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Managing testosterone deficiency in primary care: an international expert consensus

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ABSTRACT

Background: Testosterone deficiency (TD) has traditionally been managed by specialists, yet there is growing public demand for general practitioners (GPs) to become involved in the care of these men. Most TD cases initially present to GPs, and common medical conditions associated with TD are already managed by GPs, including obesity, diabetes, anaemia, and impaired mood. However, there has been scant clinical guidance or education for GPs on this topic.

AIM: To provide consensus-based expert clinical guidance on the management of TD for GPs.

Design and setting: International multidisciplinary consensus initiative sponsored by the Androgen Society.

Method: An international panel of experts- including GPs, endocrinologists, urologists, andrologists, and clinical chemists- convened in Amsterdam in November 2025 to establish key points of guidance (resolutions) for GPs wishing to manage TD. Resolutions were subsequently refined in an iterative consensus process.

Results: Unanimous consensus was achieved for all ten resolutions, covering diagnosis, treatment, monitoring, and recommendations for referral to specialists for selected populations. Key points included the requirement of symptoms and/or signs of TD combined with low values of either total or free testosterone to initiate testosterone therapy (TTh); total testosterone concentrations less than 12 nmol/L (350 ng/dl) are considered low; and monitoring for symptom response and biochemical abnormalities is essential. Large randomized clinical trial data reveals TTh is not associated with increased cardiovascular or prostate cancer risks.

Conclusion: These evidence-based, clinical recommendations serve as a practical guide for GPs wishing to incorporate the evaluation and management of men with TD into their practices.

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General practice; hypogonadism; primary care; testosterone deficiency; testosterone therapy

Introduction

General practitioners (GPs) are often the first point of contact for men with testosterone deficiency (TD), however, TD has traditionally been considered a condition reserved for specialists [1]. Various specialty societies have published guidelines, yet there are none specifically for GPs [2,3]. For reasons detailed below,

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Key policy highlights

- Testosterone deficiency is a clinically important condition with broad implications for men's health, but it remains under-recognised in primary care.
- Large randomised clinical trials, including TRAVERSE, have confirmed that testosterone therapy is both safe and effective.
- Since testosterone deficiency so frequently intersects with conditions already central to primary care, including type-2 diabetes, obesity, fatigue, and sexual dysfunction, general practitioners are ideally positioned to diagnose and manage most affected men.
- This article provides practical, evidence-based recommendations to guide general practitioners to confidently recognise and treat testosterone deficiency, while identifying the subset of complex cases warranting specialist referral.

we believe that TD in most cases can be best evaluated and treated by GPs. The purpose of this document is to provide a practical, clinical guide for GPs interested in treating men with TD. Note that the term GP here is intended to include other designations, such as primary care provider, which are more commonly used in some countries.

Methods

Participants and expert panel formation

This consensus project was conducted under the auspices of the Androgen Society. An international multidisciplinary panel of 10 experts was convened in Amsterdam in November 2025, consisting of GPs, endocrinologists, urologists, andrologists and clinical chemists, selected for their clinical experience in TD and men's health. Two additional colleagues contributed to the process but did not attend the meeting.

Topics selection and consensus meeting

An initial list of key topics was prepared by the lead coordinators and circulated for discussion and refinement. A final set of 10 topics was agreed upon by the group.

Each participant prepared an evidence-based presentation summarising current knowledge and proposed a draft resolution. Each resolution was discussed and refined for clarity, accuracy, and relevance to clinical practice.

Finalised resolutions were subsequently circulated for external feedback to five medical colleagues nominated by each participant who were presumed to have some degree of awareness of testosterone deficiency. A 5-point Likert scale (strongly disagree to strongly agree) was used.

Ethical approval and informed consent

Ethics committee approval was not required because this evidence-based expert consensus review did not involve patients (individuals, samples or data). As no patients were involved, patient informed consent was not required.

Results

Unanimous agreement was achieved for all ten resolutions deemed to be critical elements in the evaluation and management of TD by GPs. These resolutions with expanded comments are included in Table 1.

Resolution 1. General practitioners are ideally positioned to diagnose and treat testosterone deficiency

Testosterone deficiency (TD) is highly prevalent in populations treated by GPs and frequently coexists with health conditions routinely managed by GPs. These include obesity, type 2 diabetes, metabolic syndrome and cardiovascular disease [4–7]. TD remains substantially underdiagnosed and under-treated, despite consistent evidence that TD is associated with bothersome symptoms, including impaired sexual function, reduced vitality, depressed mood, and diminished quality of life. Treatment of TD provides multiple

Table 1. Consensus resolutions on testosterone deficiency.

#	Resolutions
1	**GPs are ideally positioned to diagnose and treat testosterone deficiency (TD).**
Expert comments:	- TD is common and underdiagnosed - TD is frequently associated with conditions already managed by GPs, including obesity, diabetes, and cardiovascular disease - Treatment may improve symptoms and quality of life
2	**TD has a negative impact on general health and quality of life.**
Expert comments:	- Symptoms of TD are well established but remain poorly recognised by clinicians and patients. - Common symptoms: decreased libido, ED, fatigue, depressed mood, "brain fog" - Signs include decreased strength and muscle loss, increased central obesity, gynaecomastia and decreased bone density - TD associated with increased all-cause and cardiovascular mortality.
3	**Men with symptoms and/or signs of TD combined with low testosterone levels are candidates for testosterone therapy.**
Expert comments:	- Symptoms may be sexual, mental, or physical - The most specific sexual symptoms are decreased libido, erectile dysfunction, and decreased early morning erections - Presentations vary widely: in some men sexual symptoms may predominate, in others there may be sexual or physical for symptoms with little or no accompanying sexual symptom - We recommend against treatment in men who only desire improved physique
4	**Low testosterone is defined as total testosterone < 12 nmol/L (350 ng/dl) and/or calculated free testosterone < 225 pmol/L (65pg/ml).**
Expert comments:	- Morning testing is recommended. - Ideally confirmed on 2 occasions (2-4 weeks apart) - Men are candidates for treatment if either the total or free T is below the recommended threshold value. - Evaluation of TD should be accompanied by a set of labs in addition to testosterone - See recommended labs in Table 3. - We discourage use of reference ranges for total and free T provided by laboratories. They are not clinically based and vary widely between laboratories
5	**Testosterone therapy improves metabolic health, psychological wellbeing, sexual function and quality of life.**
Expert comments:	- Testosterone therapy (TTh) can improve a wide variety of symptoms in men - Not all symptoms may respond to TTh - Libido may respond within 4 weeks, however improvement in other areas may require 6-12 months - Additional health benefits of TTh include: • Reduced progression of pre-diabetes to diabetes • Reversal of anaemia of both known and unexplained causes. • Improved bone mineral density, particularly in the lumbar spine.- PDE5-inhibitors are often required in addition to TTh to adequately manage ED - Lifestyle management is essential alongside T therapy
6	**Multiple testosterone formulations are available that can be tailored to patient needs.**
Expert comments:	- Available formulations include injections, topicals, pellets, and oral each with distinct advantages and risks. - Formulation choice should be tailored to patient preference (SDM) - Socioeconomic factors: insurance coverage, cost, access, health literacy & awareness affect treatment choice and adherence. - Not all forms of treatment are available in all countries. - Erythrocytosis risk is higher with short-acting injections and with pellets. Lower with orals and topicals - Successful treatment usually requires T levels in a mid-upper range (*ie* 500-900 ng/dl or 17-30 nmol/L) - Avoid starting TTh: • In patients with baseline Hct > 50% • In patients with baseline PSA > 4.0 ng/ml unless cleared by urologist- All testosterone formulations may adversely affect fertility
7	**Testosterone therapy does not increase the risk of prostate cancer or worsening of urinary symptoms.**
Expert comments:	- Modern evidence disproves the historical belief that TTh increases prostate cancer risk or worsens urination symptoms • No increased risk of prostate cancer or BPH has been shown in large trials and meta-analyses • TRAVERSE study confirmed similar prostate outcomes between testosterone and placebo.- Digital rectal exam is not required - PSA is likely to be falsely depressed when T levels are less than 8.7 nmol/L or 250 ng/dl due to inadequate androgen-dependent stimulation of PSA production. - Men with baseline levels below this threshold may see a rise in PSA with TTh. PSA should reach a plateau at 3-4 months. This value should then serve as a new baseline for subsequent clinical decision-making
8	**Testosterone therapy does not increase the risk of myocardial infraction, stroke or cardiovascular death.**
Expert comments:	- TRAVERSE and other studies have shown no increased CV risk with TTh versus placebo. - TRAVERSE and most other studies have shown no increased risk of veno-thrombotic events with TTh - The net effect of TTh on lipid profiles is neutral, although HDL cholesterol usually declines. - Several RCTs demonstrate TTh is safe and beneficial in stable cases of heart failure. - Erythrocytosis may occur with TTh, with risk varying by formulation; routine haematological monitoring is recommended
9	**Monitoring is required for men on testosterone therapy.**
Expert comments:	- Review patient for symptomatic response including blood tests at 3, 6 and 12 months after initiation, then at least annually - Minimum tests: testosterone, PSA, haematocrit/haemoglobin - Timing of the measurement of T depends on treatment formulation: within 2-6 hrs after administration of topical or oral formulations, and prior to next treatment (nadir) for injections and pellets - If Hct rises above 54%, consider decreasing dose, changing to another TTh modality, and/or blood donation or therapeutic phlebotomy

(*Continued*)

Table 1. (*Continued*)

#	Resolutions
10	**Specific patient groups and complex cases should be referred.**
Expert comments:	- Refer to a specialist for the following scenarios: if • patient desires fertility preservation • persistently elevated prolactin • If T level < 5 nmol/L check LH/FSH, prolactin and consider referral to endocrinologist- Severe BPH, prostate cancer history, or PSA that rises above 4.0 ng/ml. - Patients with classic symptoms but normal T

BPH: Benign Prostatic Hyperplasia; CV: cardiovascular; ED: erectile dysfunction, GP: General practitioner; FSH: follicle-stimulating hormone; Hct: haematocrit; HDL: High Density Lipoprotein; LH: luteinising hormone; PSA: prostate-specific antigen; RCT; Randomised-controlled trial; SDM: Shared Decision-Making; T: testosterone; TD: testosterone deficiency; TTh: testosterone therapy.

Table 2. Clinical signs and symptoms of testosterone deficiency (TD).

Domains	Signs and symptoms
Sexual symptoms	Reduced libido
	Erectile dysfunction
	Difficulty achieving orgasm
	Decreased early morning erections
Psychological/Mood symptoms	Depressed mood and anxiety
	Reduced motivation
Cognitive symptoms	Impaired concentration
	Brain fog
General	Fatigue
	Decreased energy and vitality
Physical symptoms	Decreased muscle mass
	Reduced strength
	Reduced stamina
	Reduced bone mineral density
	Increased body fat (especially central/abdominal adiposity)
	Gynaecomastia

symptomatic and general health benefits (see Resolution 4). Importantly, treatment may also contribute to preventative care, as low testosterone levels are predictive of incident diabetes, metabolic syndrome, and all-cause mortality [8].

The traditional referral to specialists of men suspected of having TD is often associated with delays in diagnosis, additional costs, patient inconvenience, and failure of patients to follow-through with appointments, resulting in inefficiency and lost opportunities to optimise health and well-being. For these reasons GPs are uniquely positioned to identify and manage TD [9,10].

Resolution 2. TD has a negative impact on general health and quality of life

Clinical manifestations of TD include sexual, physical, cognitive, and adverse psychological symptoms [3,4,11]. Sexual symptoms are the most common reason men present for evaluation as summarised in Table 2. However, many men present with non-sexual complaints [7] or physical symptoms [3,4,7,11] (Table 2).

TD is also associated with important adverse health outcomes, including anaemia, decreased bone mineral density, atherosclerosis, obesity, type 2 diabetes, and metabolic syndrome. Low testosterone concentrations have been linked to reduced overall health status and quality of life [2,12]. Large longitudinal cohorts have shown that lower testosterone predicts increased cardiovascular morbidity and mortality and is a biochemical predictor of death in ageing men [13–16].

Resolution 3. Men with symptoms and/or signs of TD combined with low testosterone levels are candidates for testosterone therapy

The diagnosis of TD requires the presence of both: 1) characteristic symptoms and/or signs and 2) low serum T [3,4,17]. These men are candidates for TTh. While TTh may be argued to provide preventive health

benefits to asymptomatic men with low serum T levels, the data are not yet sufficiently robust to recommend this. Conversely, we do not recommend GPs initiate TTh in men with classic symptoms of TD but with normal serum T levels. While there may be circumstances where a man with normal T might benefit from TTh, this determination is best made by a specialist.

Exogenous testosterone should be avoided in men seeking fertility preservation [3,18]. Referral to a specialist should be considered in this population for treatment options that do not adversely impact fertility (see resolution #10).

We recommend against the use of TTh for asymptomatic men with normal T concentrations who request TTh to improve their physique or athletic performance.

Resolution 4. A low testosterone value is defined as total testosterone < 12 NMOL/L (350 NG/DL) and/or calculated free testosterone < 225 PMOL/L (65 PG/ML)

We recommend that total T less than 12 nmol/L (350 ng/dl) and/or calculated free T less than 225 pmol/L (65pg/ml) should be considered low and are consistent with a diagnosis of TD. These values have support in the literature and are consistent with clinical experience [3,4,17,19–21]. No single biochemical value reliably identifies individuals likely to respond to treatment from those who are unlikely to respond [22,23].

There is evidence that free testosterone is a more reliable indicator of testosterone status than total T [24]. Wide inter-individual variations in sex hormone-binding globulin (SHBG) concentrations confound the interpretation of total T concentrations, since the majority of circulating T is tightly bound to SHBG, rendering this fraction biologically unavailable [3,4,17]. Symptomatic men are candidates for treatment if either total or free T values are low.

Additional baseline blood tests to be obtained during evaluation of men for TD are listed in Table 3.

Blood tests should be obtained in the morning due to diurnal variation [3,4,17]. Laboratory-provided reference ranges for total and free T vary widely, are not clinically based, and should not be used for the diagnosis of TD [4,17,25].

Resolution 5. Testosterone therapy improves metabolic health, psychological wellbeing, sexual function and quality of life

Testosterone therapy in men with TD has been demonstrated to have multiple benefits. These include improvements in libido, erectile function, sexual activity, mood, energy, depressive symptoms, and well-being [26–33].

Metabolic and haematological benefits have also been observed. In the T4DM trial, TTh reduced progression from prediabetes to type 2 diabetes [34]. TTh consistently corrects anaemia associated with TD. Observational data also suggests TTh is associated with reduced mortality [35–37].

Musculoskeletal improvements include increased muscle mass and reduced fat mass [26,34,35,38], as well as gains in bone mineral density, especially in the lumbar spine [38,39].

Some clinical improvements may take six to twelve months to become apparent [26,34,39,40], although improved libido may be seen within 4 weeks. TTh may improve erectile function in men with inadequate response to PDE5 inhibitors alone; conversely, PDE5 inhibitors may provide additional benefits to TTh in men with erectile dysfunction treated with TTh alone [27]. Lifestyle measures, including weight reduction and increased physical activity, complement the effects of TTh [34].

Table 3. Recommended laboratory tests in men evaluated for testosterone deficiency.

Baseline laboratory tests
Testosterone (T)
Sex hormone binding globulin (SHBG)
Luteinizing hormone (LH)
Follicle-stimulating hormone (FSH)
Prolactin
Haematocrit
PSA should be obtained in men ≥ 40 years

Resolution 6. Multiple testosterone formulations are available that can be tailored to patient needs

Multiple testosterone formulations are available, including transdermal gels, injectable preparations, subcutaneous pellets, and oral testosterone undecanoate [17,41,42]. Key formulation-specific considerations are summarised in Table 4.

Formulation choice should be individualised through shared decision-making, considering patient preference, lifestyle, cost, insurance coverage, and access [3,4,17]. Not all formulations are available in all countries, and local regulatory and reimbursement environments influence prescribing practices.

While the newly introduced oral T products appear to have less inhibition of spermatogenesis, patients should be informed that any form of TTh may cause infertility.

Resolution 7. Testosterone therapy does not increase the risk of prostate cancer or worsening of urinary symptoms

Current evidence fails to support the historical belief that raising serum T is dangerous for prostate cancer (PCa). Large prostate biopsy-based trials found no association between endogenous testosterone levels and prostate cancer risk [43,44]. While US prescriptions for TTh increased six-fold from 2002 to 2013, rates of PCa did not increase [45]. The large ($N = 5204$) TRAVERSE trial showed prostate cancer rates and urination symptoms did not differ between T and placebo groups. Combined data from the 4 largest RCTs revealed nearly identical PCa rates for the testosterone and placebo arms [45,46].

These findings are consistent with the saturation model [47]. Once adequate T concentrations are obtained, maximal binding of androgen to the androgen receptor is achieved (saturation) and higher concentrations have no further effect on prostate tissue growth. On average, saturation is reached at 8.7 nmol/L (250 ng/dl) [47,48].

Studies show [47,49] that PSA will rise with TTh if baseline T is below the saturation point, but not above it [47,49]. An initial PSA rise in men during TTh should stabilise by 3 months. Further management of PSA changes or elevation should then follow usual practices and local guidance [3,4,17,18]. Men with PSA > 4.0 ng/mL or abnormal prostate exam at baseline should undergo further evaluation before treatment according to local guidelines [4,17,18]. PSA should be obtained at baseline and followed 1-2 times yearly while receiving TTh.

Resolution 8. Testosterone therapy does not increase the risk of myocardial infarction, stroke or cardiovascular death

The cardiovascular safety of TTh has been extensively investigated. Current evidence shows no increased risk of major adverse cardiovascular events (MACE), specifically, myocardial infarction (MI), stroke, or cardiovascular death [50–54].

Table 4. Overview of testosterone formulations: key advantages and limitations.

Formulation	Key advantages	Main limitations/risks
Short-acting intramuscular testosterone (testosterone enanthate, testosterone cypionate)	Effective in restoring testosterone levels	Higher rates of erythrocytosis compared with non-parenteral formulations
Long-acting injections (testosterone undecanoate)	Cost-effective Reliable testosterone elevation Infrequent administration	Higher rates of erythrocytosis compared with non-parenteral formulations
Transdermal formulations (gels/creams)	Provide more stable testosterone levels; lower risk of erythrocytosis	Requires daily application. Rare cases of transfer to partners or children through skin contact have been reported
Testosterone pellets	Long dosing intervals; reduced need for frequent administration	Requires a minor in-office surgical procedure. Limited availability in many countries. Small risk of infection, pellet extrusion, haematoma
Oral testosterone undecanoate	Non-invasive; reduced erythrocytosis risk	Availability currently limited to US and few other countries. Cost may be a factor. Compliance may be challenging due to twice-daily dosing

In the TRAVERSE trial [50,55], rates of MACE were similar for the TTh and placebo groups. (58, 64). These results were consistent with other large, randomised trials, and numerous observational trials [26,34].

Testosterone therapy is considered safe in men with stable chronic heart failure. A randomised study conducted over 12 months in men with stable moderate chronic cardiac failures (NYHA Class II and III) demonstrated beneficial effects of testosterone therapy and improved functional capacity and symptoms without increased cardiovascular events [56].

TRAVERSE and most observational studies have failed to show any increased risk of venothrombotic events among men undergoing TTh [51]. TTh is associated with modest improvements in lipid profile, with mixed effects on HDL [50,51]. Small increases in blood pressure over the initial 6 months have been noted with some T formulations, however RCTS with duration of one year or longer have shown no increased blood pressure.

Resolution 9. Monitoring is required for men on testosterone therapy

Men receiving TTh require ongoing monitoring [17,18]. Assessment should include symptomatic response, treatment adherence, and possible adverse effects. Adverse effects associated with TTh may include erythrocytosis (increase haemoglobin haematocrit), increase in PSA that should be stabilised by 3 months, acne, reduced testicular volume, suppression of spermatogenesis, infertility, gynaecomastia and pedal/ankle swelling.

Clinical and laboratory assessment is recommended at approximately 3, 6, and 12 months after initiation of therapy, and annually thereafter [3,4,17,18]. Minimum laboratory monitoring should include serum testosterone, haemoglobin and/or haematocrit to detect erythrocytosis, and prostate-specific antigen (PSA) [17,18] as presented in Table 5. The timing of testosterone measurements during TTh should be adapted to the formulation used and the timing of the last dose or application [4,17] (See Table 4).

Therapy should be reviewed if haematocrit rises above 54%. In this situation, dose adjustment, temporary cessation of treatment or therapeutic phlebotomy should be considered [4,17,18].

Resolution 10. Specific patient groups and complex cases should be referred

While most men with TD can be managed in primary care, certain populations and complex cases are best managed by specialists [1]. Clinical situations for which a referral is recommended are presented in Table 6. These include men seeking to preserve fertility or testicular volume, men with PCa, and men with complex or severe cardiovascular disease.

External feedback

A majority of external respondents endorsed all ten resolutions, with a high degree of agreement (≥75%) obtained for 8 of 10 resolutions. Lower degrees of agreement were noted for Resolutions #1 on the

Table 5. Recommended laboratory and clinical monitoring during testosterone therapy (TTh).

Laboratory monitoring	Clinical monitoring
• Serum testosterone	• Symptomatic response
• Haemoglobin and/or haematocrit	• Monitor for erythrocytosis. Values above 54% or 18g/dl require intervention.
• Prostate-specific antigen (PSA)	• Monitor for elevation above 4.0 ng/ml or rapid, progressive rise after new baseline determined at 3 months.

Table 6. Clinical situations requiring referral or further evaluation.

Clinical situation
Desire to preserve current or future fertility
Markedly low total testosterone (<5 nmol/L)
Persistent or markedly elevated prolactin levels
Severe benign prostatic hyperplasia
Men with a history of prostate cancer
Rising PSA, or PSA values exceeding 4 ng/mL before or during treatment
Classic suggestive symptoms of testosterone deficiency with normal testosterone levels
Haematocrit rise ≥ 54% during treatment

positioning of General practitioners to diagnose and treat testosterone deficiency and #4 on the level of testosterone to consider for treatment.

Discussion

Summary

The aim of this international consensus statement is to provide a practical set of clinical recommendations for the evaluation and management of TD by GP. The underlying basis for this initiative is the belief that GPs are uniquely positioned to manage most cases of TD, since TD is prevalent in patient populations already treated by GPs and may contribute to improved healthcare outcomes. While referral to specialists is appropriate for complex or special populations, most men with TD may be best managed by GPs with appropriate education and training. This document provides practical, clinical guidance for the management of TD in a GP setting.

We have emphasised brevity over comprehensiveness to improve clinical utility. Readers seeking more in-depth information should refer to previously published guidelines or texts [3,4,17,18,21].

External validation revealed a high degree of agreement with the consensus resolutions. Not surprisingly, the lowest rates of endorsement were observed for the relatively new idea that GPs should play a central role in managing TD, and for what biochemical threshold should serve as a "low" T value. While our recommendations are consistent with most international societies, US-based guidelines recommend a lower threshold.

Comparison with existing literature

This document differs from previously published clinical recommendations and guidelines by focusing on the specific concerns of GPs rather than specialists. However, the recommendations themselves are consistent with established clinical practices. We note that country-specific issues may not allow for adoption of one or more recommendations proposed here. For example, in France regulations require the first testosterone prescription must be provided by an endocrinologist, although GPs are then allowed to renew the prescription.

Implications for research and/or practice

This document proposes a conceptual shift that TD should be considered primarily within the domain of practice of GPs rather than specialists. Specialist care remains important for complex cases or specific populations. This shift should enhance patient care while reducing healthcare inefficiencies and costs required by obligatory referral to specialists.

Strengths and limitations

A key strength of this document is the use of a consensus model among GPs and specialist experts. The international group of experts have outlined for the first time how GPs can safely and effectively approach men with TD. Limitations include inapplicability of some recommendations due to country- or regional-specific circumstances. Concerns regarding subjective or regional biases have been addressed by inclusion of an international and multidisciplinary panel of experts, the consensus process, and external validation.

Conclusion

This consensus document provides a practical guide to the management of TD in primary care, including diagnosis, treatment, monitoring, and referral, when appropriate. We believe adoption of the resolutions herein will enhance men's health on a global scale.

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Author contributions

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Data availability statement

The recommendations are based on published literature and expert consensus. Further information on the external feedback process and aggregated data may be obtained from the corresponding author upon reasonable request.

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