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Journal of General Medicine and Clinical Practice

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Case Report

Managing Syncope in Smaller Setting

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Received date: March 28, 2025; Accepted date: April 14, 2025; Published date: April 21, 2025

Citation: K. Suresh, (2025), Managing Syncope in Smaller Setting, *J. General Medicine and Clinical Practice,* 8(4); **DOI:10.31579/2639-4162/264**

Abstract

With all the variety of individual phenotypic adaptation, its development in higher animals is characterized by certain common features. There are two stages in the development of most adaptive reactions, namely: the initial stage of urgent but imperfect adaptation and the subsequent stage of perfect, long-term adaptation. The urgent stage of the adaptive reaction occurs immediately after the onset of the stimulus and, therefore, can be realized only on the basis of ready-made, previously formed physiological mechanisms. The obvious manifestations of urgent adaptation are the animal's flight in response to pain, an increase in heat production in response to cold, an increase in heat transfer in response to heat, an increase in pulmonary ventilation and minute volume of blood circulation in response to lack of oxygen. The most important feature of this stage of adaptation is that the body's activity proceeds at the limit of its physiological capabilities — with almost complete mobilization of the functional reserve — and does not fully provide the necessary adaptive effect. Thus, running of an unadapted animal or human occurs at near-maximum values of the minute volume of the heart and pulmonary ventilation, with maximum mobilization of the glycogen reserve in the liver; due to insufficiently rapid oxidation of pyruvate in muscle mitochondria, the level of lactate in the blood increases. This lacedemia limits the intensity of the load — the motor reaction can be neither fast enough nor long enough. Thus, adaptation is implemented "from the spot", but it turns out to be imperfect.

Kew Words: individual adaptation; interrelation; function; systemic structural trace

Introduction

Syncope is a transient loss of consciousness and postural tone that occurs suddenly due to decreased cerebral blood flow, followed by spontaneous recovery. It affects 3% of males and 3.5% of females at some point in life [1,2]. As people get older incidence increases to affect up to 6% of people over age 75 years [2]. Vasovagal syncope (VVS), the commonest type of such a problem is defined as “the development of hypotension and bradycardia with the typical clinical manifestations of pallor, sweating and weakness and complete loss of consciousness for no more than 20 Seconds [4, 5]. VVS is frequent and benign, most people do not need special treatment, but repeated episodes and VVS in elderly can become a significant health and social challenge. India witnesses around 500,000 cases of Syncope each year of which one thirds are recurrent episodes and 70,000 are recurrent, infrequent unexplained Syncope [3]. Syncope in childhood is a common medical problem with an estimated incidence of 125.8 per 100.000 children and it is more frequent in females [1]. Orthostatic hypotension is a drop in blood pressure that occurs when a person has been standing for a while, or changes from a sitting to a standing position. Blood pools in the legs, preventing a normal amount of blood from being pumped to the brain. This brief drop in blood flow to the brain causes a person to faint. This more commonly occurs in older adults [5]. Presyncope is the prodrome of syncope in the absence of transient loss of consciousness in a person who has used countermeasures like sitting or lying down to avoid syncope. It is nothing but orthostasis without loss of consciousness or postural tone. [1,4]. Orthostasis" is the physiological response of the body’s autonomic nervous system, to maintain blood pressure when transitioning from a lying or sitting position to an upright position [6]. The condition can occur at any age, but a common clinical condition in the elderly with or without other medical issues. VVS or Transient Loss of Consciousness (TLOC) or is also a well-known phenomenon in dental/ maxillofacial surgery.

Syncope is associated with significant morbidity and risk of recurrence. Though Its pathophysiology remains to be fully elucidated, there appears to be a relation between trigemino-cardiac reflex and syncope, as seen under general anaesthesia when all sympathetic reflexes are blunted and under local anaesthesia during extractions of maxillary molars and mediate syncope [8]. Recurrent syncope causing a repeated reduction in the cerebral blood flow can predispose to progressive neurodegeneration, a decline in overall health and functionality [9]. Presyncope and syncope have a similar prognosis. Occasional dizziness or light-headedness may also be triggered by mild dehydration, low blood sugar or overheating, and standing up after sitting for a long time, with no cause for concern. If the symptoms of orthostatic hypotension, even for just a few seconds, occur frequently need medical consultation right away. This article is prompted by occasional attacks of Syncope by self and other cases managed or overseen & requisite literature search on pathophysiology & global management practices. It is necessary for all nations to take effective measures to address this problem

given the commitment for healthy ageing life expectancy (HALE) challenge [13].

Case Reports:

1. **Autobiography of the author:** This author in his early 80 years**,** Diabetic (T2D) since 1991 and Hypertensive since 1992, both reasonably well controlled, having undergone CABG in 2005, and post CABG angioplasty in February 2023. He has been getting episodes of Syncope since 2021, once in 2-3 months, whenever he gets up from sitting on the floor {(squatting) for choosing vegetables in the street side markets or for spreading them on the floor at home to dry them before cleaning and packing} to stand erect. The dizziness lasts for about 10-15 seconds, as he takes support of a wall and becomes normal. All biomarkers, cardiovascular and Neurological imaging investigations are normal. He is managing by countermeasures like taking support of wall or a table or a chair or sitting to avoid syncope.
2. **Syncope Secondary to Arrhythmogenic Ventricular Cardiomyopathy**: A 65-year-old Indian rural female presented to a private tertiary care hospital with a syncopal episode while she was walking home from evening stroll. She is known diabetic and hypertensive for last 2 decades, both not well controlled as she is not regular in medication. She complained of palpitations for a week. She could not recall the syncopal episode fully and was supported by friends who were walking with her. On arrival at the hospital, her electrocardiogram (ECG) showed normal sinus rhythm (NSR) with right axis deviation (RAD) and right bundle branch block (RBBB). Cardiovascular magnetic resonance imaging (MRI) showed preserved biventricular function, mild bi-atrial dilatation, and features suggestive of atrial fibrillation and ventricular cardiomyopathy. She was put on bisoprolol and had an implantable cardioverter defibrillator fitted and discharged home with cardiology follow-up.

3. **Syncope in Carotid Sinus Syndrome:** A 58-year-old male presented to a private clinic where the doctor had recently done a course on palliative care in 2020. He gave an history of and discharge summary from a specialised in hospital head and neck oncology Carotid Sinus Syndrome. The discharge summary read: A swelling in the left angle of the mandible was detected on physical examination. On magnetic resonance imaging, it was found to be encroaching the carotid space/indenting carotid arteries. Histopathological examination of an incisional biopsy revealed squamous cell carcinoma. As the mass was found to be surgically unresectable, and he had not tolerated chemotherapy (oral metronomic chemotherapy combination of twice daily celecoxib 200 mg and weekly methotrexate 15 mg/m2) for which, he developed Grade 4 paclitaxel hypersensitivity. Therefore, he was managed by palliative care. We started him on tablets morphine 60 mg/day and paracetamol 2 gm/day and pregabalin 75 mg at bedtime for neuropathic pain (WHO Step III analgesics). He started having syncopal attacks after a week. This too was stopped, and he was further investigated. All fasting blood glucose, liver enzymes, serum creatinine, electrolytes (sodium, potassium, magnesium, calcium, and phosphorus), complete blood count, and electrocardiogram (ECG) were reported normal. On admission, the patient had a heart rate of 48 beats/min and was hypotensive (90/70 mmHg). ECG was normal, apart from bradycardia. Renal function test and serum electrolytes (sodium, potassium, magnesium, calcium, and phosphorus) were all normal. Echocardiography showed normal Left ventricular structure and functions. Computed tomography scan of brain and thorax were normal; no metastatic lesions were found.

   Following a quick cardiac consultation he was put on intravenous atropine 0.5 mg, repeated 5 more times, which helped to tide over the hemodynamic crisis.

   Detailed evaluation of the case pointed out the cause as left carotid sinus syndrome (CSH), which is an exaggerated response to carotid sinus baroreceptor stimulation and results in dizziness or syncope from transient diminished cerebral perfusion.

   In this case, mechanical deformation of the carotid sinus had led to an exaggerated response with bradycardia or vasodilatation, resulting in hypotension and syncope.

4. **Psychotropic Syncope:** A young lady of 21 years presented to a medical college OPD in December 2024, with the history of a apparent loss of consciousness for about 20 seconds that morning and a week ago also. She gave history of similar episodes whenever she stood up associated with palpitations for the last 6 months. Her episodes were aggravated during hot weather, hot water shower or and loud noise. She was highly stressed due to failing matrimonial negotiations since a year and was also anxious for which she had consulted a neurologist & was on psychotropic drugs.

5. **Cough Induced Syncope:** A 34 years-old male presented on 14 January 2025 with a 2-week history of multiple episodes where he lost consciousness during or after cough. The syncopal events lasted for durations ranging from 30-60 seconds. There was history of brief jerky movements of body during the episode but no history of incontinence or tongue biting. Chest x-ray and pulmonary function tests were normal. A 2D-ECHO suggested mild concentric left ventricular hypertrophy with EF of 60%. He was a chronic alcoholic, weighting 97kgs and his BMI was 32.4. During consultation, the clinician witnessed episodes of cough-induced syncope. During the episode, his systolic blood pressure showed a reduction from 110 mmHg to 80 mmHg. His face became congested, and he lost his conscious. The blood pressure returned to baseline as soon as the symptoms resolved. CECT chest was normal except for an incidental finding of osteochondroma of 3rd and 4th right thoracic ribs. Symptomatic management of cough (steam inhalation, cough suppressants & antihistaminic, bronchodilators.) was done. Dietary and lifestyle modification was advised to the patient. Outpatient follow-up weekly for three subsequent visits he is having no more syncopal attacks.

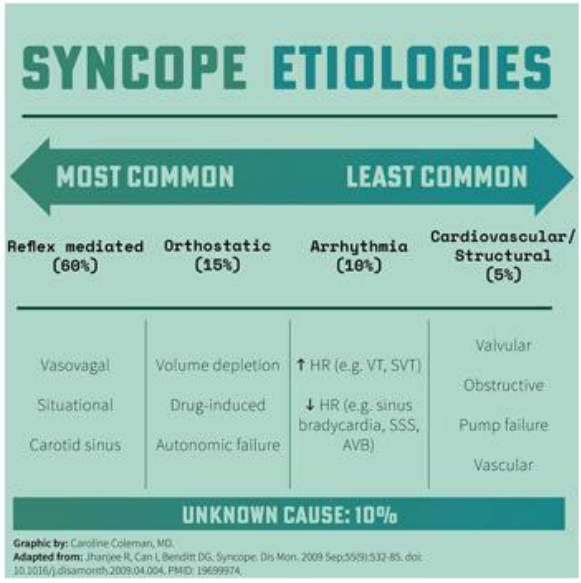
Discussions:

Today, vasovagal syncope is a common problem that has become a significant health and social challenge**.** Approximately 35% of people between 35 and 60 years of age have had at least one episode of VVS. By age 60, 42% of women and 32% of men experience vasovagal syncope at least once [5]. In a review of 12 studies with a sample size of 36,156 people, the global prevalence of vasovagal syncope was reported as 16.4 (95%CI: 6–37.5). The annual incidence of syncope is 5.7 episodes per 1000 individuals between 60 and 69 years and 11.1 episodes per 1000 individuals between 70 and 79 years, and after 80 years it rises to 19.5 per 1000 individuals [2] in Engaland. Syncope is a common in India, with incidence increasing with age, particularly after 70 years, and vasovagal syncope being the most frequent cause, especially in younger individuals. Syncope is broadly classified into four categories: reflex-mediated (neutrally mediated), cardiac,

orthostatic, and neurological. In India Vasovagal Syncope (Neurocardiogenic) is the most common type of syncope, particularly in younger individuals followed by Cardiac causes which become more prevalent with age, including arrhythmias, structural heart problems, and ischemic heart disease, Orthostatic Hypotension is another common cause, especially in older adults, often related to medications or autonomic dysfunction. Some other causes include Neurological, endocrinological, & psychiatric disorders. Unexplained Syncope in which the cause remains unknown accounts for about 10% [13,4,5].

India specific epidemiological data is limited compared to other countries, but some specific considerations include i) Cultural & socioeconomic factors that influence the presentation and management. ii)The high prevalence of cardiovascular disease causes is a significant concern. More research is needed to better understand the epidemiology, causes, and management of syncope in the Indian population. Other non-Syncope causes of transient loss of consciousness include hypoglycaemia, seizure, concussion, psychogenic.

Vasovagal syncope is the most benign type of syncope, with an average prevalence of 22% in the general population, with a significant medical, social, and economic impact on the general population [7,9]. Approximately 35% of people between 35 and 60 years of age have had at least one episode of VVS. By age 60, 42% of women and 32% of men experience vasovagal syncope at least once [2]. The risk of vasovagal syncope is approximately between 3% of visits to the emergency room and 5% of outpatient visits to the hospitals [3].



Pathophysiology:

When a person stands, gravity causes blood to pool in the lower extremities, potentially leading to a drop in blood pressure and reduced blood flow to the brain. To counteract this, the body activates i) The sympathetic nervous system that constricts blood vessels and increases heart rate to maintain blood pressure ii) Muscle pumps and the non-uniform distensibility of blood vessels help to return blood to the heart. Most cases of Syncope are reflex mediated (60% -Vasovagal, Situational & Carotid sinus) followed by Orthostatic (15%- volume depletion, drug induced & autonomic failure) Arrythmias {10% either increased heart rate (VT, SVT) or decreased heart rate (Sinus Bradycardia, SSS, AVB)} and Cardiovascular or Structural (5%- Valvular, Vascular, obstructive or pump failure) defects. In 10% cases no cause is detectable.

The mechanisms of VVS: The afferent part of the vasovagal reflex in terms of the steps from the process to autonomic control and central processing is not fully understood so far. However, the efferent part of the reflex is clear as hypotension and bradycardia, due to inhibition of the sympathetic system & specific activation of the parasympathetic system [2]. This reflex usually occurs during regional anaesthesia, bleeding, or compression of the inferior vena cava in the supine position. Vasovagal-mediated hypotension and bradycardia disrupts cerebral blood flow, resulting a sudden & transient loss of consciousness and postural tone. Vasovagal syncope is of two types 1) Classic VVS- is caused by emotional or orthostatic stress and can be diagnosed just by taking a history. The most common age of onset of this condition is 13 years. 2) Nonclassical VVS consists of episodes without obvious precipitating events and is diagnosed by clinical criteria, exclusion of other causes of syncope, and a positive response to the tilt test (TT). Nonclassical VVS often begins at an older age and is associated with carotid sinus hypersensitivity, postprandial hypotension, or orthostatic hypotension [4,5].

The risk factors for orthostatic hypotension: Age, medications, & certain disease are the risk factors.

Syncope in children is caused by a temporary drop in the amount of blood that flows to the brain. In children Situational syncope is a common type of reflex syncope that is associated with typical triggers emotional stress, pain, prolonged standing, dehydration, or the sight of blood, miction, swallow, cough and hair grooming. This is followed by ii) Vasovagal syndrome is a sudden drop in blood pressure with or without a decrease in heart rate, caused by a problem with overstimulating the nerves that have direct input on the heart and blood vessels iii) Arrhythmia, a heart rate that is too slow, too fast, or too irregular to keep enough blood flow to the body, including the brain, is a rare cause of syncope in children and iv) Structural (muscle or valve defects) heart disease. Myocarditis an Inflammation of the heart muscle, can also cause fainting.

Orthostatic Hypotension is a condition where blood pressure drops significantly upon standing, often causing dizziness or light-headedness, is also known as postural hypotension. It is typically diagnosed by measuring blood pressure in a lying position and then again after sitting and standing for a few minutes. Orthostatic hypotension is common in those who are age 65 and older as special cells (baroreceptors) near the heart and neck arteries that control blood pressure can slow as we age. An aging heart finds it hard to speed up to make up for drops in blood pressure. Medications like diuretics, alpha blockers, beta blockers, calcium channel blockers, angiotensin-converting enzyme (ACE) inhibitors and nitrates and certain antidepressants, used to treat Parkinsonism and certain antipsychotics,

muscle relaxants, used to treat erectile dysfunction and narcotics also have a risk of postural hypotension. Diseases like heart valve problems, heart attack and heart failure, and nervous system disorders, like Parkinson's disease and metabolic diseases that cause neuropathy like diabetes, alcohol abuse, nutritional deficiencies- vitamins B1, B3, B5 B6 (Thiamine Niacin Pantothenic acid and Pyridoxine respectively), Alpha-tocopherol a type of vitamin E, infections, & autoimmune disorders pose higher risk of Postural hypotension.

Recurrent Syncope in elderly:

A case–control study of 50 cases of recurrent syncope and 50 controls, aged 75 years and older took a detailed history and sequential evaluation for aetiologies looking at Cognition, frailty, activities of daily living, depression, and nutrition were assessed using various scales. The results inferred Most (80%, 80/100) of the participants were males and the mean age was 80.04 ± 4.3 years. In the syncope group, 42% (21/50) of patients had arrhythmia, and 30% (15/30) had valvular heart disease. Recurrent syncope was significantly associated with lower scores on Montreal cognitive assessment scale (OR: 6.47 $P < 0.001$), four or more comorbidities (OR: 6.29 $P < 0.001$), and hearing impairment (OR: 6.21 $P < 0.004$) on multivariate logistic regression analysis. The study concluded that Recurrent syncope is significantly associated with cognitive impairment, the presence of four or more comorbidities, and hearing impairment. Conduction abnormality was the most common aetiology of recurrent cardiovascular syncope. Structured evaluation and appropriate management of recurrent syncope might reduce the decline in physical, cognitive, and psychological reserve [2].

Diagnosis, Management & Prognosis: A good clinician must take information from the history and do a thorough physical exam, look for vital signs, investigate cardiac biomarkers and ECG. to stratify risk of the patient into low, medium, or high risk. Patients of the medium- or high-risk categories must undergo further cardiac workup at speciality facility. Identifying the underlying cause of syncope is crucial for risk stratification and appropriate management as i) Cardiac syncope carries a higher mortality risk & morbidity ii) Recurrent syncope has a significant impact on quality of life and requires careful evaluation and management. Therefore, A family Physician must follow golden rules of history taking & examination to decide if patient needs urgent referral or s/he can manage at her/his level!

I.A good history (asking about vasovagal prodromal symptoms like Light-headedness or dizziness upon standing, Blurry vision, Weakness & Fainting and Confusion and Orthostatic - an increase in the heart rate of 30 or more, a decrease in systolic blood pressure of 20 mm Hg or more, or a decrease in diastolic blood pressure of 10 mm Hg or more with standing for 1 minute when compared with values obtained in the supine position.)

ii. Limited myoclonic jerking, incontinence, or <10 seconds of post-episode confusion seen in syncope, in contrast to Tonic-clonic movements, loss of consciousness > 30 seconds, lateral tongue biting, & minutes of post-episode confusion indicate seizure

iii. Most low-risk cases of syncope can be identified from the initial history, physical exam, and electrocardiogram.

iv. Risk scoring systems, are helpful to identify elevated risk for high-risk causes

v. Neurologic testing is only required in those with history or exam findings concerning for neurologic causes like seizure or stroke

vi. Echocardiogram is preferred for patients whose history, physical, or electrocardiogram reveal abnormal cardiac findings.

vii. If a case is not clearly a low-risk or high-risk aetiology of a patient's transient loss of consciousness, consider a Simplified Well's Score and D-dimer to rule out PE.

Most of cases f Syncope can be managed at Primary care or family physicians' level though, effective management of recurring syncope requires a multidisciplinary approach involving cardiologists, neurologists, and other healthcare professionals.

Well's Score: The Wells score is a clinical prediction rule that helps determine the pre-test probability of pulmonary embolism (PE) based on factors like clinical signs of deep vein thrombosis, previous history of PE or DVT, heart rate, and other relevant factors.

D-dimer Test: D-dimer is a protein fragment produced when a blood clot is broken down. A negative D-dimer test result suggests a low probability of a blood clot, including PE.

Combined Approach: When a patient has a Wells score of 4 or less (indicating low pre-test probability) and a negative D-dimer test, PE can be safely ruled out, avoiding unnecessary imaging like CT scans. This strategy is efficient because it reduces the number of patients who require further testing, while maintaining a low risk of missing a PE diagnosis.

High risk patients: Patients with a high-risk score (Wells score > 4) usually do not receive a D-dimer test but are directly referred for CTPA or V/Q scanning.

PERC Rule: If the PTP is low using the Wells score then the PERC rule can be applied. If the answer to all the criteria in PERC rule is 'Yes', then the PERC rule is negative. No further testing is required, and pulmonary embolism is safely excluded. A Wells score of 4 or less [3], combined with a negative D-dimer test, can safely rule out pulmonary embolism (PE) in patients with low pre-test probability, reducing the need for CT scans. Troponins are indicated when there is concern for ischemia, but not for all-comers with syncope. Get a stress test if patient has chest pain and in cases of exertional syncope. Echocardiography (Echo) is required only for selected patients with cardiac symptoms, abnormal physical exam findings, or ECG abnormalities

Wells' Criteria for Pulmonary Embolism

Objectifies risk of pulmonary embolism:

When to Use	Pearls/Pitfalls	Why Use
Clinical signs and symptoms of DVT	No- 0,	Yes+3
PE is #1 diagnosis OR equally likely	No- 0,	Yes+3
Heart rate > 100	No- 0	Yes+1.5
Immobilization at least 3 days OR	No-0	Yes+1.5
surgery in the previous 4 weeks		
Previous, objectively diagnosed PE or DVT	No-0	Yes+1.5
Haemoptysis	No-0	Yes+1
Malignancy w/ treatment within 6 months	No-0	Yes+1
or palliative		
Wells' Criteria for DVT		
When to Use	Pearls/Pitfalls	Why Use
Active cancer, Treatment or		
palliation within 6 months	No-0	Yes+1
Bedridden recently >3 days or		
major surgery within 12 weeks	No-0	Yes+1
Calf swelling >3 cm compared to the other leg		
Measured 10 cm below tibial tuberosity	No-0	Yes+1
Collateral (non-varicose) superficial veins present	No-0	Yes+1
Entire leg swollen	No-0	Yes+1
Localized tenderness along the deep venous system	No-0	Yes+1
Pitting oedema, confined to symptomatic leg	No-0	Yes+1

Note: The Wells' Score is less useful in hospitalized patients

Cardiology consultation may be desired for guidance on specialized testing in cases of suspected arrhythmia like electrophysiologic study (EPS) or implantable loop recorders (ILR). In >80% of patients with syncope and a wide QRS (≥ 120 ms), a specific diagnosis can be reached with a sequential evaluation. Normal QRS width is 70-110 ms. The QRS width is useful in determining the origin of each QRS complex (e.g. sinus, atrial, junctional or ventricular). QRS < 100 ms are supraventricular in origin. if initial evaluation is nondiagnostic EPS and ILR (if EPS is also nondiagnostic) may be required. Inpatient and outpatient rhythm monitoring is required for patients with syncope due to a suspected arrhythmia. Telemetry is done for in-hospital monitoring during admission. Continuous Holter monitors records for 24-48 hours, add value if symptoms are frequent. Most Cardiologists in India don't consider outpatient monitoring for first episodes of, unless palpitations are predominant, or the patient has experienced several episodes captured with a device without a clear cause.

Global commitment for improving The Healthy Life Expectancy (HALE), a measure of how many years a person can expect to live in good physical & Mental health and independent, free of disease and disability. HALE is a more nuanced way to understand health outcomes than life expectancy alone, as it considers both morbidity and mortality.

Syncope in Children: A review of 30 (children aged 4 to 17 years) Hospital records with clinical and laboratory details of children presenting with real or apparent syncope. Five diagnostic categories the differential diagnosis, namely neurocardiogenic syncope (NCS), psychogenic pseudosyncope (PPS), cardiac, neurological and indeterminate. The commonest cause of syncope was NCS (63.3%), followed by PPS (13.3%), cardiac (10%), neurological (10%) and indeterminate (3.3%). Exercise, loud noise or emotional triggers and family history were associated with cardiac aetiology, and electrocardiogram (ECG) was diagnostic in the majority. Children with PPS and cardiac syncope had frequent episodes when compared with other groups. Indiscriminate antiepileptic use was found in 5 children, including two cardiac cases. Study inferred those frequent recurrences of syncope suggested PPS or cardiac cause. Cardiac aetiology is easily identifiable on history and ECG alone [10]

Syncope, Healthy Average Life Expectancy (HALE) & Public Health:

Prior to the COVID-19 pandemic, global life expectancy had increased by more than 6 years between 2000 (66.8 yrs) and 2019 (73.1 years). While healthy life expectancy (HALE) had also increased by 9% from 58.1 in 2000 to 63.5 in 2019, primarily due to declining mortality rather than reduced years lived with disability. However, the COVID-19 pandemic reversed

about a decade of gains in both life expectancy at birth. By 2020, both global life expectancy and HALE had rolled back to 2016 levels (72.5 years and 62.8 years, respectively). The 2021 year saw further declines, with both going down to 71.4 years and 61.9 years, respectively. From the Public Health perspective, all the countries having committed to universal health coverage (UHC) by 2030, the countries that have not seen sufficient gains in life expectancy must plan specific programs to push UHC to achieve the Sustainable Development Goal (SDG).

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