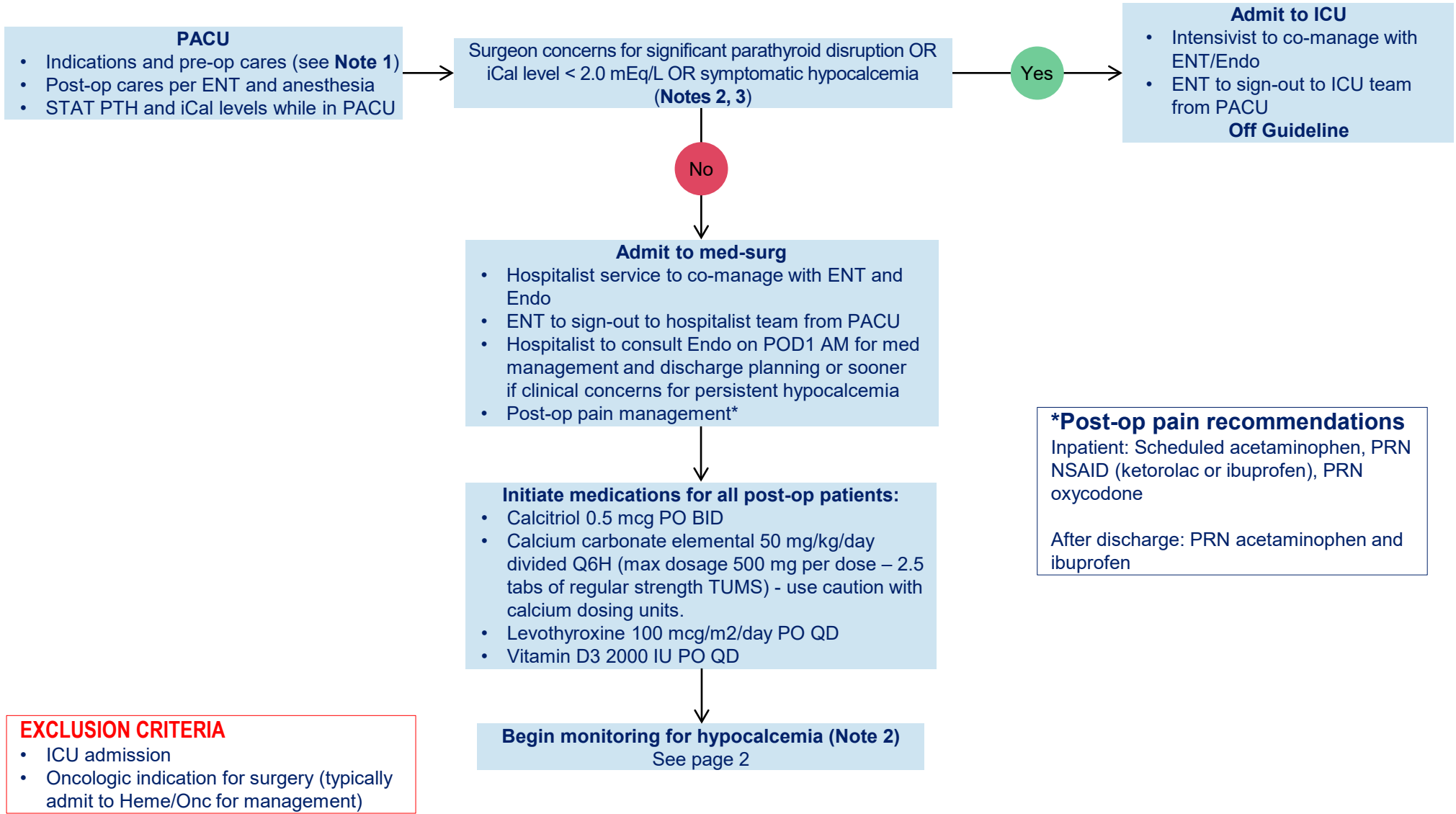


Aim: To standardize the management of children following partial or total thyroidectomy.



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Monitoring for post-op hypocalcemia

After initial levels in PACU or when re-entering after "Management of hypocalcemia"

Step 1: iCal Q4H x3 (Note 4)

Calcium levels remain adequate? (Note 4)

No

Yes

Step 2: iCal Q6H x 2

Calcium levels remain adequate? (Note 4)

No

Yes

Step 3: iCal Q12H x 2

Calcium levels remain adequate? (Note 4)

No

Yes

Step 4: iCal QDay if remains inpatient

Discharge criteria and follow up recommendations
See Page 4

Management of hypocalcemia

Place patient on telemetry monitoring until levels have stabilized (Note 5)

iCal < 1.8 mEq/L OR total calcium < 8 mg/dL

iCal 1.8-2.0 mEq/L OR total calcium 8-9 mg/dL AND symptoms of hypocalcemia

Obtain 12 lead EKG (Note 5)

Obtain 12 lead EKG

Abnormal EKG (Note 5)

Normal EKG

Administer calcium chloride 10 mg/kg IV (max dose 500 mg, Note 6)

Increase calcium carbonate to 75 mg/kg/day (elemental) PO divided Q6H (max dose of 500 mg elemental). If already at max dose, no adjustments needed.

Repeat iCal 1 hour after administration

Repeat iCal in 3-4 hours

If adequate calcium level (Note 4), return to Step 1 of "Monitoring for post-op hypocalcemia" algorithm.

If not adequate, return to "Management of hypocalcemia" algorithm.

If requiring more than one IV calcium replacement or oral supplement adjustment, discuss with Endo.

If requiring IV calcium chloride administration more frequently than Q3H, discuss transfer to PICU.

NOTE 1**Indications**

Common indications for pediatric total or subtotal thyroidectomy:

- Thyroid nodules, certain goiters
- Failed medical management of Graves' disease, Hashimoto's
- Thyroid cancer

Pre-op Optimization

Recommended initiation of calcitriol, calcium, and vitamin D3 supplementation 3 days prior to procedure (done by Endo):

- Calcitriol 0.5 mcg PO BID
- Calcium carbonate elemental 50 mg/kg/day PO TID (max dosage 500 mg per dose)
- Vitamin D3 2000 IU PO QD

Continue supplementation until instructed to stop post-operatively.

NOTE 2

Symptoms of hypocalcemia:

- Tetany – perioral numbness, paresthesias, muscle cramps
- Laryngospasm
- Seizures
- Hypotension

NOTE 3

Risk factors for hypocalcemia:

- Neck dissection/lymph node exploration
- Low PTH post-op
- Younger age
- Previous hyperthyroidism

NOTE 4

Adequate calcium levels:

- iCal \geq 2.0 mEq/L
- Total Ca \geq 9 mg/dL
- iCal 1.8-2.0 mEq/L or Total Ca 8-9 mg/dL WITHOUT symptoms of hypocalcemia

iCals can be obtained via venipuncture OR fingerstick draw.

If assessing calcium level via BMP/CMP, you must also consider if correction is needed for hypoalbuminemia:

Corrected calcium (mg/dL) = (0.8(normal albumin [g/dL] – serum albumin [g/dL])) + Serum Ca (mg/dL)*

NOTE 5

EKG changes from hypocalcemia*:

- Prolonged QTc
- Heart block, ventricular dysrhythmias (uncommon)

*If prolonged QTc, recommend repeat EKG once calcium levels have stabilized to demonstrate normalization. If EKG does not improve with calcium normalization, recommend discussion with cardiology. If any other EKG abnormality (i.e. heart block), recommend consultation with cardiology and PICU.

Calcium can be considered stabilized and telemetry can be discontinued after two iCals greater than 2.0 mEq/L.

NOTE 6

IV calcium chloride can be given on the med-surg floor via a PIV. For patients without central access (only PIV), calcium chloride dilute infusion (50 mg/mL) should be utilized to minimize vein irritation.

Max dose for IV calcium chloride on med/surg unit is 500 mg per dose.

Link to med administration guide on StarNet:

<https://starnet.childrenshc.org/departments/Pharmacy/pediatric-iv-medication-administration-guidelines.pdf>

Discharge criteria

- Stable calcium levels with no symptoms of hypocalcemia for 24 hours. If calcium levels remain low/borderline but meeting all other criteria, discuss possibility for outpatient lab monitoring with endocrinology.
- Pain managed with oral medications (After discharge: PRN acetaminophen and ibuprofen)
- Adequate oral intake
- Follow-up plan in place

Follow-up Recommendations

- Outpatient endo medications: Continue calcitriol, calcium carbonate, levothyroxine, and vitamin D3 as directed by endocrinology
- Typical clinic follow-up recommendations: 1 month endocrinology/thyroid nodule clinic, separate ENT follow-up at surgeon's discretion

References

1. Maksimoski, M., Bauer, A. J., Kazahaya, K., Manning, S. C., Parikh, S. R., Simons, J. P., D'Souza, J., Maddalozzo, J., Purkey, M. R., Rychlik, K., Ho, B., Rutter, M. J., Jiang, W., Prager, J. D., Diercks, G., Propst, E. J., Miyamoto, R. C., Stack, B. C., Randolph, G. W., & Rastatter, J. C. (2022). Outcomes in Pediatric Thyroidectomy: Results From a Multinational, Multi-institutional Database. *Otolaryngology-Head and Neck Surgery*, 167(5), 869–876. <https://doi.org/10.1177/01945998221076065>
2. Patel, N. A., Bly, R. A., Adams, S., Carlin, K., Parikh, S. R., Dahl, J. P., & Manning, S. (2018). A clinical pathway for the postoperative management of hypocalcemia after pediatric thyroidectomy reduces blood draws. *International Journal of Pediatric Otorhinolaryngology*, 105, 132–137. <https://doi.org/10.1016/j.ijporl.2017.12.011>
3. Yu, Y. R., Fallon, S. C., Carpenter, J. L., Athanassaki, I., Brandt, M. L., Wesson, D. E., & Lopez, M. E. (2017). Perioperative Determinants of Transient Hypocalcemia After Pediatric Total Thyroidectomy. *Journal of Pediatric Surgery*, 52(5), 684–688. <https://doi.org/10.1016/j.jpedsurg.2017.01.011>
4. Radakrishnan, A., Reddy, A. T., Dalal, P., Rastatter, J. C., Josefson, J. L., Samis, J. H., Beestrum, M., Tian, Y., & Raval, M. V. (2021). Hypocalcemia prevention and management after thyroidectomy in children: A systematic review. *Journal of Pediatric Surgery*, 56(3), 526–533. <https://doi.org/10.1016/j.jpedsurg.2020.08.032>
5. Overman, R. E., Hsieh, L. B., Menon, R., Thomas, I. H., & Bruch, S. W. (2020). 4-Hour postoperative PTH level predicts hypocalcemia after thyroidectomy in children. *Journal of Pediatric Surgery*, 55(7), 1265–1269. <https://doi.org/10.1016/j.jpedsurg.2019.11.014>
6. Jiang, W., Lee, E., & Newfield, R. S. (2019). The utility of intact parathyroid hormone level in managing hypocalcemia after thyroidectomy in children. *International Journal of Pediatric Otorhinolaryngology*, 125, 153–158. <https://doi.org/10.1016/j.ijporl.2019.07.006>
7. Obiarinze, R., Fazendin, J., Iyer, P., Lindeman, B., & Chen, H. (2021). Intraoperative parathyroid hormone measurement facilitates outpatient thyroidectomy in children. *The American Journal of Surgery*, 221(4), 683–686. <https://doi.org/10.1016/j.amjsurg.2021.02.009>

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