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### **Non-medicalization of Medical Science: Rationalization for future**

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#### **Abstract**

As we delve into the intricacies of human disease, millions of people continue to be diagnosed by what are labelled as pre-conditions or sub-clinical entities and may receive treatments designed to prevent further progression to clinical disease, but with debatable impact and consequences. Endocrinology is no different, with almost every organ system and associated diseases having subclinical entities. Although the expansion of these “grey” pre-conditions and their treatments come with a better understanding of pathophysiologic processes, they also entail financial costs, drug adverse-effects and lack true prevention, thus refuting the very foundation of Medicine laid by Hippocrates “Primum non nocere” (Latin), i.e. do no harm.

Subclinical hypothyroidism, prediabetes, Osteopenia and MACS are some of the endocrine pre-clinical conditions which do not require active pharmacological management in the vast majority. Infact, progression to clinical disease is seen in only a small minority with reversal to normality in most. Giving drugs also does not lead to true prevention by changing the course of future disease. The goal of the medical fraternity thus as a whole should be to bring this large chunk of humanity out of the hospitals towards leading a healthy lifestyle and away from the label of a medical disease condition.

#### **INTRODUCTION**

##### **Background**

It was David Humes, who more than 250 years ago had discerningly said “It’s impossible to separate the chance of good from the risk of ill” an adage that holds even more meaning today than ever before. In today’s era of rapid progress in medical science, the lines have been blurred between “ease” and “dis-ease” with not only medical terms for pre-clinical medical conditions but also various pharmacological treatments being encouraged to “prevent” the development of clinical diseases. The rationale for such treatments remains debatable and controversial.

The concept of medicalization dates back to 1968 when Pitts and Irving K. Zola(1972) defined medicalization as “a effective means of social control”(1). Thereafter, Conrad, one of the pioneers of medicalization defined it as a “process by which non-medical problems become defined and treated as medical problems, usually in terms of illness and disorders”(2). A continually evolving term over decades, medicalization can range from sexuality to garden variety mood disturbances, from childbirth to menopause, from cancer to ageing, blurring the lines between physiological and disease states. While physicians, social movements used to be at the crux of medicalization when it was first introduced as a concept in the 1970s, the major players driving medicalization today have been the pharmaceutical and the biotechnology industries, posing ethical concerns. The other main reason is the urge to find something “new” or target newer/higher/Lower goals in therapeutics by medical scientists leading to a flurry of pre-clinical labels to almost every chronic disease.

In this article we discuss a few of these pre-clinical conditions (subclinical hypothyroidism, pre-diabetes, osteopenia, MACS), highlighting the futility of overtreatment which may be variable early in the course. The medical community needs to exercise restraint with pharmacological measures where changes in lifestyle could play a more decisive role in leading a healthy life.

## **SEARCH STRATEGY**

THE FOLLOWING DATABASES WERE USED TO IDENTIFY THE RELEVANT STUDIES: PUBMED/MEDLINE, SCOPUS AND COCHRANE DATABASES. WE ALSO APPLIED RCA (REFERENCE CITATION ANALYSIS) TO FURTHER ENHANCE OUR SEARCH RESULTS. ALL THE DATABASES WERE SEARCHED FROM THEIR INCEPTION TILL 10 MARCH 2022. WE DID A SEARCH AGAIN AND THE SEARCH WAS EXTENDED UPTILL 10 JUNE, 2022 TO LOOK FOR ANY ADDITIONAL ARTICLES. KEYWORDS USED WERE MAINLY RELATED TO THE TOPICS OF INTEREST INCLUDING "PREDIABETES" OR "IMPAIRED FASTING GLUCOSE" OR "IMPAIRED GLUCOSE TOLERANCE", "SUBCLINICAL HYPOTHYROIDISM", "OSTEOPENIA" OR "LOW BONE MASS", AND "MILD AUTONOMOUS CORTISOL EXCESS". REFERENCE LISTS OF REVIEW ARTICLES AND GUIDELINES WERE ALSO SCANNED FOR POTENTIAL ARTICLES FOR INCLUSION. THERE WAS NO RESTRICTION FOR STUDY DESIGN AND LANGUAGE (WHERE ENGLISH LANGUAGE TRANSLATION WAS AVAILABLE). ALL ARTICLES RELATED TO NON-MEDICALIZATION WERE REVIEWED AND THOSE RELEVANT TO THE TOPICS OF INTEREST WERE CONSIDERED FOR INCLUSION IN THIS SCOPING REVIEW.

## **MACS**

Minimal autonomous cortisol excess (MACS) is defined as <sup>6</sup>ACTH independent cortisol excess often without clinical signs and symptoms of Cushing's syndrome. Previously referred to with terms including "subclinical Cushing's syndrome", "preclinical Cushing's syndrome" and "subclinical hypercortisolism", currently the ESE/ENSAT has suggested the use of the term "minimal autonomous cortisol excess" which is universally used(3). The term was first introduced as "Pre-clinical Cushing's syndrome" by Charbonnel and coworkers in 1981(4). The entity has since made rapid strides and undergone major changes with respect to its understanding, nomenclature and definitions used for diagnosis.

0.3% of adrenal incidentalomas present with Cushing's syndrome(5). MACS is diagnosed in 5- <sup>21</sup>48% of patients with incidentally discovered adrenal tumors following

evaluation in endocrine clinics(6,7). The diagnosis of MACS is made in patients with adrenal incidentaloma with an abnormal 1-mg dexamethasone suppression test with absent stigmata of Cushing's syndrome. The 1-mg dexamethasone suppression test has been recommended by current recommendations to have the highest sensitivity for diagnosing MACS(3,8). However, the diagnosis requires exclusion of potential causes of physiological hypercortisolism such as obesity, diabetes, and anxiety/depression. These have also been described as comorbidities associated with MACS and can act as potential confounders in diagnosis.

In a recent systemic review and meta-analysis done by Elhassan *et al*(9) involving <sup>6</sup>more than 4000 patients with benign adrenal incidentalomas, the prevalence of hypertension, obesity, dyslipidemia, and type 2 diabetes in the MACS sub-group were 64%, 41%, 34% and 28% respectively. This prevalence of dyslipidemia and obesity was almost similar to non-functioning adrenal tumors (NFAT) and only hypertension and diabetes were more common in the MACS subgroup. Although Hypertension, dyslipidemia and diabetes were likely to worsen in the MACS sub-group on follow-up, progressive worsening is the sine qua non in most chronic conditions. The results have been conflicting with cardiovascular events being prevalent in non-functioning adrenal tumors at baseline (8.7% *vs* 6.3%), and new cardiovascular events developing in MACS than NFAT (15.5 *vs* 6.4%). On top of it, the mortality rates were similar between the two groups despite these differences in metabolic complications. This would mandate a cautionary approach to managing "mild" hypercortisolism based on no difference shown in mortality outcomes thus putting in doubt the benefit of any intervention at this so-called pre-clinical stage

<sup>12</sup>Patients with MACS have also been found to carry a risk of osteoporosis and mostly asymptomatic vertebral fractures (46-82%), as compared to 13-23% of patients with non-functioning adrenal incidentalomas(10). <sup>6</sup>A study done by Goh *et al* followed up <sup>101</sup>101 patients with benign adrenal adenomas over a 3-year follow-up period. Ninety-two patients had a diagnosis of non-functioning adenomas while nine patients had a diagnosis of MACS defined as an abnormal 24-hr UFC and 1mg-DST. <sup>13</sup>After 3 years

(range 2.9-4.7 years), four of the nine patients with MACS showed normalization of cortisol parameters (44%), and five of the 92 non-functional AI patients developed MACS (5%) (11). Nearly half of the patients with MACS had normalization of biochemical parameters on follow-up. Whether the initial diagnosis was because of a false-positive test in the first place, or a spontaneous reversal of the cortisol excess, the more important fact is that only 9% patients had MACS initially and more than half of them normalized on follow-up. Additionally, the risk of progression to overt Cushing's remains very low (<1%) in patients with MACS, as has been uniformly reported across multiple studies (12-14). Hence, this should prompt a more vigilant interpretation of any results which imply a higher risk for complications in MACS. This also suggests that caution be exercised with regards to diagnostic interpretation and adopting invasive management decisions.

There remains a need to establish the benefits of adrenalectomy on mortality, quality of life and potential reversal of these comorbidities in light of the doubtful clinical impact of MACS. A meta-analysis done by Bancos *et al* involving retrospective studies with heterogeneous definitions of MACS showed improvement in hypertension (RR 11, 95%CI: 4.3-27.8) and diabetes mellitus (RR 3.9, 95%CI: 1.5-9.9), but not dyslipidemia (RR 2.6, 95%CI: 0.97-7.2) or obesity (RR 3.4, 95%CI: 0.95-12) when compared with conservative management(15). A study done by Salcuni *et al* found a 30 % vertebral fracture risk reduction with surgical *vs* conservative management (Odds ratio 0.7, 95%CI 0.01-0.05,  $P = 0.008$ ). There have been few studies on the potential use of Mifepristone and Metyrapone in MACS demonstrating beneficial effects on several metabolic parameters(16,17).

All these evidences are largely based on small, heterogenous studies with inconsistent definitions of MACS, comorbidities and as well as degrees of improvement. With the knowledge that half of MACS return to normalcy (nonfunctional status), <1% progression to Cushing's, the involved risks and morbidity of a major surgery, publication bias for positive results certainly calls into question this medicalization.

Moreover, differences in assay factors and the presence of significant comorbidities may lead to possible false-positive results leading to misclassification of patients and adding to bias.

The 2016 European guidelines for the management of adrenal incidentaloma currently suggest an individualized approach. They do recommend surgical management in patients with post-dexamethasone cortisol  $>138$  nmol/L ( $>5$   $\mu$ g/dL) and the presence of at least two comorbidities potentially related to cortisol excess (e.g. type 2 diabetes, hypertension, obesity, osteoporosis), of which at least one is poorly controlled by medical measures. One needs to weigh the risks and morbidity associated with an adrenal surgery with the perceived benefits. A causal link between MACS and these comorbidities has not been unequivocally established, and these comorbidities can usually be efficaciously managed with medical treatment. Robust randomized trials comparing intensive medical therapy and adrenalectomy, with consistent definitions, appropriately defined end-points and a longer duration of follow-up may bust the myth of operating on MACS.

### **Subclinical Hypothyroidism**

An entity which has been in vogue over the past few decades, subclinical hypothyroidism is essentially a biochemical diagnosis, defined as an elevated TSH level with a fT4 Level that is within the population specific range.

The prevalence of overt hypothyroidism ranges from 0.2-5.3%(18) while the prevalence of subclinical hypothyroidism varies from 4.3% to 15% (3x to 150x), with a multitude of factors affecting incidence including female gender, age and iodine status(19). Serum TSH levels in subclinical hypothyroidism have been classified into two categories ranging from the ULN to 10 and 10 or higher. What is interesting to note is the fact that more than 90% of patients fall in the earlier bracket. Even more striking is the fact that the risk of progression to overt hypothyroidism is only 2% per year in the absence of TPO antibodies and 4% per year in the presence of TPO antibodies. As many as two-thirds (~60%) of these individuals see their TSH levels return to the normal range

without treatment(20). Simply put, treating 100 patients for hypothyroidism with TSH between 4-10  $\mu\text{U}/\text{mL}$  will potentially avoid progression to overt hypothyroidism in 2-4 patients while what they add on to are unnecessary multiple clinic visits, treatment costs, polypharmacy and modification of daily habits including taking the tablet 30-60 minutes before a meal in the rest. The question that matters “is it really worth it?” and are we wasting 96% of our efforts? Would it not be prudent to wait for identifying and then treating only those who actually progress to overt hypothyroidism unless there are significant immediate medical concerns which may be benefited with treatment as in infertility or in pregnant females.

There are a number of factors affecting TSH levels. TSH levels tend to follow a circadian fluctuation with nadir levels in the afternoon and only 30% having higher levels in the evening and night. This TSH peak may also be altered in night-shift workers, those with irregular sleep patterns, following vigorous exercise and mood disorders. Moreover, although population specific reference ranges have been defined for  $\text{fT}_4$  and TSH concentrations, the intra-individual hypothalamic-pituitary axis set point is largely genetically determined and is minutely sensitive to changes in thyroxine concentrations, which despite being within the population specific range may be enough to result in an increased TSH concentration. Furthermore, due to alterations in the hypothalamic-pituitary TSH set point, there is a trend towards elevated TSH concentrations with advancing age which is a physiological change. Besides this there are several conditions which should be ruled out before making a diagnosis of SCH(21). (Table 1)

Taking these factors into account, the guidelines clearly mention that a diagnosis of subclinical hypothyroidism should be made following confirmation with a repeat TSH,  $\text{T}_4$  measurement(22) and even when reconfirmed on second testing, only a subset may need treatment. However, one-third of the people are offered treatment after a single TSH measurement making them “patients” and making levothyroxine one of the leading prescriptions worldwide(23).

### ***Symptoms and quality of life:***

With regards to symptomatology, around 1 in 3 patients with subclinical hypothyroidism are asymptomatic. Symptoms when present, tend to predominantly be fatigue, muscle weakness, and cold intolerance. However, around 20-25% of patients with normal TSH levels report these symptoms. A meta-analysis done by Feller *et al* done in 2018 on Quality of life<sup>4</sup> showed no difference in hypothyroid symptoms (16.7 vs 16.5) or fatigue<sup>4</sup> (28.6 vs 29) as assessed using the ThyPRO self-reported instrument (scale 0–100, lower better), or in health related quality of life, depression, cognitive function, or muscle strength(24). About treatment on the various aspects of hypothyroidism, the largest trial done to date, the TRUST trial did not demonstrate any effect of levothyroxine<sup>9</sup> on the coprimary outcomes of hypothyroid symptoms and fatigue scores after 12 mo of therapy nor on the secondary outcomes of quality of life, handgrip strength, cognitive function, blood pressure, weight, BMI, waist circumference or carotid plaque thickness(25).

### ***Cardiovascular risk:***

Amongst the various organ systems that thyroid hormone does play a role in, its effects on the cardiovascular system have been evaluated most extensively. Multiple studies have found that surrogate markers of cardiovascular function (such as left ventricular diastolic function) and lipid profile deteriorate with subclinical hypothyroidism (26,27). However, while these observations seem to suggest that raised TSH levels may be associated with an increased risk of adverse cardiovascular outcomes, such has not been the case in multiple randomized trials. Subclinical hypothyroidism was not associated with an increased risk of atrial fibrillation, heart failure, stroke, coronary heart disease events, mortality from coronary heart disease, or overall mortality compared with euthyroid individuals in an individual patient meta-analysis performed by the Thyroid Studies Collaboration (28–31).<sup>18</sup> There are limited randomized clinical trials with sufficient power to examine the impact of thyroid hormone therapy on cardiovascular<sup>4</sup>

events, the TRUST study found that treatment of SCH did not impact the incidence of cardiovascular events within 1 year after initiation of therapy (25).

**Treatment:**

Current guidelines recommend that all individuals with subclinical hypothyroidism would not benefit from treatment and clinicians need to weigh other factors when deciding on treatment (32–34). Treatment guidelines for subclinical hypothyroidism have been summarized in the table. To conclude, there is significant evidence to suggest that subclinical hypothyroidism remains an entity which is misdiagnosed, and largely over-treated and there is a need to improve on adherence to the guidelines (Table 2) with periodic reassessment of symptoms, with discontinuation of treatment if and when no benefit becomes evident.

**3** Older patients (>70 yr): Treatment with levothyroxine should be considered if clear symptoms of hypothyroidism are present or if the risk of vascular events is high. (Not a graded recommendation, but part of the treatment algorithm)

All adults (on 2 occasions, 3 mo apart), consider treatment.

TSH: ULN to 10 mIU/L

**3** Treatment should be considered on the basis of individual factors (i.e., symptoms suggestive of hypothyroidism, a positive test for antibodies to thyroid peroxidase, or evidence of atherosclerotic cardiovascular disease, heart failure, or associated risk factors for these diseases). (Grade B, because of a lack of randomized, controlled trials)

Younger patients (<65 to 70 yr): A trial period of treatment with levothyroxine should be considered when symptoms suggestive of hypothyroidism are present. (Grade 2)

**3** Older patients (especially >80 to 85 yr): Careful follow-up with a wait-and-see strategy, generally avoiding hormonal treatment, is recommended. (Grade 3)

Age <65 years (on 2 occasions, 3 mo apart):

Consider a 6-month trial of levothyroxine if symptoms present.

## Prediabetes

Pre-diabetes, a term developed to pre-empt the progression to diabetes represents an intermediate state of hyperglycemia. Varying definitions have been used by the WHO and ADA to define prediabetes, classifying them into impaired fasting glucose (IFG) and impaired glucose tolerance (IGT) depending on fasting plasma glucose levels and 2-hr plasma glucose levels after a 75-gram oral glucose tolerance test. ADA, in addition, uses HbA1c too to classify diabetes.

The worldwide prevalence of diabetes ranges from 6 to 10.5% in adults (38,39) while the prevalence of pre-diabetes ranges from 5.5% to around 50% (40) depending on the ethnicity and definitions used to define pre-diabetes (Table 3). The yearly conversion rate varies from pre-diabetes to diabetes is 5-20%, with rates ranging from 4-6% for isolated IGT, 6-9% for isolated IFG, and 15-19% for those with both IFG and IGT(41). The reversal rates vary from 45% for individuals with IFG, 37% for individuals with IGT and 17% for individuals with impaired HbA1c levels(42).

### *Complications of Pre-diabetes:*

The strongest evidence for pre-diabetes comes with cardiovascular complications(45). In a metanalysis done by Huang-et al, IFG, IGT and HbA1c were independently associated with an increased risk of composite cardiovascular outcomes, coronary heart disease, stroke and all-cause mortality(46). In a meta-analysis done by Echouffo-Tcheugui *et al* pre-diabetes was associated with a moderately increased risk of CKD (47). Several studies have shown similar results with increased rates of micro-albuminuria and progression to chronic kidney disease in prediabetes(48-50). Pre-diabetes also has been associated with an increased prevalence of diabetic neuropathy especially autonomic involvement, and increased risk of diabetic retinopathy(51,52).

### *Treatment:*

Multiple randomized control trials including the diabetes prevention program(DPP)(53), the Finnish diabetes prevention study(DPS)(54) and the Da Qing diabetes prevention study(55) demonstrate that lifestyle/behavioral therapy is highly effective in preventing progression to type 2 diabetes. In a recent meta-analysis, lifestyle interventions for obese or overweight individuals with pre-diabetes led to a reduced incidence of diabetes(56). The DPP for instance demonstrated that an intensive lifestyle intervention could reduce the risk of incident type 2 diabetes by 58%. To prevent one case of diabetes during a period of three years, 6.9 persons would have to participate in the lifestyle-intervention program, and 13.9 would have to receive metformin. The ADA currently recommends lifestyle modification for pre-diabetes with a target of 7% weight loss and 150 minutes/week of moderate intensity physical activity(57).

While weight loss does lead to a definite reduction in incident type 2 diabetes, it often comes with the challenge of sustaining it long-term(58). Multiple pharmacological agents have been evaluated (table) with the strongest evidence and long-term safety favoring metformin. In the Indian Diabetes Prevention Programme (IDPP-1) study, Metformin and lifestyle intervention reduced diabetes risk similarly at 30 mo although the lifestyle intervention in the Indian DPP-1 was less effective than the DPP(59). The ADA currently recommends Metformin should be considered in those with BMI  $\geq 35$  kg/m<sup>2</sup>, those aged <60 years, and women with prior gestational diabetes mellitus (60).

While current evidence does suggest the effectiveness of treatment modalities for the prevention of pre-diabetes to diabetes, the long-term effects on microvascular and macrovascular complications remain debatable. Moreover, although pharmacotherapy has been found to be beneficial in preventing type 2 diabetes, questions regarding the starting and end-point-of-therapy, long-term safety of other potential drugs, economic considerations regarding its cost-effectiveness and health benefits remain unanswered.

Shahraz *et al* using NHANES data showed that a widely promoted web-based risk test by ADA and AMA would label more than 73 million Americans, including more than 80% of those older than 60 years, as being at high risk for “prediabetes”, thus elegantly demonstrating how common conditions can be “medicalized”(61).

## Osteopenia

Osteopenia a term which came into being by the WHO in 1992 was initially “meant to indicate the emergence of a problem without having any diagnostic or therapeutic significance”. The WHO currently defines osteopenia as a BMD T score that is higher than  $-2.5$  but less than  $-1.0$ (62,63).

The prevalence of osteoporosis ranges from 2% to 26.3%(64) while that of osteopenia is two to three times higher, varying from 54 to 80%(65). Because osteopenia is so much more prevalent than osteoporosis, the majority of fractures occur in women with osteopenia. In the National Osteoporosis risk assessment study which involved 149,542 postmenopausal women followed up for 1 year, the gross disparity in the proportion of women with osteopenia and osteoporosis(39% v/s 6%) meant that more fractures were observed among women with osteopenia despite them having a lower risk for the same. When we look at the temporal transition of osteopenia to osteoporosis in a study done by Gourlay *et al* which included 3,702 women with osteopenia, the investigators estimated the time for 10% of the women to transition to osteoporosis before having a hip or clinical vertebral fracture. Women were stratified into three subgroups: mild osteopenia(T score from  $-1.01$  to  $-1.49$ ), moderate osteopenia(T score from  $-1.50$  to  $-1.99$ ) and severe osteopenia(T score from  $-2.00$  to  $-2.49$ ). For 10% of the women to transition to osteoporosis, it took 17 years for those with mild osteopenia, five years for those with moderate osteopenia and one year for those with severe osteopenia. Moreover, there was no difference in time needed to transition to osteoporosis among women with normal bone density and mild osteopenia(66).

Hillier *et al* performed a study including a large cohort of women aged 65 years and older with osteopenia at baseline. 4.7% and 15.7% of these women developed hip and a major osteoporotic fracture respectively within 10 years. The corresponding values were 1.2% and 6.3% for women with normal BMD and 14.3% and 30% for women with osteoporosis(67).

While lifestyle measures along with appropriate intake of calcium and vitamin D can be uniformly recommended to all women with osteopenia, pharmacological treatment remains largely debatable(68,69). A variety of algorithms and clinical tools such as FRAX have been developed to enable physicians in stratifying women with osteopenia and decide on potential indications of treatment. Most trials evaluating the efficacy of these agents involve women with osteoporosis or prevalent vertebral fractures with fewer trials in osteopenic women. In the fracture intervention (FIT) trial, <sup>1</sup>alendronate was not associated with a reduced risk of sustaining a vertebral fracture among women with a T score between -1.6 and -2.5 (HR 0.8; 95 % CI, 0.3-2.1)(70). In a RCT done by McCloskey *et al*, the NNT to prevent the occurrence of one clinical fracture was three and a half times higher among women with T>-2.5 than women with osteoporosis (NNT= 66 vs 19) despite similar relative risk reduction (22% vs 30%)(71). Hence while relative risk reduction might appear greater in terms of numbers it does not quite translate into significant numbers in terms of absolute risk reduction. Cost-effectiveness is another factor that needs to be taken into consideration. Studies done by Schousboe *et al* and Meadows *et al* <sup>1</sup>have assessed the cost-effectiveness of prescribing alendronate among post menopausal women with osteopenia and found that the drug is not cost-effective(72,73). The long duration of treatment, lack of defined endpoints and the adverse effects associated with long term use are other factors that need to be considered prior to initiating pharmacological therapy in osteopenia (Table 4). Hence, in the absence of unequivocal clinically and epidemiologically relevant benefits of pharmacotherapy, osteopenia essentially remains a radiological diagnosis in the absence of risk factors for fracture and is probably best managed by periodic monitoring and fracture risk assessment.

### Reasons for progressive Medicalization

There are many reasons why clinicians may provide more care than is needed. A primary <sup>2</sup>reason is “technology creep.” After a new drug or device is approved for use in a condition in which there is a proven benefit, its use often expands to lower-risk

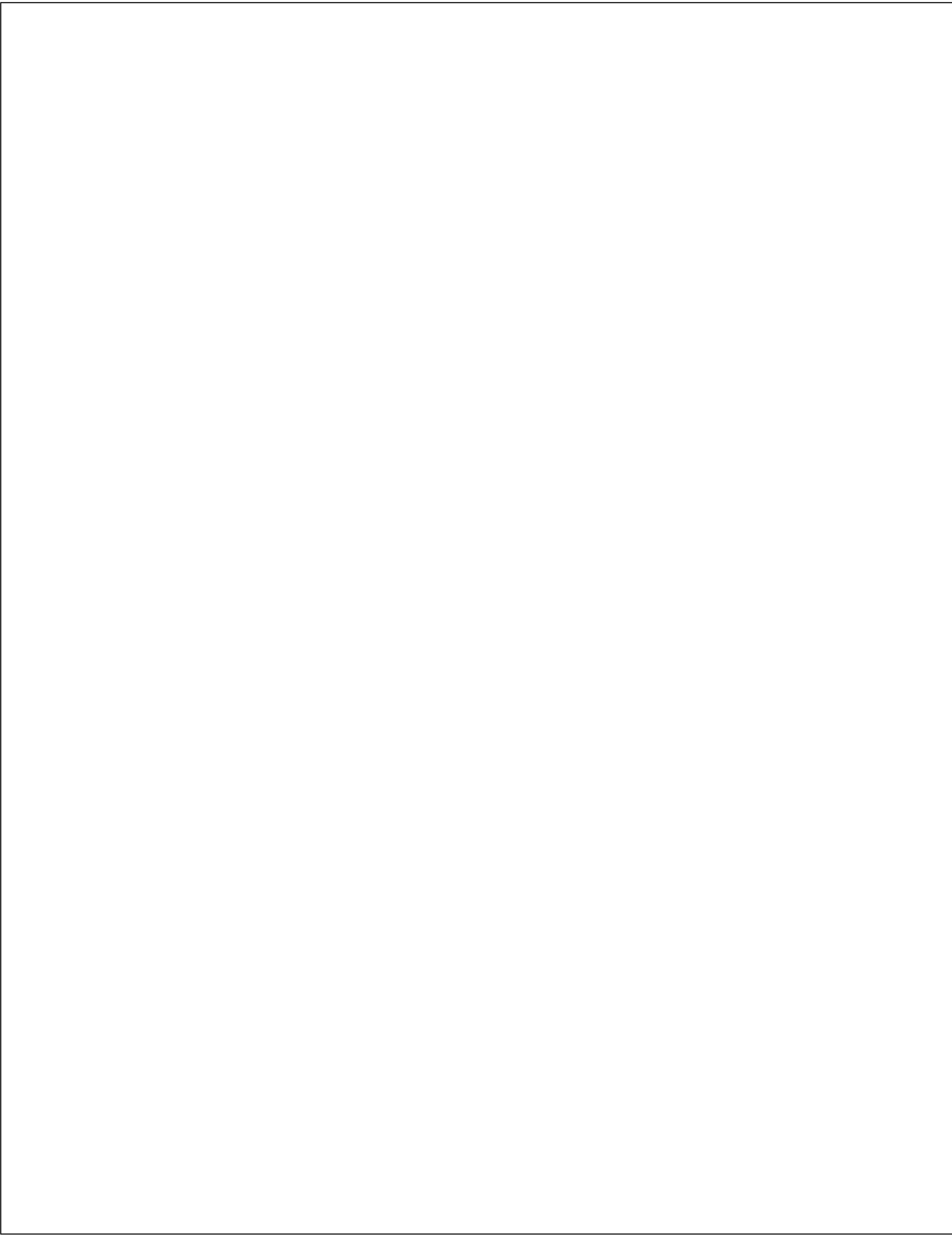
groups in which the benefit does not outweigh the risk. Others<sup>2</sup> include payment systems that reward procedures disproportionately compared with talking to patients, expectations of patients who equate testing and interventions with better care, the glamour of technology, the fact that it may be quicker to order a test or write a prescription than explain to a patient why they are not being treated, and defensive medicine<sup>2</sup> (76). Even if a medical intervention has been shown to provide a clear benefit in selected groups, using it in other groups, especially in those with milder disease or at-risk group for disease, can result in harm.

It is worthwhile to note<sup>2</sup> that providing excessive health care service is most likely to occur in situations in which there is less strong evidence to document the benefit and harms of the service. Infact, editors of JAMA Internal Medicine took note of “medicalization” of common conditions, as an area of increasing concern(77). “Less is More,” was a series used<sup>14</sup> to highlight situations in which the overuse of medical care could result in harm and in which less care is likely to result in better health (78). A comprehensive look at the four pre-clinical conditions is summarized in Table 5.

## **CONCLUSION**

A fine balance between indiscriminate acceptance of medicalization of areas of human existence and blind criticism of new medicalization cases needs to be struck. A reasonable way to look at any chronic non-communicable disease should be to avoid unnecessary medicalization by medical labeling of the “grey zone” preceding a disease. Rather it should seek to identify people at highest risk for targeted allocation of limited health care resources and address the lifestyle changes which can improve the overall health of the community. Having a proven therapeutic intervention for a disease does not pre-validate its use in the pre-clinical stage of the same disease and can lead to more harm than good.

The time is more than ripe for paying heed to hard facts and sane logic both for the patient as well as the medical community for treading carefully with regards to early interventions for “preclinical and subclinical” conditions in medical science.



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