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THYROID PATIENT TREATMENT AUDIT

Clinical Audit Report, Decision Protocol & Longitudinal Analytics

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Executive Summary & Clinical Scope: - This clinical audit analyzes 289 thyroid reports across 18 clinical variables. The dataset captures patient identification numbers, deviations in FT4 and FT3 scores from their targets, baseline symptom severity, drug regimens, primary interventions, recommendations for secondary testing, and planned review timelines.

Key Findings: Active FT3 replenishment is linked to direct clinical symptom improvement, whereas FT4 accumulation without deiodination is associated with greater patient distress. Secondary diagnostic panels provide a structured escalation pathway for refractory symptoms.

Key Operational Metrics

- **Total Thyroid Reports Evaluated:** 289 Evaluations (288 with complete parallel hormone & symptom scores).
- **Unique Longitudinal Patients:** 59 Patients (evaluated across 2 to 3 distinct test dates).
- **Average Baseline Symptom Score:** 6.65 points (Median: 5.0, Range: 0 to 28).
- **Secondary Diagnostic Test Rate:** 13.8% of evaluations (40 total recommendations).
- **Mean Longitudinal Tracking Window:** 99.7 Days (~3.3 Months, Range: 56 to 167 days).
- **TSH, FT4 and FT3** are reported based on a scoring system from [-10 to +10], with [-5 to + 5] representing the average reference range for laboratories and [-1 to +1] the optimal range.

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Introduction & Organizational Context

CountryHealth is a UK-based specialist clinic that diagnoses and treats hypothyroidism using a functional medicine model. It combines regulated clinical care with remote telehealth services, offering thyroid-focused support that extends beyond routine symptom management and emphasizes long-term health optimization.

The clinic's value proposition rests on deep expertise in hypothyroidism, a holistic approach, and a structured, quality-controlled patient experience, supported by ISO 9001:2015 certification, CQC registration, and multiple industry awards. CountryHealth serves adults in the UK and beyond who remain symptomatic or feel underserved by standard care and are highly motivated to regain their vitality.

Patients typically arrive after prolonged dissatisfaction with conventional levothyroxine monotherapy, as survey data show that a substantial subset of hypothyroid patients report low treatment satisfaction and persistent symptoms such as fatigue, low mood, and weight difficulties (Peterson et al., 2018). These persistent complaints are not adequately captured by standard thyroid-stimulating hormone monitoring, as patients with normal biochemical markers may still report a considerably reduced quality of life (Nygaard et al., 2025).

Consistent with this, the clinic's approach of T4/T3 combination therapy has reported patient preference for the combination in several cohorts (Lindner, 2025).

Thyroid Medication Strategies: Synthetic vs. NDT Formulations

Clinicians operate within three primary medication frameworks to balance metabolism and symptoms:

- **Levothyroxine (Synthetic T4):** Represents the precursor hormone. It relies on the body's tissues to convert T4 into the active T3 state.
- **Liothyronine (Synthetic T3):** Delivers direct active hormone, often added when a patient struggles with peripheral T4-to-T3 conversion.
- **Natural Desiccated Thyroid (NDT):** Formulations derived from natural porcine sources (e.g., Armour, ERFA) which natively combine both T4 and T3 hormones.

Clinical care frameworks are complemented by functional diagnostics, lifestyle modifications, clinical nutritional support, personalized supplement protocols, and structural assessments (e.g., thyroid ultrasound). Together, these components are intended to address the underlying drivers of persistent symptoms rather than relying solely on biochemical normalization.

Operational Clinical Workflows & Review Protocols

Effective thyroid care requires integrating precise hormone biomarkers with patients' real-world symptoms. Each prescribing decision is guided by a structured clinical workflow that combines practitioner expertise with coordinated service models and clearly defined review timelines.

Each patient is assigned a defined review schedule that prompts reassessment of biochemical markers and symptom burden at fixed intervals, allowing prescribing adjustments to be tracked against outcomes across the full treatment pathway.

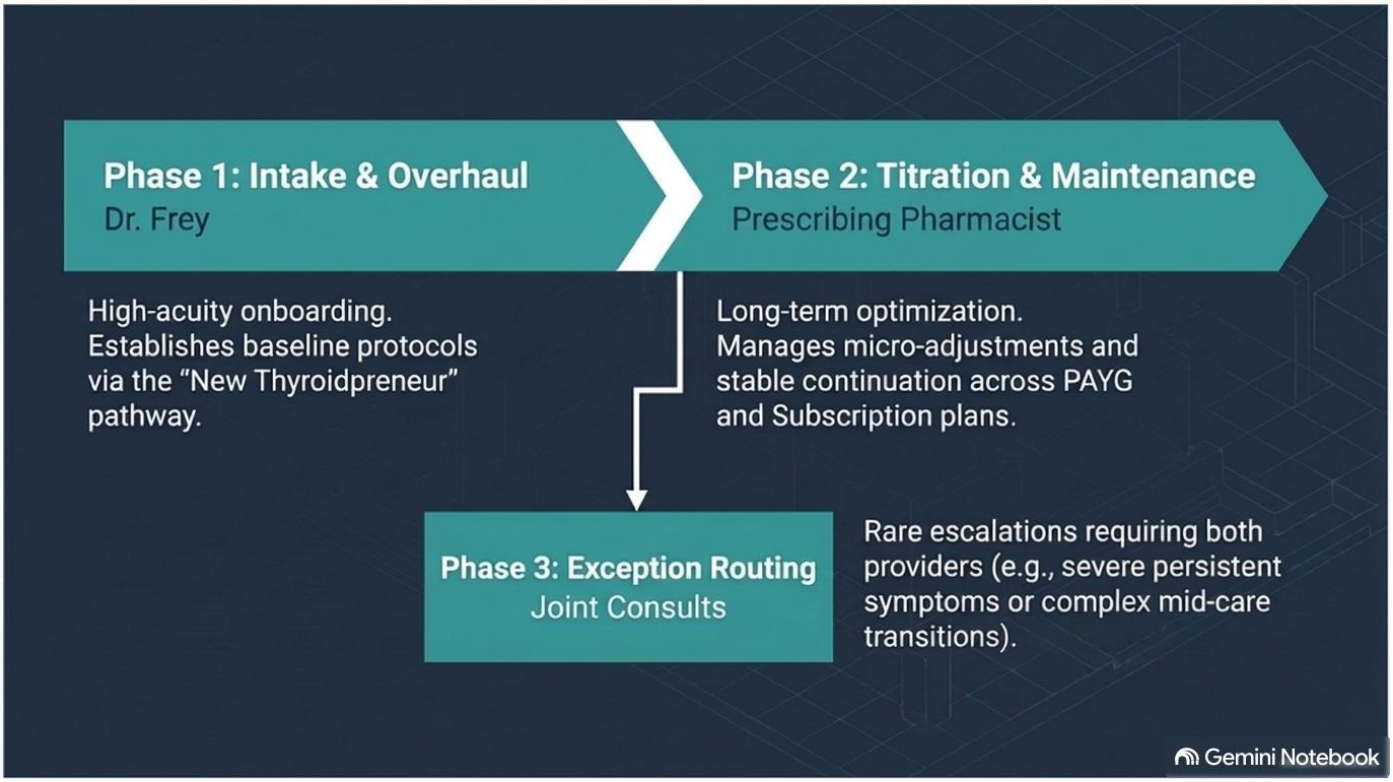
Defined Practitioner Roles

- **Dr. Frey (The Initiation and complex case Specialist):** Serves as the primary clinician for high-acuity intakes, major medication overhauls, and complex changes in clinical management.
- **Prescribing Pharmacist (The Optimization Specialist):** Handles most routine follow-up reviews, maintenance-dose continuations, and steady-state adjustments.
- **Joint Consults (Exception Routing):** Joint reviews are reserved for high-acuity cases, including patients with severe, persistent symptoms or those undergoing complex treatment transitions.

Clinical Adjustments & Intervention Pathways

- **Initiating NDT:** Patients who do not achieve adequate symptom control with synthetic monotherapy are transitioned to natural desiccated thyroid extract, such as ERFA or Armour.
- **Fine-Tuning Dosage:** Using blood panels and symptom scores, clinicians dynamically adjust NDT, levothyroxine, and liothyronine by adding or changing doses, or discontinuing treatment as clinically indicated. Dose changes are reviewed at each scheduled follow-up, and any shift in therapy is documented against the patient's symptom scores and biochemical markers to allow outcomes to be compared across the full treatment pathway. Because the same metrics are recorded at every scheduled review, the audit can attribute symptom changes to specific dosing decisions rather than to the passage of time alone.
- **Combination Therapy:** When active T3 remains low despite stable T4 levels, clinicians may add liothyronine

to the existing levothyroxine regimen or transition the patient to NDT. Dose adjustments under this pathway are then monitored at the next scheduled review, so that any change in symptom scores or biochemical markers can be attributed to the specific therapeutic decision.

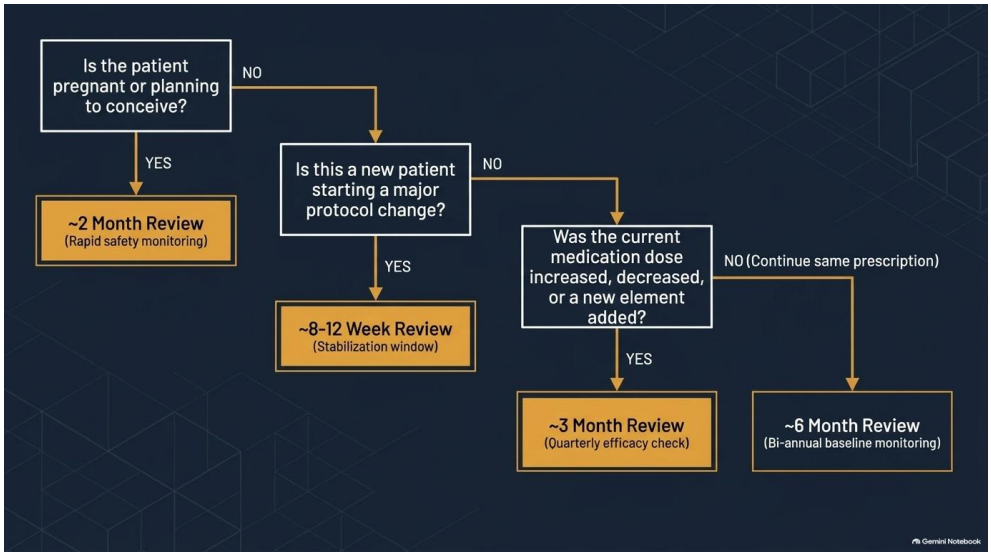


Master Clinical Guidelines Matrix

Clinical Pathway	Target Hormone Profile	Primary Recommended Action	Review Interval
1. Non-Converter	FT4 > 0 & FT3 < 0	Stop T4 -> START ERFA / Armour NDT	2 to 3 Months
2. Sub-Optimal FT3	FT3 <= -2	Increase NDT Dose / Add Liothyronine	2 to 3 Months
3. Optimal FT3 + High Sx	FT3 >= 0 & Symptoms >= 6	Order GI Map or Adrenal Fatigue Panel	2 to 3 Months
4. Stable Control	FT3 >= 0 & Symptoms <= 3	Continue current NDT prescription	3 to 6 Months
5. Active Pregnancy	Gestational Stage	Escalate Levothyroxine; Avoid NDT	6 to 8 Weeks

Algorithmic Review Scheduling Rules

Follow-up appointments are scheduled according to clinical stability, pregnancy status, the changes of recent blood test results, and symptom scores:

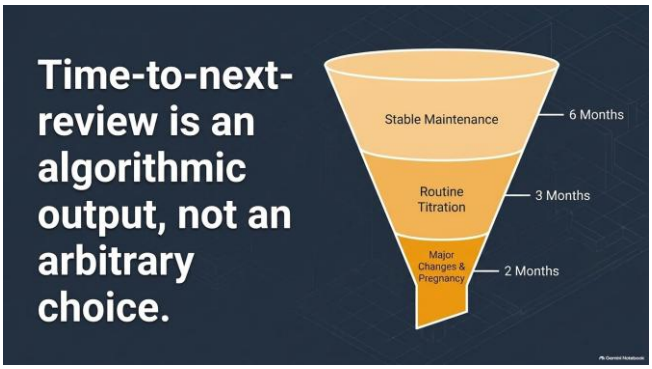


- **Major Protocol Transitions (8–12 Weeks):** Major medication changes require close monitoring before patients transition to maintenance. Once biochemical markers and symptom scores have stabilized, the patient is moved to a maintenance interval and the review cadence is extended accordingly.

- **Routine Dose Titration (~3 Months):** Routine dose titrations are reviewed approximately every three months to assess treatment efficacy. Dose changes made at each review are documented against symptom scores and biochemical markers, so that any shift in efficacy can be linked to a specific prescribing decision rather than to the passage of time.

- **Stable Maintenance (~6 Months):** Clinical stability allows review intervals to be extended, reducing clinical workload while maintaining patient safety.

- **Pregnancy & Conception (~2 Months):** All pregnant patients and those in active preconception care bypass the standard schedule and receive expedited follow-up



Data Audit: Clinical Models vs. Patient Outcomes

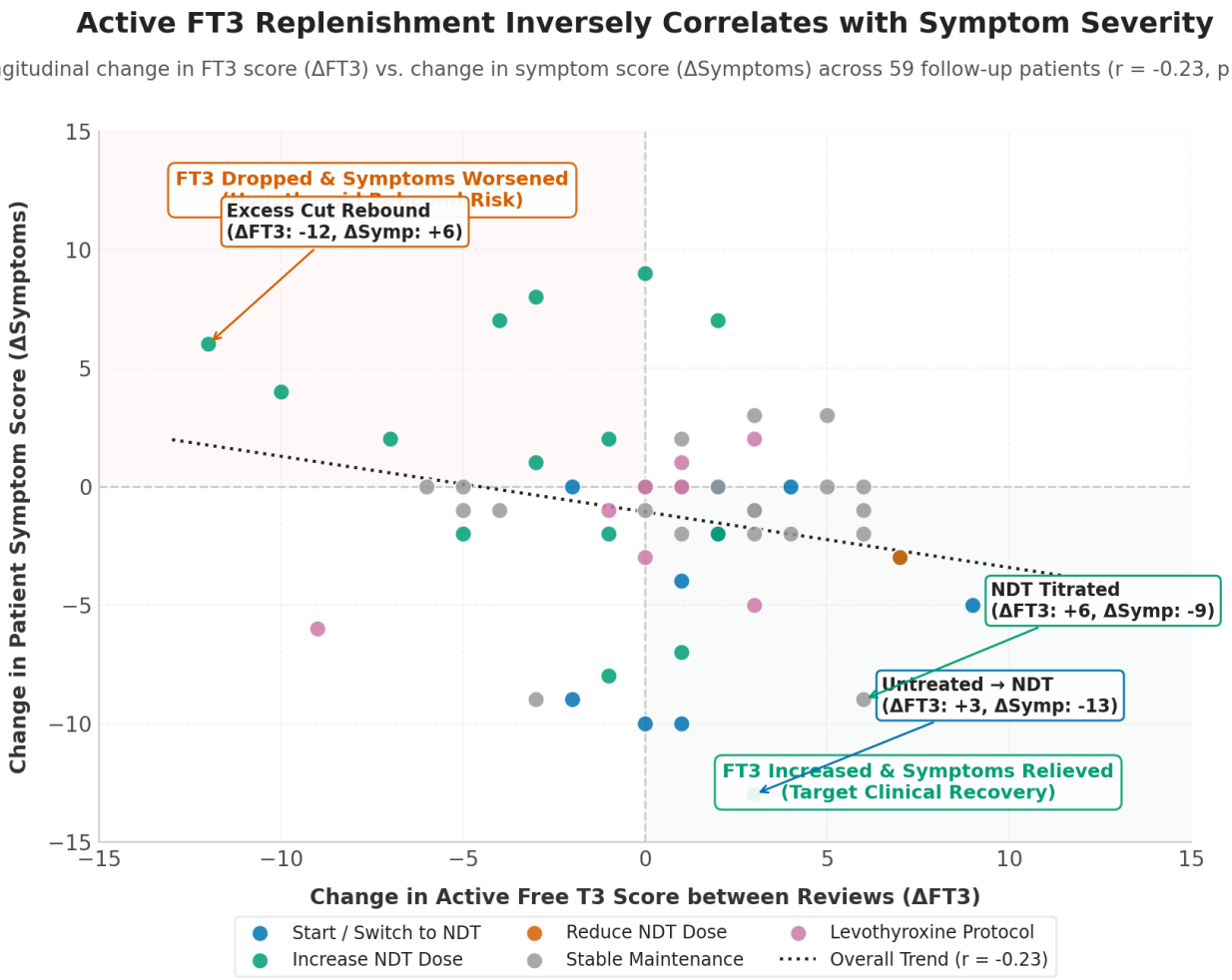
Baseline Hormone Dynamics & The T4 Conversion Bottleneck

Across all 288 evaluations with complete laboratory data, FT3 and FT4 scores showed distinct, opposing associations with clients' symptoms. In a linear regression analysis, both FT4 score (beta = +0.323, p = 0.019) and FT3 score (beta = -0.267, p = 0.012) were statistically significant independent predictors of overall symptom burden. Notably, the direction of these associations diverged, with higher FT4 scores corresponding to greater symptom burden while higher FT3 scores were linked to fewer reported symptoms, a pattern consistent with impaired peripheral conversion of T4 to T3 in a subset of clients. Because FT4 and FT3 scores were analyzed as independent predictors within the same model, the observed divergence reflects their joint contribution to symptom burden rather than either biomarker alone, which suggests that a high circulating T4 level may not translate into adequate tissue-level thyroid hormone activity for these clients.

This divergence also indicates that circulating FT4 alone is an insufficient marker for guiding levothyroxine dosing in this population, and that FT3 status should be evaluated alongside it at each scheduled review.

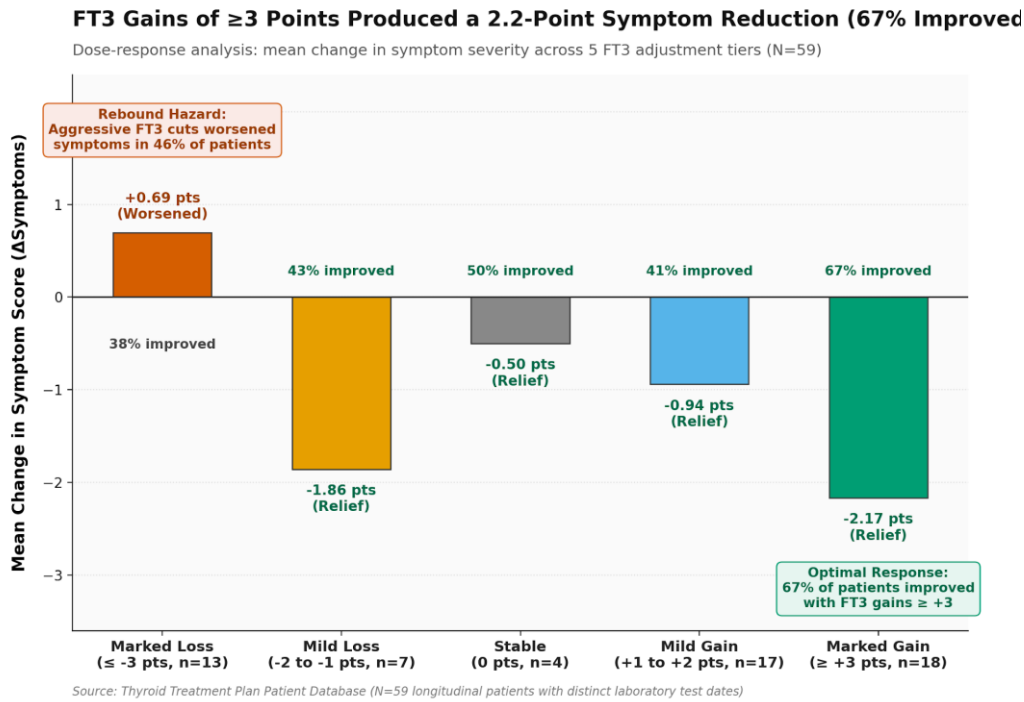
Active FT3 Score (Inverse Relationship):

As circulating active T3 levels rise toward the clinical target (FT3 >= 0), patient symptom scores tend to decline (r = -0.127, p = 0.032). Patients whose FT3 scores increased by >=3 points experienced an average 2.17-point reduction in symptoms, with 67% improving. By contrast, patients with marked FT3 declines (<= -3 points) experienced symptom worsening (+0.69 points), consistent with a rapid hypothyroid rebound.



Active FT3 replenishment was associated with symptom relief: patients whose FT3 scores increased substantially (points) experienced an average 2.2-point reduction in symptom severity, and 67% showed clinical improvement. Conversely, patients with marked FT3 declines showed symptom worsening, a pattern consistent with a rapid hypothyroid rebound that warrants closer biochemical monitoring at the next scheduled review.

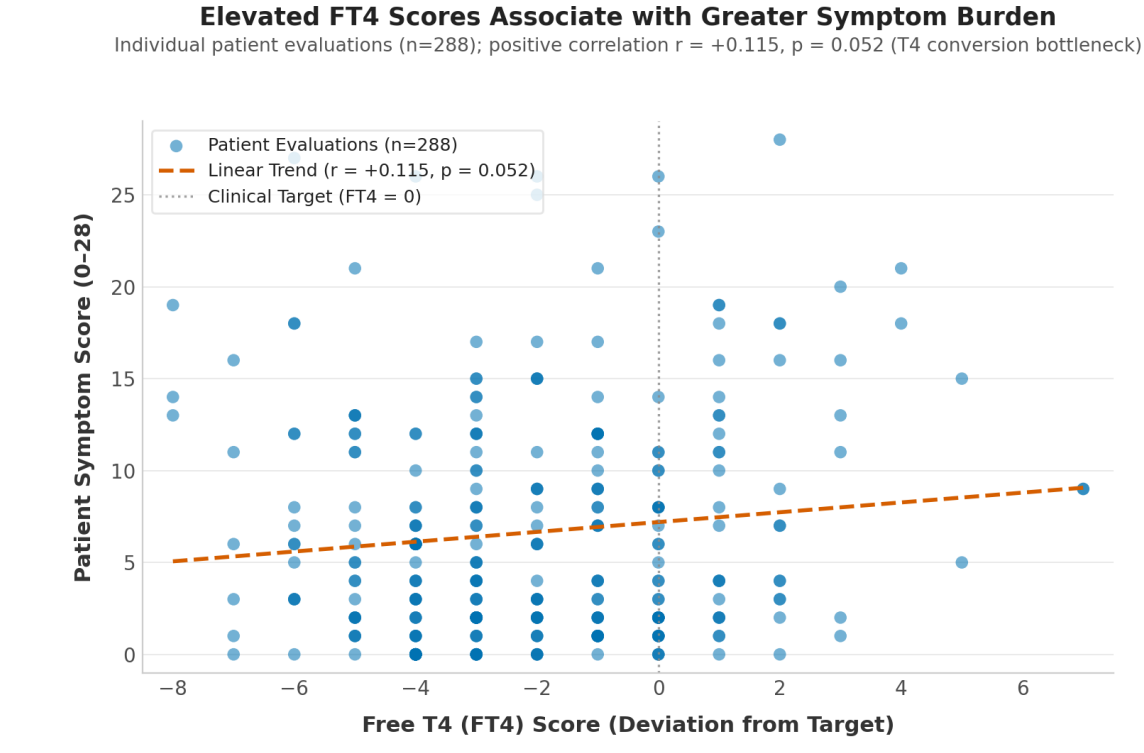
These findings highlight the inverse trend between FT3 gains and symptom relief (r=-0.23,p=0.084), illustrating how patients in the bottom-right quadrant achieved substantial symptom reductions following T3 replenishment.



Longitudinal outcomes show a clear divergence: patients whose FT3 scores rose by ≥+3 points experienced an average 2.17-point reduction in symptoms, with 67% improving, whereas those whose FT3 scores fell by <= -3 points experienced average symptom worsening of 0.69 points. This contrast supports monitoring FT3 alongside symptoms during treatment.

Precursor FT4 Score (Positive Correlation):

Higher FT4 scores were associated with greater overall symptom burden (r = +0.115, p = 0.052). This association appears to be driven largely by patients who do not efficiently convert T4, allowing unmetabolized T4 to accumulate while active cellular hormone levels remain severely deficient.

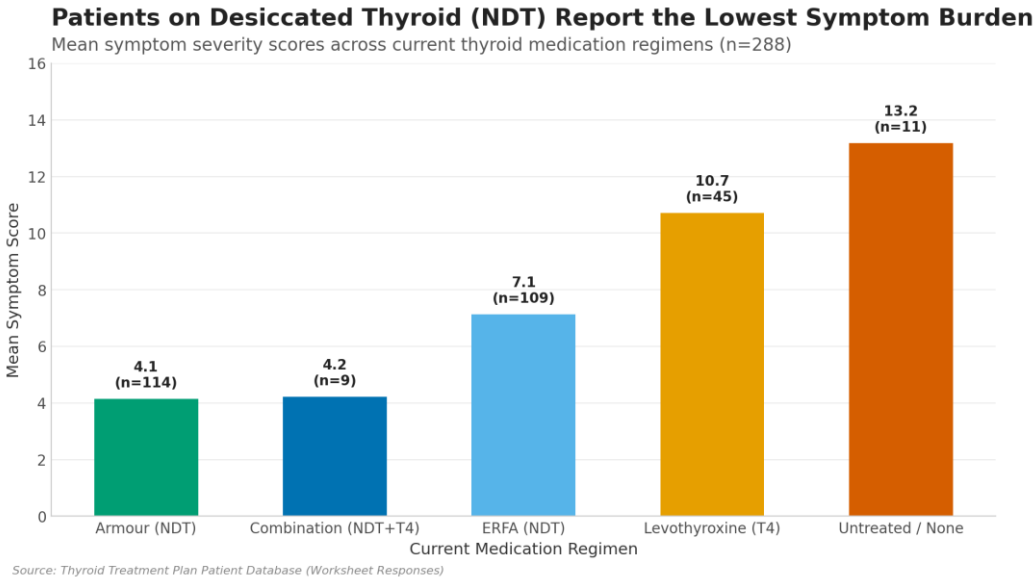


The graph shows a positive association between precursor FT4 scores and symptom severity ($r = +0.115, p = 0.052$), largely reflecting patients with elevated FT4 who do not efficiently convert it into active T3. This pattern aligns with clinical observations that residual hypothyroid complaints in levothyroxine-treated patients are specifically related to low FT3 concentrations, supporting the role of FT3 in dose-adequacy decisions (M et al., 2019). Because residual symptoms in levothyroxine-treated patients are not reliably captured by TSH alone, FT3 and patient-reported symptom instruments should be reviewed together at each scheduled visit to determine whether the current dose is adequate (Naushad et al., 2025).

Symptom Burden Stratified by Medication Regimen

Analysis reveals distinct variations in mean symptom severity scores across treatment cohorts:

- Armour NDT: Mean symptom score of 4.1 (n=114).
- Combination Regimens (NDT + T4): Mean symptom score of 4.2 (n=9).
- ERFA NDT: Mean symptom score of 7.1 (n=109).
- Levothyroxine Monotherapy (Synthetic T4): Mean symptom score of 10.7 (n=45).
- Untreated / Baseline Cohort: Mean symptom score of 13.2 (n=11).



Note: The difference between the Armour and ERFA cohorts may reflect differences in treatment duration. Long-term, stable patients have typically remained on Armour, the clinic's historical baseline option. Given current uncertainties in the US supply, new patients are now predominantly started on ERFA, resulting in a shorter average treatment period for that cohort.

The High FT4 / Low FT3 Conversion Mismatch

The highest mean symptom burden in the database was observed among patients with elevated FT4 scores (>0) and suboptimal FT3 scores (<0). This group of 28 patients had a mean symptom score of 11.11 and a median score of 11.0. This subgroup's elevated symptom burden, relative to the other cohorts, is consistent with the mechanism described in the literature, where unmetabolized T4 accumulates while tissue-level T3 remains deficient despite biochemical euthyroidism defined by TSH and FT4 alone (Jansen et al., 2023; Kasahara, 2025).

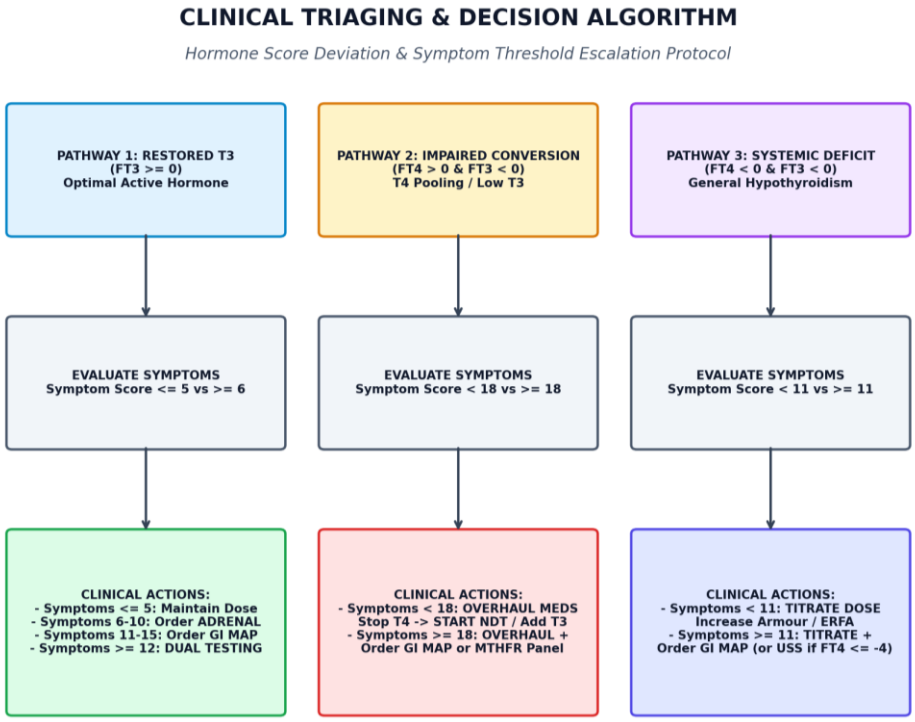
More than 67% (19 of 28) of patients in this cohort were taking levothyroxine monotherapy, a pattern suggestive of impaired peripheral conversion. Clinicians address this profile by switching patients to NDT or adding liothyronine.

Secondary Diagnostic Testing & Escalation Protocols

Supplementary testing panels provide an escalation framework when primary thyroid therapy does not fully resolve symptoms, fitting seamlessly into the existing timeline:

- **GI Map (24 Recommendations):** Ordered for patients with optimal active hormone levels (FT3 ≥ 0) who continue to experience moderate-to-severe symptoms (mean score: 10.96). The panel is used to identify gut dysbiosis that may interfere with cellular utilization.
- **Adrenal Fatigue Panel (15 Recommendations):** Ordered for patients taking NDT who report exhaustion, anxiety, or low stress tolerance despite normal active T3 levels (mean symptom score: 10.00). Patients with a positive adrenal panel result are typically signposted to a adrenal support protocol which is reviewed alongside thyroid dosing, since persistent fatigue after thyroid optimization may reflect factors beyond hormone replacement alone.

- **Dual GI Map + Adrenal Panels (5 Recommendations):** Ordered for multisystem distress involving both gastrointestinal and HPA-axis symptoms (mean score: 13.40).
- **MTHFR Panels (3 Recommendations):** The panel was ordered exclusively by Dr. Frey for patients highly refractory symptoms (mean symptom score: 13.67). Results from MTHFR testing were reviewed alongside the patient's full thyroid and symptom profile, as genetic variants affecting folate metabolism were considered a possible contributor to persistent complaints that had not responded to hormone optimization.
- **Thyroid Ultrasound / USS (3 Recommendations):** Ordered for patients taking NDT to assess thyroid structure when TG or TPO antibody levels are elevated or rising. Where the ultrasound reveals structural changes such as heterogeneous echotexture or nodularity, the findings are documented in the patient record and reviewed alongside the symptom profile. If imaging is inconclusive or shows no structural abnormality, the result is documented and antibody trends are reassessed at subsequent visits to determine whether repeat ultrasound is warranted.

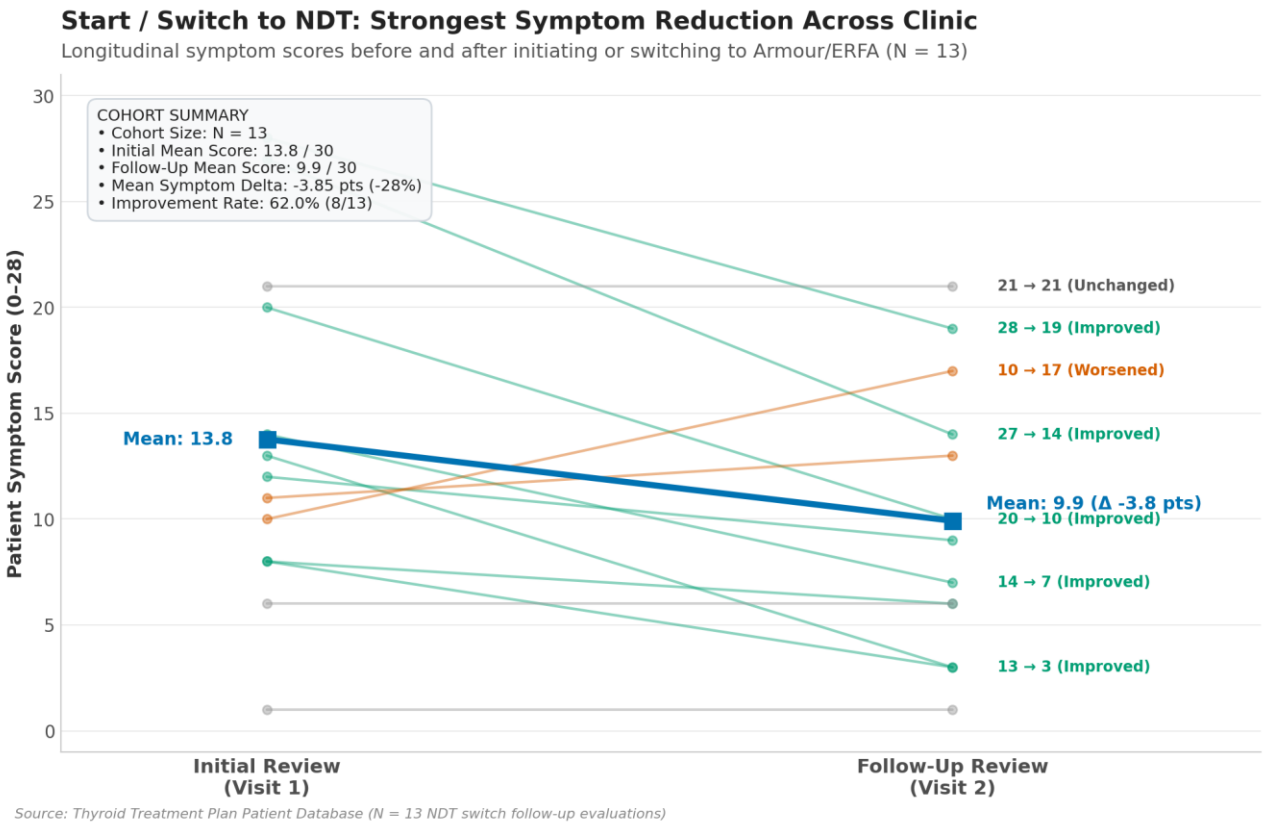


Longitudinal Patient Trajectory Analysis

A total of 59 unique patients were monitored longitudinally over an average review period of 99.7 days. Overall, symptoms decreased in 49.2% (29 patients), remained stable in 22.0% (13 patients), and increased in 28.8% (17 patients). The mean global symptom score decreased by 1.03 points.

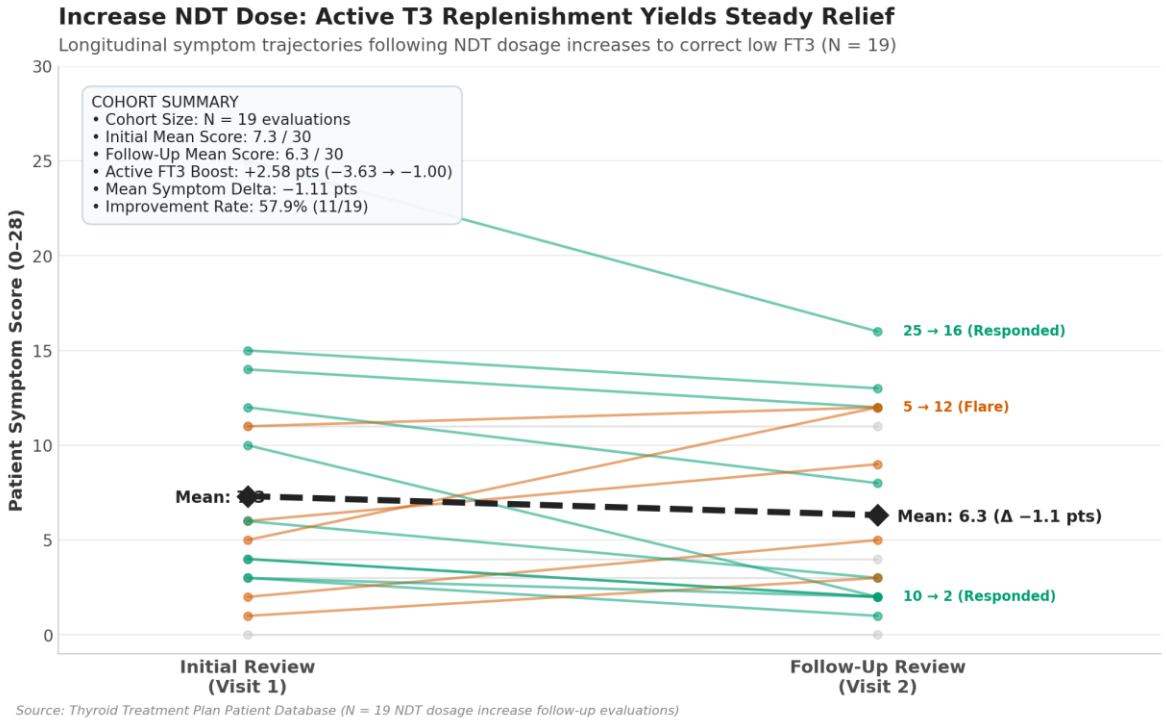
Cohort 1: Starting or Switching to NDT (n = 13):

Patients who switched from synthetic T4 to desiccated thyroid experienced the greatest improvement in the database. Their mean symptom score fell from 13.8 to 9.9 points (a 3.85-point decrease), with 62% improving. This reduction may reflect a decrease in excess unconverted T4. Patients in this cohort who did not improve were more often those with persistently low FT3 despite dose adjustments, therefore warranted FT3 reassessment and a review of dose adequacy, rather than a change in product alone.



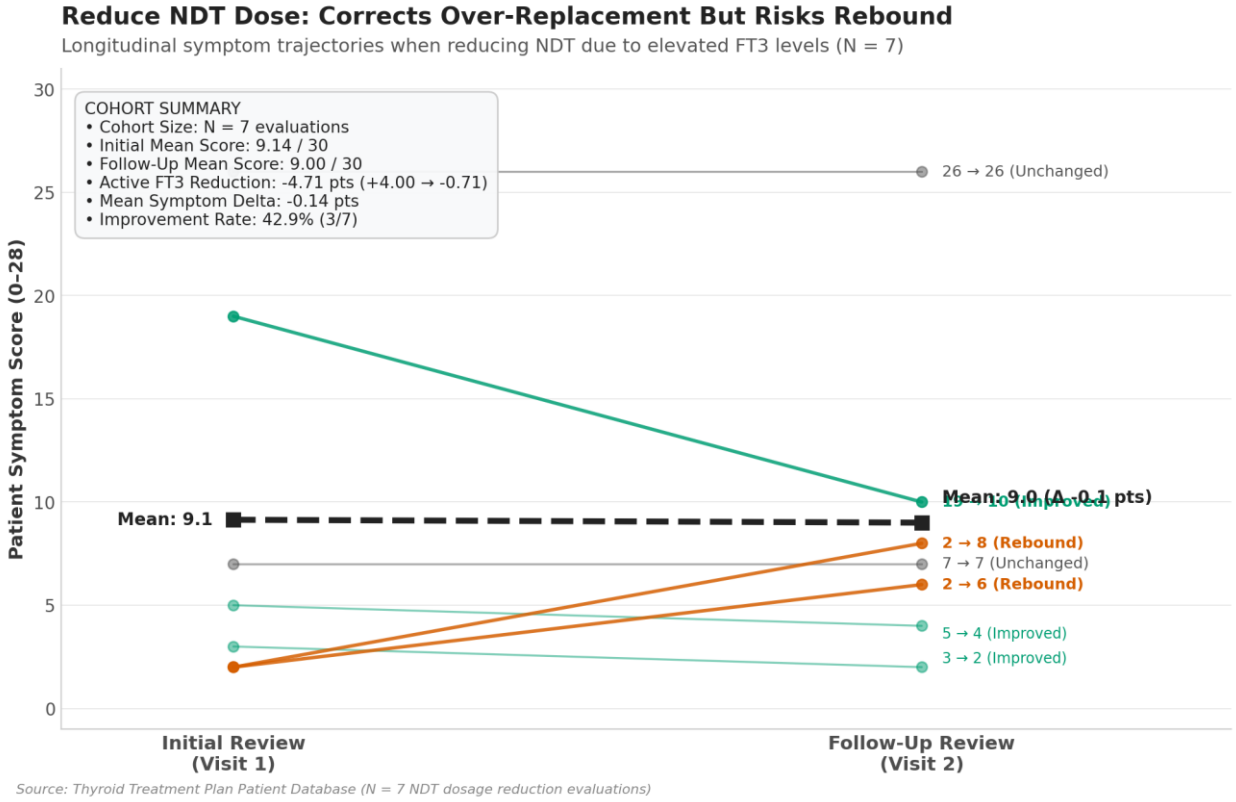
Cohort 2: Increasing NDT Dosage (n = 19):

Among patients with low baseline active hormone levels, upward titration was associated with a 2.63-point increase in mean FT3 and a decrease in mean symptom score from 7.32 to 6.21; 58% of patients improved. Patients who did not improve in this cohort were more frequently those whose FT3 remained in the lower reference range despite upward titration, suggesting that further dose adjustment or a review of conversion status was needed.



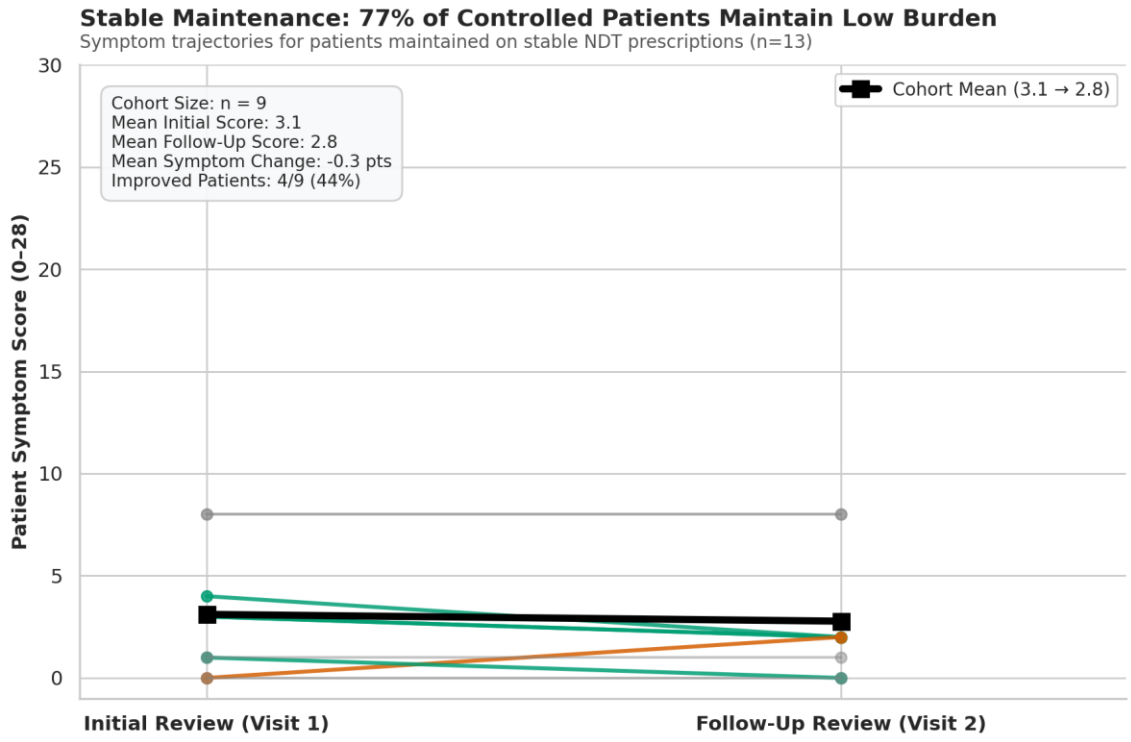
Cohort 3: Reducing NDT Dosage (n = 7):

Dose reductions addressed over-replacement in patients such as patient A, whose symptom score fell from 19 to 10. However, aggressive reductions led to hypothyroid rebounds in some patients, including patient B, whose score rose from 2 to 8, increasing the cohort's overall mean.



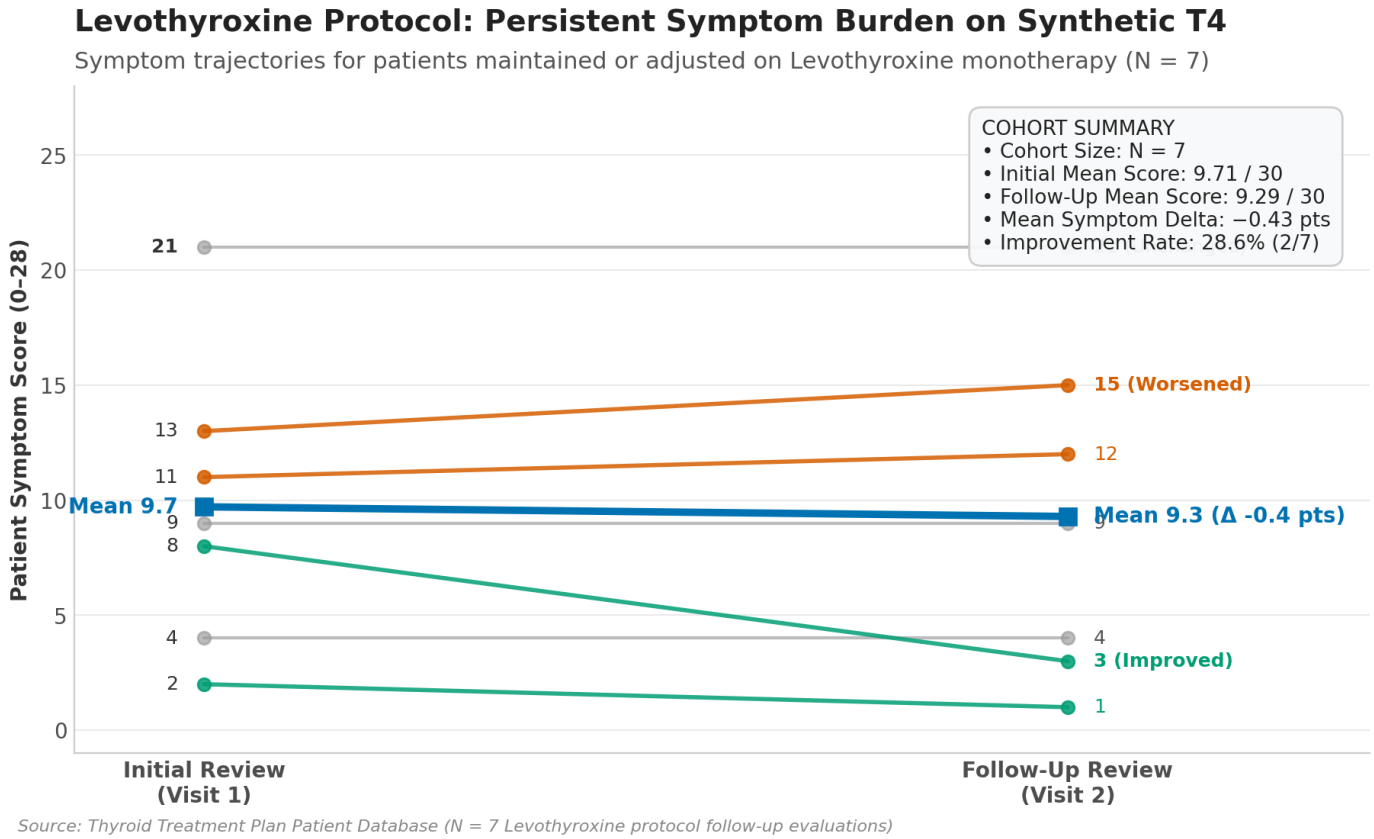
Cohort 4: Stable Maintenance (n = 13):

Patients in this cohort maintained a low mean symptom score of 2.85, with 77% scoring 4 or lower; monitoring also captured occasional flares.



Cohort 5: Levothyroxine Modifications (n = 7):

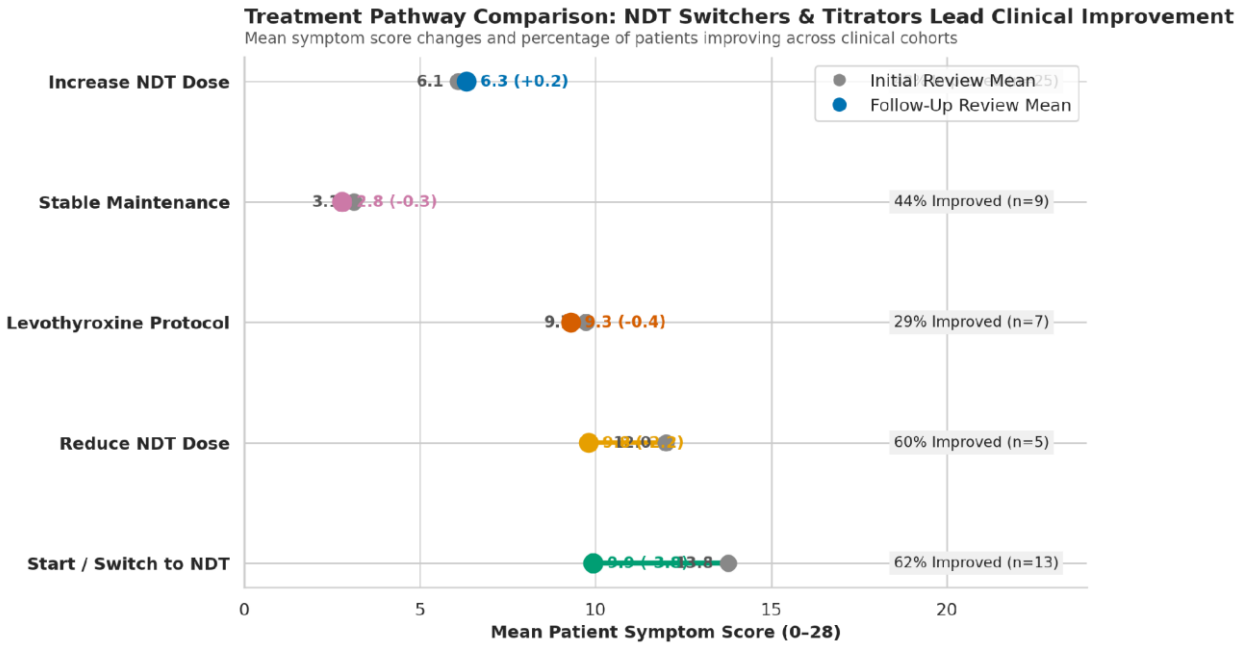
Maintained on synthetic T4 monotherapy, this cohort continued to experience substantial symptoms: the mean symptom score declined only slightly, from 9.71 to 9.29, and just 29% of patients improved, suggesting ongoing T4-to-T3 conversion bottlenecks.



Source: Thyroid Treatment Plan Patient Database (N = 7 Levothyroxine protocol follow-up evaluations)

Summary review of all 5 cohorts

The graph shows that the largest symptom reductions occurred in Cohort 1 (switching to NDT), while Cohort 5 (levothyroxine monotherapy) showed the smallest change, indicating where further clinical attention is most needed. Because Cohort 5 showed the least improvement, the findings suggest that patients remaining on synthetic T4 monotherapy would benefit most from a structured review of conversion status, including consideration of a change in therapy.



Special Clinical Populations: Gestational & Preconception Care

Pregnancy and preconception care require closer monitoring and a distinct approach to medication selection. Women with hypothyroidism who are planning pregnancy or are pregnant typically require higher levothyroxine doses than before conception, and thyroid function should be reassessed at regular intervals throughout gestation, as FT4 targets are more stringent in this population.

- **Hormone Prioritization:** Synthetic levothyroxine is the preferred medication during pregnancy and for rapid preconception correction to protect fetal development. NDT is generally reserved for patients who were stable on it before pregnancy or used during postpartum lactation.

- **Surveillance Cadence:** Pregnant or preconception patients requiring dose titration are reviewed every 6–8 weeks to monitor changing hormone requirements and adjust treatment promptly.

Case Study Sequence: Active Gestational Care (Patient C)

Patient C was evaluated across 3 visits (May-Aug 2026).

- Physiological Demand Escalation: In early pregnancy, the patient remained well-controlled with an FT4 score of 0 and minimal symptoms (scores 1–2). By August, expanding maternal plasma volume and fetal demands depleted precursor levels, dropping the FT4 score to -3 and triggering a mild symptom increase to 4.

- Active Dose Titration: The clinician responded directly to this drop by escalating the Levothyroxine dose ("Add Levothyroxine") to safeguard maternal-fetal thyroxine supply.

- Tight Review Intervals: While standard maintenance reviews in the clinic are spaced 3 to 6 months apart, this patient was kept on a strict 6- to 8-week monitoring cycle

Test Date	Gestational Stage	FT4 Score	FT3 Score	Symptom Score	Current Medication	Clinical Treatment Plan	Next Review Interval
18/05/2026	Early Pregnancy	**0** (Optimal)	**-1**	**2**	Levothyroxine	Continue same Levothyroxine & Liothyronine doses	8 weeks (16/07/2026)
20/06/2026	Mid Gestation	**0** (Optimal)	**-2** (Drifting)	**1**	Levothyroxine	Continue Levothyroxine; **Add Liothyronine**	~8 weeks (21/08/2026)
13/08/2026	Advancing Gestation	**-3** (Deficient)	**-2**	**4**	Levothyroxine	**Add Levothyroxine** (dose escalation); continue Liothyronine	

Preconception Cohort Profiling

- **Patient D — Urgent Preconception Intake:** Presented with an untreated baseline, high deficiency (FT4 = -4), and extreme symptoms (26). Dr. Frey initiated immediate Levothyroxine monotherapy to build thyroxine reserves ahead of conception, mapping an 8-week tracking safety review.

- **Patient E — Preconception Dual-Therapy Maintenance:** Maintained **on a combination** framework (ERFA NDT + Levothyroxine) with low symptom burdens (4). Prescribing pharmacists maintained the prescription line with an automatic 2-month review to guarantee preconception stability.

- **Patient F — Drug-Free Euthyroid Surveillance:** Biochemically balanced (FT4 = -1, FT3 = +1) and virtually symptom-free (1) without medication. No hormone therapy was initiated; placed on proactive 3-month monitoring surveillance.

Postpartum & Lactation Care

A single record tracks a patient actively breastfeeding (patient G). Unlike gestational states managed exclusively with synthetic options, this postpartum patient is successfully and stably managed on Natural Desiccated Thyroid (NDT), demonstrating balanced tracking scores (FT4 = +1, FT3 = +1, symptoms = 1) and a contracted 2-month review timeline.

Discussion:

Effective thyroid care integrates biochemical measures with patients' reported symptoms. Prescribing decisions need to be guided by a structured clinical workflow that brings together practitioner expertise, coordinated care, and clearly defined follow-up intervals. These planned reassessments allow clinicians to monitor hormone levels and symptom burden, as well as evaluate treatment changes and outcomes over time.

The audit identified distinct symptom trajectories according to changes in FT3. Among patients whose FT3 scores rose by at least 3 points, mean symptom scores decreased by 2.17 points, and 67% reported improvement. Conversely, patients whose FT3 scores fell by at least 3 points experienced a mean symptom-score increase of 0.69 points. These findings highlight the value of considering FT3 alongside symptom burden during treatment.

FT4 scores showed a weak positive association with symptom severity (), although the result did not meet the conventional threshold for statistical significance. This pattern may be consistent with evidence that residual hypothyroid symptoms during levothyroxine treatment are associated with low FT3 concentrations, underscoring the potential relevance of FT3 when evaluating dose adequacy (M et al., 2019). Accordingly, FT3 levels and patient-reported symptoms should be assessed during scheduled reviews of treatment adequacy (Naushad et al., 2025).

The highest mean symptom burden in the database occurred among patients with elevated FT4 scores (>0) and suboptimal FT3 scores (<0). This subgroup comprised 28 patients, with a mean symptom score of 11.11. Its greater symptom burden relative to the other cohorts is consistent with a proposed mechanism in which unmetabolized T4 accumulates while tissue-level T3 remains deficient, despite biochemical euthyroidism as defined by TSH and FT4 alone (Jansen et al., 2023; Kasahara, 2025). This pattern suggests that the imbalance is not captured by standard thyroid-stimulating hormone or free thyroxine measurements, which may therefore underestimate the clinical significance of residual hypothyroid symptoms in patients treated with levothyroxine alone (Idrees et al., 2020).

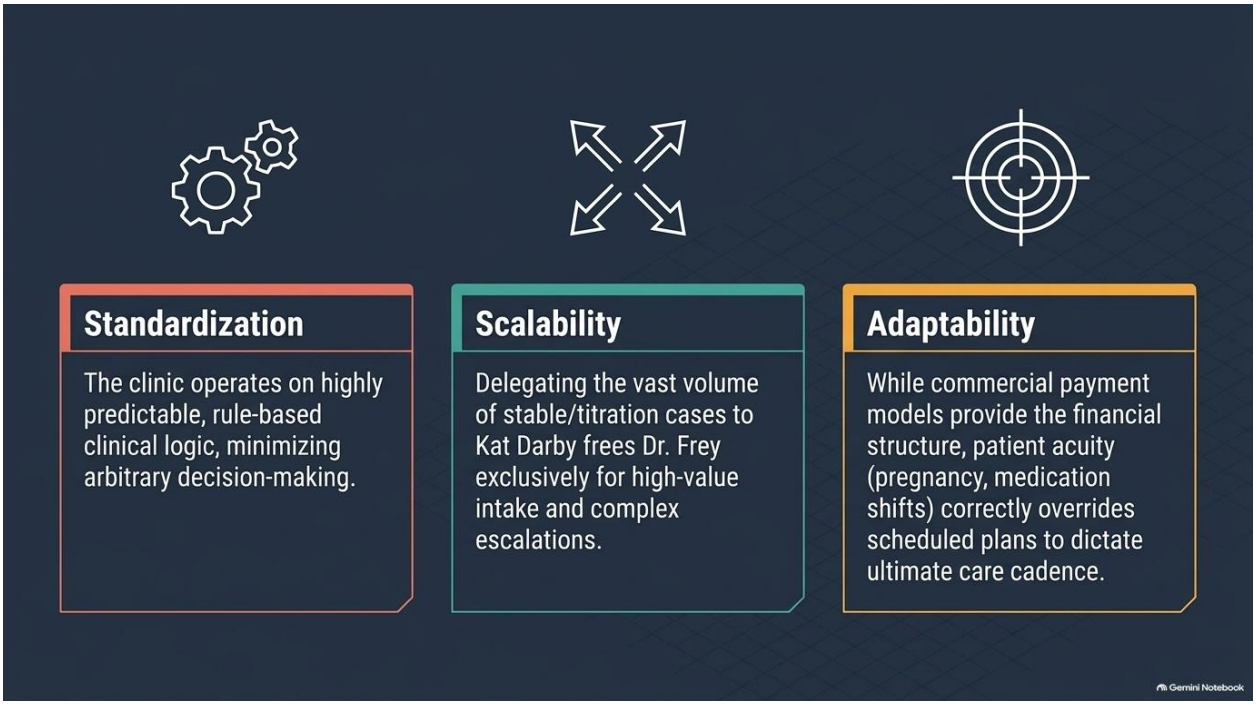
Addressing this gap therefore requires routine assessment of FT3 and symptom burden alongside TSH, particularly in patients with persistent complaints despite a normal TSH (Chiovato et al., 2019; Jonklaas et al., 2014), as it is common practice in CountryHealth. Current guidelines, however, do not yet reflect this need, and the clinical evidence suggests that relying on TSH and FT4 alone leaves a meaningful subset of patients with unexplained residual symptoms that go unrecognised in routine monitoring (Hegedűs et al., 2024; Mitchell et al., 2020).

Future guidance could therefore be strengthened by incorporating FT3 measurement into routine follow-up, so that patients with persistent symptoms despite normal TSH are identified and managed more systematically (Jonklaas, 2022; Perros et al., 2021). Such a shift would also align routine practice with the evidence that TSH and free T4 are weak predictors of free T3 and therefore of tissue-level thyroid status (Lawton et al., 2024), while the observed FT3 dependence of symptoms in levothyroxine-treated patients reinforces the case for dual-marker surveillance (Hoermann et al., 2019).

More than 67% of patients in this cohort (19 of 28) were receiving levothyroxine monotherapy, a pattern that may indicate impaired peripheral conversion. In response to this profile, clinicians may consider switching to NDT or adding liothyronine.

Supplementary testing panels provide a framework for escalating assessment when primary thyroid therapy does not adequately resolve symptoms, while fitting within the existing care timeline.

Pregnancy and preconception care require more frequent monitoring and a distinct approach to medication selection. Women with hypothyroidism who are planning pregnancy or are pregnant typically need higher levothyroxine doses than before conception. Thyroid function should therefore be reassessed at regular intervals throughout gestation, when FT4 targets are more stringent. Because maternal thyroid hormone requirements rise during gestation, clinicians should anticipate that dose adjustments may be needed as early as the first trimester, guided by the FT4 level. Because the fetal thyroid depends on maternal T4 supply during early gestation, delays in adjusting the dose can leave a window of relative under-replacement that is difficult to correct later (Ettleson & Bianco, 2020).



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