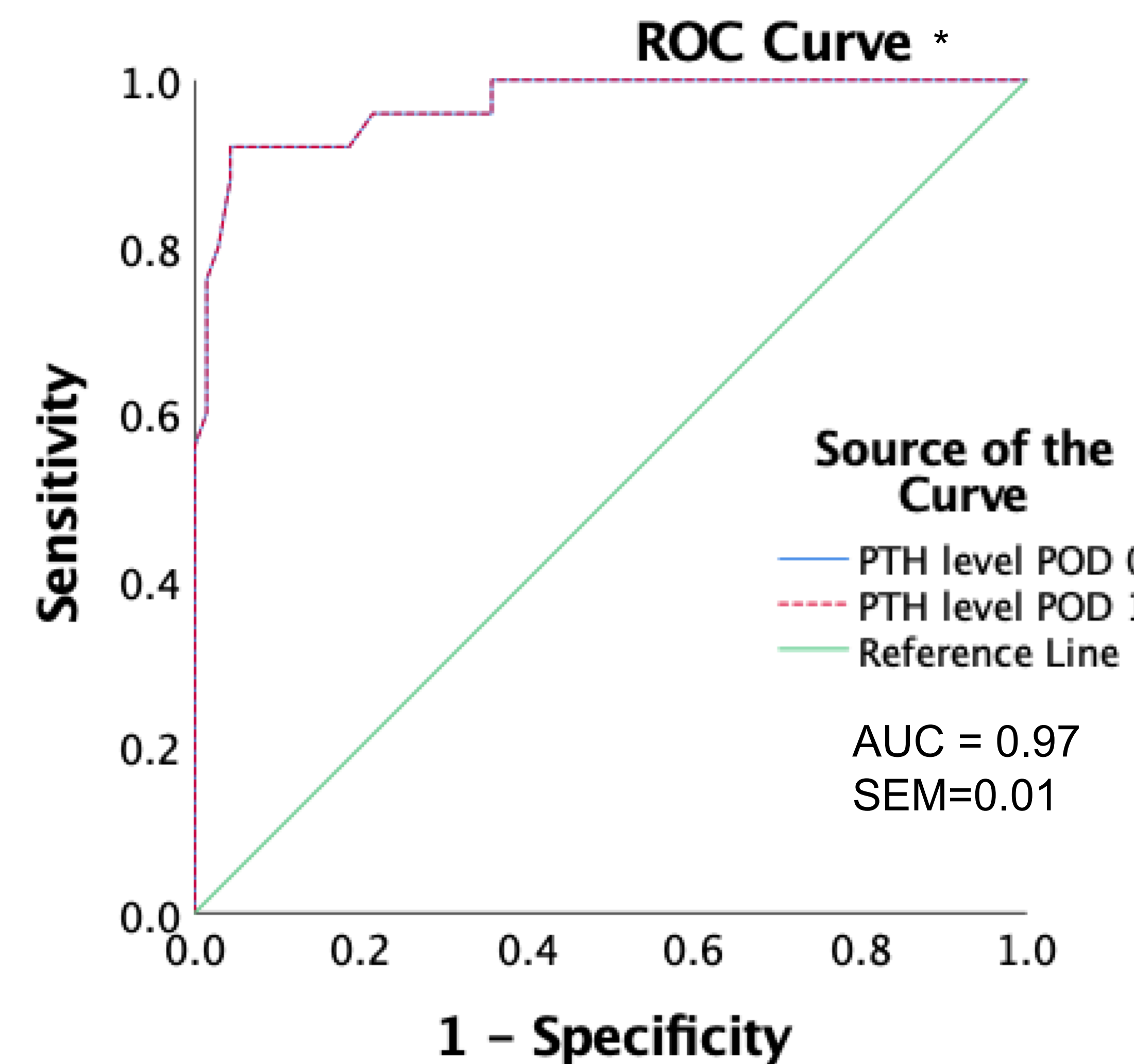


Table 1: Sensitivity and specificity of Recovery unit PTH at different thresholds to predict hypocalcemia based on pre-implementation data

PTH	Sens (%)	Spec (%)
1.4	72	99
<u>1.5</u>	76	<u>99</u>
1.6	80	97
...	...	...
2.7	92	81
<u>2.8</u>	<u>96</u>	79

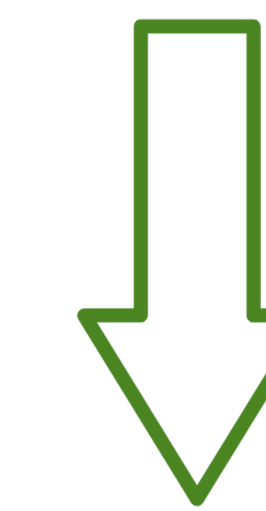
Table 2: Proposed guideline for calcium management post total/completion thyroidectomy

PTH	Suggested management
≤ 1.5	Calcium 1g elemental PO TID + calcitriol 0.25mcg BID
1.6 - 2.7	1. Follow Ca trend [†] $\rightarrow$ reassess $\pm$ supplement Or 2. Calcium 500mg elemental PO TID
≥ 2.8	No supplementation required
Symptomatic $\downarrow$ Ca [‡] or corr calcium ≤ 1.7 mmol/L	Consider calcium gluconate 1g IV bolus Start infusion of calcium gluconate

[†] Ca trend for at least 3 consecutive readings each 12 hrs apart

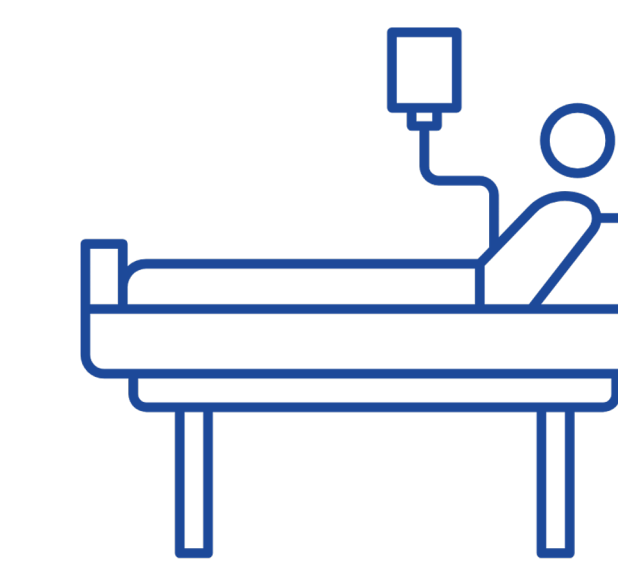
[‡] persistent perioral/distal digital numbness/paresthesia, carpopedal spasm, and/or positive Trousseau's sign

Management of patients who underwent thyroid surgery before and after PTH-based guideline implementation:



Calcium over- supplementation

13 (13.7%) $\rightarrow$ 2 (3.1%)
p=0.06



Length of stay > 2 nights

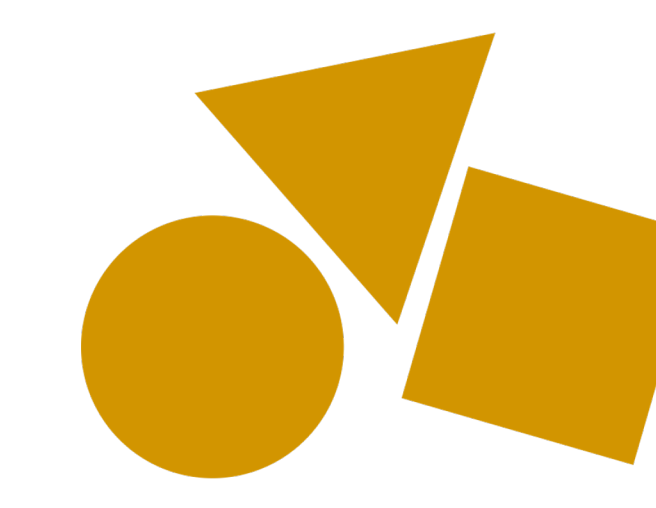
13 (13.7%) $\rightarrow$ 2 (3.1%) p 0.05
p=0.05

* Proposed guideline followed in (60 cases or 94%) post-implementation

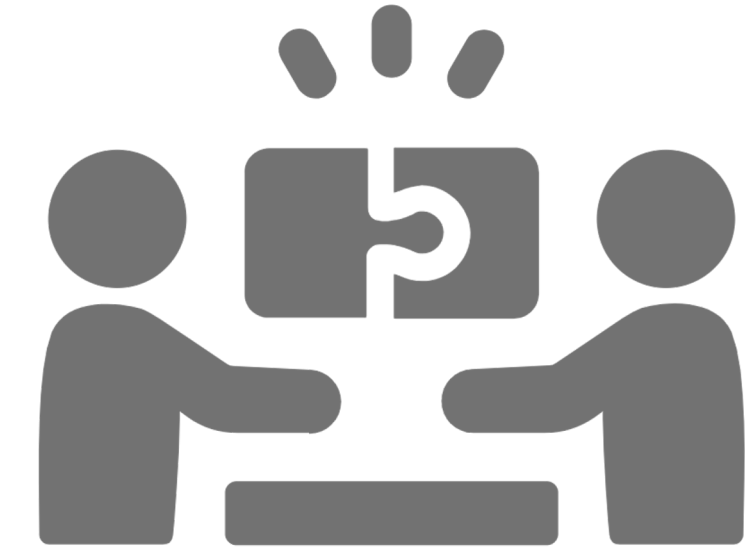
Conclusion



Recovery PTH reliably predicts hypocalcemia after thyroid surgery



PTH measurements are not universal
institution-specific data are recommended for PTH-based algorithms



Stakeholder engagement is critical