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'The Environment is where we all meet; where we all have mutual interest; it is the one thing all of us share'

- Lady Bird Johnson -

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Cover Story : Plastic is a danger to climate change

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President's Message

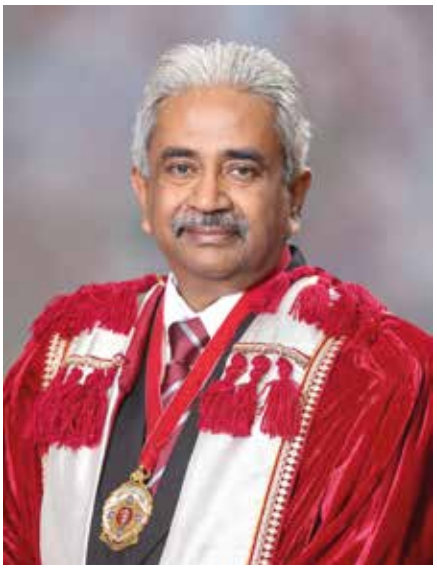
Dear SLMA Members,

Sri Lanka is a country that is thought to be highly vulnerable to the impact of climate change. Climate change and the inevitable biodiversity loss in Sri Lanka have far-reaching consequences for the environment, economy, and public health. This issue of SLMA Newsletter focuses on this important subject of climate change, most particularly the nexus between plastics and climate change. The connected issues of loss of biodiversity are also discussed.

Sri Lanka is vulnerable to extreme weather events like floods, cyclones, and droughts, which are disconcertingly becoming more frequent and severe due to climate change. These events can lead to injuries, displacement, and the spread of waterborne diseases, thereby causing significant health risks to the population. In the past month we have experienced unusually high rain fall with many districts in the South experiencing major floods, together with landslides in the hill country, impacting many families. Plastic bags, bottles and packaging are also blamed for clogging drains and causing urban flooding.

The changing climate can also alter the distribution and behaviour of disease vectors such as mosquitoes which could result in increased incidence of dengue fever posing greater health threats to the population. Increased rainfall and flooding can contaminate water sources, leading to the spread of waterborne diseases such as cholera, typhoid, and hepatitis. These diseases can have serious health consequences.

At a time when the country is facing food insecurity amongst a



major proportion of the population, climate change can affect crop yields and food availability, causing further aggravation to levels of malnutrition and related health problems, especially in vulnerable populations.

Climate change also worsens air quality due to increased heat, wildfires, and changes in atmospheric conditions. Poor air quality can exacerbate respiratory diseases like asthma and also lead to more cardiovascular problems. Rising temperatures can cause heat-related illnesses, including heatstroke and dehydration, which can be life-threatening, particularly among the elderly and those with pre-existing health conditions.

Often unnoticed is the impact of climate change on Mental Health. The increasing frequency of extreme weather events, loss of livelihoods, and physical displacement can lead to mental health issues, including anxiety, depression, and post-traumatic stress disorder. Biodiversity loss can also impact mental well-being, as people may have less access to natural spaces. The availability and ready access to such spaces is often associated with mental health benefits.

Sri Lanka has a rich biodiversity, including many varieties of indigenous medicinal plants. A significant proportion of the Sri Lankan population obtain traditional and Ayurveda treatment. Biodiversity loss can result in the loss of potential treatments and cures for diseases. Biodiversity loss can disrupt ecosystems, including those that provide clean water and even upregulate disease vectors. This can directly impact public health. A reduction in biodiversity can also lead to a more limited food supply, potentially reducing dietary diversity and affecting nutrition. Research also has found that, changes in ecosystems can lead to the emergence of new diseases as pathogens adapt to new hosts and environments.

There is an urgent need to mitigate the impact of plastics on climate change and human health. Overall, reducing plastic consumption and improving waste management practices are critical steps to both addressing climate change and minimizing the health risks associated with microplastics. To mitigate the health impacts of climate change and biodiversity loss in Sri Lanka, it is crucial for the government, communities, and international organizations to work together and in tandem on adaptation and mitigation strategies. These may include disaster preparedness, public health programmes, improved healthcare infrastructure, and conservation efforts to protect and restore biodiversity. Education and awareness campaigns would also play a vital role in helping people adapt to these changes and reduce their vulnerability.

Dr Vinya Ariyaratne
President SLMA.

Activities in Brief
(16th September 2023 - 15th October 2023)

SLMA Saturday Talks

16th September

'A patient presenting with shortness of breath: The role of lung function tests' by Professor Lakmali Amarasiri, Department of Physiology, Faculty of Medicine, Colombo.

23rd September

'Surviving through loss: grief and grief counselling' by Dr Luckshika Amarakoon, Faculty of Medical Sciences, University of Sri Jayawardenapura.

7th October

'Let's talk about contraception. Less known facts' by Dr Wedisha Gankanda, Consultant Obstetrician & Gynaecologist.

14th October

'Is there a sorting hat to navigate the maze of anxiety?' by Professor Harshani Rajapakse, Department of Psychiatry, Faculty of Medicine, Karapitiya & Moratuwa.

Other Activities

17th September

A collaborative workshop was organized by the College of Administrators of Sri Lanka (CMASL) and the Intercollegiate Committee of Sri Lanka Medical Association on *'Leadership & Management Skills for Clinical Consultants'* at Citrus, Waskaduwa.

The resource persons and the topics of lectures are as follows;

'The importance of leadership & management skills for consultants' by Dr Sunil de Alwis, Additional Secretary, Medical Services, MoH, *'Overview of management theories & practices in healthcare'* by Dr Palitha Maheepala, WHO Country Representative to Pakistan, *'Role of a medical leader: Practical experiences'* by Dr Sudath Dharmaratne, DDG, Laboratory Services, MoH, *'Striving for healthcare quality & patient safety: Role of the clinician'* by Dr Sathsivam Sridharan, DDG, Planning, MoH, *'Human resource management in the hospital setting: Practical experience'* by Dr Kumara Wickramasinghe, Deputy Director, NHSL, *'Productivity concepts in healthcare setting'* by Dr Wimal Karandagoda, Former Director of Medical Services, Lanka Hospitals, PLC and *'Application of evidence-based practices in management and the handling of day-to-day administrative issues'* by Dr Sarath Samarage, Former DDG, Planning, MoH.

19th September

A clinical meeting was held with the collaboration of the Sri Lanka College of Microbiologists on the topic *'Combating antimicrobial resistance through antimicrobial stewardship'*.

Dr Rohini Wadanamby, Consultant Clinical Microbiologist/ President Sri Lanka College of Microbiologists spoke on *'Think twice, seek advice, antibiotics are not always the answer'*, Dr Kushlani Jayatillake, Consultant Microbiologist, Sri Jayawardenapura General Hospital on *'Implementation of antimicrobial stewardship in healthcare settings: Challenges faced in Sri Lanka'* and Dr Madhumanee Abeywardena, Consultant Clinical Microbiologist, National Hospital, Kandy on *'Introducing AWaRe classification and antibiotic stewardship in primary care settings'*.

22nd September

A press conference was held on the topic *'Is Nipah Virus a threat to Sri Lanka?'*. The resource persons were Dr Vinya Ariyaratne, President, SLMA and Dr Saranga Sumathipala, Consultant Virologist, Apeksha Hospital.

25th September

A press conference on *'Prevention of child sexual exploitation'* was conducted by the Sri Lanka College of Sexual Health & HIV Medicine, Sri Lanka College of Paedeatricians, College of Forensic Pathologists of Sri Lanka, the Sri Lanka College of Child & Adolescent Psychiatrists and the Sri Lanka Medical Association.

The resource persons were Professor Harendra de Silva, Emeritus Professor of Paediatrics, Faculty of Medicine, University of Colombo, Professor Udayakumara Amarasinghe, Chairman, National Child Protection Authority, Dr Thilani Rathnayake, Consultant Venereologist, Professor Ajith Rathnaweera, Professor in Forensic Medicine, Dr Darshani Hettiarachchi, Consultant Child Psychiatrist, Dr DT de Silva, Acting Consultant JMO and Ms Renuka Jayasundara, DIG Women & Children's Bureau, Sri Lanka Police.

26th September

A joint webinar was organized by the SLMA Expert Committee on Planetary Health & Climate Change and the United Nations Population Fund (UNFPA) on *'Climate change impact: Policies. people, health & Beyond'*.

The resource persons were Dr Vinya Ariyaratne, President SLMA, Mr Kulne Adeniyi, Country Representative, UNFPA, Dr Anil Jasinghe, Secretary, Ministry of Environment, Dr Enoka Suraweera, Consultant Community Physician, MoH, Dr Surantha Perera, Chairperson, SLMA Expert Committee on Planetary Health & Climate Change and Mr John Buenaventura, Humanitarian – Development Nexus Specialist, UNFPA Sri Lanka Office.

27th September

Professor Samath D Dharmaratne, Chairperson, SLMA Expert Committee on Prevention of Road Traffic Crashes attended a seminar held to educate the Media on Road Safety, organized by the National Council for Road Safety, Ministry of Transport.

5th October

The second edition of the book *'SLMA Guide to the Management of Decompression Sickness (DCS)'* was officially launched by the SLMA in collaboration of the Sri Lanka Navy.

Dr Malik Fernando, Past President, SLMA spoke on *'Introduction & History of DCS Guidelines'*, Dr YB Weerasinghe on *'Exploring the Abyss: The mysteries & dangers of DCS'* and Dr DK Ariyadewa spoke on *'Optimized management of DCS'*.

Vice Admiral UVMP Perera, Commander of the Sri Lanka Navy graced the occasion.

10th October

A media briefing on *'Irregularities in Purchasing Immunoglobulin'* was organized by the SLMA jointly with the Association of Medical Specialists (AMS), Government Medical Officers' Association (GMOA) and the SLMA Intercollegiate Committee.

Dr Vinya Ariyaratne, President, SLMA, Dr Darshana Sirisena, President, GMOA, Dr Asoka Gunaratne, Consultant Anaesthetist & Intensivist, representing the AMS, Dr Piyara Ratnayake, President, Association of Sri Lankan Neurologists (ASN) and Dr Chamil Wijesinghe, GMOA Media Spokesman addressed the meeting.

Plastic is a danger to climate change. Are we doing enough to prevent climate change?

Dr. Sajith Edirisinghe
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Senior Lecturer and Clinical Geneticist
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How much plastics does the world produce?

Plastic pollution is a global problem. Plastics are made from fossil fuels. When more plastic is produced, more fossil fuel is burnt, and we make the climate crisis worse. Plastic pollution can alter population habitats and natural processes, reducing the ability of ecosystems to adapt to climate change, directly affecting livelihoods of millions of people, food chains & production capabilities, and social well-being. On 5th June 2023, the world celebrated the 50th anniversary of the World Environment Day established by the United Nations General Assembly in 1972.

By 1950 the entire world roughly produced only 2 million tonnes of plastics per year. But after the industrial revolution and increased demand by 2019, annual production had increased nearly 230-fold, reaching 460 million tonnes. This indicates that over the period from 1950 to 2019, the cumulative production of plastics has reached up to 9.5 billion tonnes. If it is considered at an individuallevel, it was estimated that each living human being can have more than one tonne of plastic(Mcnutt, 2017).

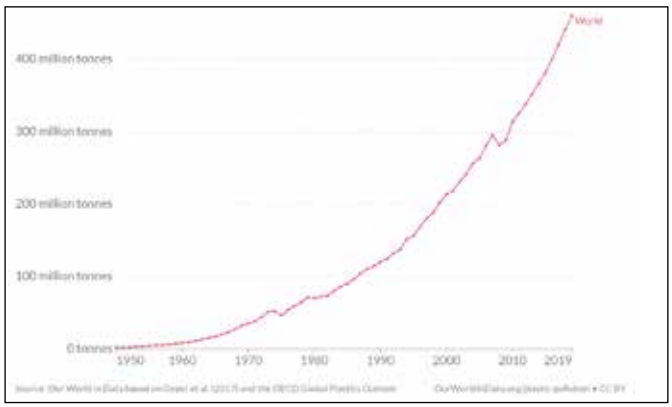

Figure 01 – Global plastic Production 1950-2019 (Mcnutt, 2017)

What have we done so far?

So far the world was using these plastics in a linear economy fashion. In simple terms, the linear economy is where we mine raw materials and process into a product that is thrown away after use. In between these steps of this process, a recycling part has been incorporated without a proper plan.

Then what should we do?

According to the decisions taken at the fifth United Nations (UN) Environment Assembly in March 2022, all 193 UN Member States decided to end plastic pollution. According to a recent UNEP report, " Turning off the Tap", plastic pollution could be reduced by 80% by 2040, if all the countries and companies make deep policy and market shifts using existing technologies. The United Nations Environment Programme (UNEP) 2023, has proposed a concept of a circular economy to reduce plastic pollution(Fletcher et al., 2023). In simple terms, the circular economy is we close the cycles of all these raw materials. Introducing a sustainable recycling process is one solution to closing the cycle. But to close these cycles requires much more than just recycling.

Figure 02 - United Nations Environment Programme 2023 report – Turning off the tap (Fletcher et al., 2023)

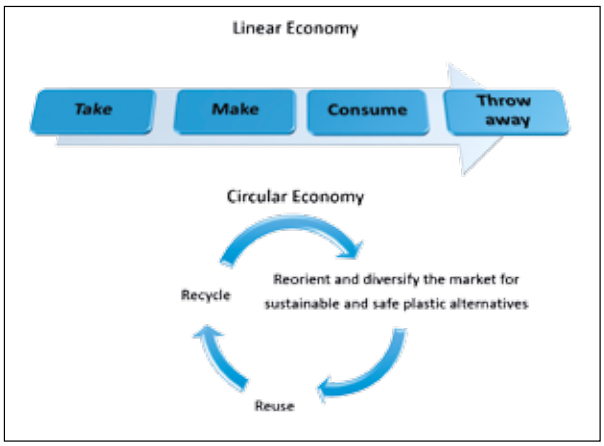

Figure 03 - Linear and Circular economy for plastics

According to a report published by the United Nations Environment Programme 2023 by introducing the reuse concept, together with the elimination of unnecessary and problematic plastic products, they expect to reduce demand for new plastics in 2040 by approximately 30%. While accelerating the recycling pathways they expect to further manage 20% of the plastics volume. With the newer concept of reorienting and diversifying sustainable alternatives to plastic products, especially plastics with short-lived/single use of plastics, UNEP expects to reduce another 17% of plastics that risk ending up as pollution.

As Sri Lankans how can we adapt to the circular economy?

Reuse

- Carry the necessary reusable bags when shopping at a grocery store.
- Carry reusable containers to store items such as fish/ meat when purchasing.
- Use disposable plastic bottles to store dry rations at home. In empty bottles, grains can be stored without wind exposure
- Start a small garden using disposable plastic bottles. It can also provide non-toxic foods.
- Plastic bottles/cans can be rearranged in a variety of designs and used for example, as tills to save money.
- Disposable plastics can be used to make various toys and home appliances to create self-employment opportunities.
- Carry a bottle of water when going out. Minimize buying plastic water bottles.
- Install simple bulk dispensers in stores where the general public can pay and refill.
- Establishment of a cash deposit refund scheme for plastic bottles.
- Develop a packaging (Eg – Polystyrene) take-back system.

These actions could decrease the risk of exposure to hazardous chemicals in plastics and the dependence on fossil fuel-based plastics. Also, these simple solutions are vital in the face of oil and gas price volatility, geopolitical risks, and the urgent need to tackle climate change. Formal packaging reuse policies are becoming more common. From the packaging reuse policies, France is expecting reuse targets of 5% by 2023 and 10% by 2027(Repository, 2023).

Recycle

According to the Royal Statistical Society data by 2018 only 9.5% of total plastic waste in the world was being recycled. The rest was sent for landfilling and burnt. When considering the last 03 years from the year 2020, according to the Environmental Audit Report in 2020 out of the total quantity of plastics imported to Sri Lanka annually, only 30 % is recycled systematically. When looking at PET plastic bottles recycling is nearly 20%. That means 01 out of 05 bottles go for recycling and 04 out of 05 bottles ended up in the environment.

However, re-designing of plastic products and labeling them which enables easy recycling is not enough. There should be proper collection and storage systems. Having proper collection and sorting processes that go hand in hand with the recycling system might help to create a properly recycled plastic that matches the required quality.

But can recycled plastics compete with virgin plastics? Recycling markets cannot survive or stand alone while virgin plastic has a lower price compared to recycled plastic. Recycled materials are often sold at higher prices than virgin plastic due to the cost involved in the supply chain and manufacturing(Caro et al., 2023). This is one of the major drawbacks in the plastic recycling industry where government concessions and interventions are required.

Reorient and diversify the market for sustainable and safe plastic alternatives

Exploring the possible alternative materials to replace virgin plastics is very important. Some plastics in the market are short-lived products that cannot be removed directly or switched to reuse concept are non-recyclable or have a high littering rate (Eg - lunch sheets). In these instances, switching or reorienting the mindset/thinking pattern from traditional plastics to sustainable substitute materials may need to be considered . For example use of a lunch box rather than using lunch sheet and the use of glass to serve water, as a reorientation of plastic single-use cups/bottles can drastically decrease plastic pollution.

Do you know about #BeatPlasticPollution?

The United Nations Environment Programme 2023 has launched the campaign #BeatPlasticPollution to focus attention on solutions to plastic pollution. They have proposed very simple things which can be done to reduce plastic pollution(UNEP, 2023).

1. **Clean a Beach:** If you live near a coastline, join beach clean-ups in your area. Or take your family along on a beach walk and start your clean-up.
2. **Clean a River:** Rivers are direct pathways of plastic debris into the ocean. Join a river clean-up or do your own! The river will look nicer also benefitting its ecosystem and the ocean.
3. **Shop Sustainably:** Next time you are out shopping, choose food with no plastic packaging, carry a reusable bag, buy local products, and refill containers to reduce your plastic waste and its effect on the environment.
4. **Try a Zero-Waste Lifestyle:** Become a zero-waste champion. Invest in sustainable, ocean-friendly products- reusable coffee mugs, water bottles, and food wraps. Consider options like menstrual cups, bamboo toothbrushes, and shampoo bars. These will help you save money and the ocean too.
5. **Travel Sustainably:** When you are on holiday, try to watch your single-use plastic intake. Refuse miniature bottles in hotel rooms, take your reusable drinking bottle, and use reef-safe sunscreen, without microplastics.
6. **Be an advocate for change:** Ask your local supermarkets, restaurants, and local suppliers to ditch plastic packaging, refuse plastic cutlery and straws, and tell them why. Pressure your local authorities to improve how they manage waste
7. **Dress Sustainably:** The fashion industry produces 20% of global wastewater and 10% of global carbon emissions. That's more than all international flights and maritime shipping combined. Consider sustainable clothing lines, and vintage shops and repair your clothes when possible.
8. **Choose plastic-free personal care products:** Personal care products are a major source of microplastics, which get washed into the oceans straight from our bathrooms. Look for plastic-free face wash, day cream, makeup, deodorant, shampoo, and other products.

Visit Beat Plastic Pollution - PRACTICAL GUIDE by UNEP 2023

https://wedocs.unep.org/bitstream/handle/20.500.11822/42437/Plastic_Pollution_WED23EN.pdf?sequence=1&isAllowed=y

Figure 04 - Beat plastic pollution - practical Guide 2023 from UNEP

As Sri Lankans… Think twice…. Have we done our job to protect our motherland from pollution? if not … start from today…for a better tomorrow…

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Threats to Biodiversity in Sri Lanka

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Ecological scientists believe that we are in the midst of a sixth mass extinction. It was estimated in a UN convention on biodiversity in 2015 that every day up to 150 species become extinct and the rate of extinction has been accelerating (1). As an island nation we in Sri Lanka are at an increased risk of losses to biodiversity when compared to large continental landmass areas. In this context the aim of this article is to discuss the threats to biodiversity in Sri Lanka and enhance the awareness to protect biodiversity.

Sri Lanka is considered to be a country rich in biodiversity for its size, probably due to its diverse terrains ranging from central cold hill country tapering down to hot low-land beaches right round. If we consider the vertebrates alone, in Sri Lanka it is home to 126 species of mammals (2) with 21 endemic species (3), 528 species of birds with 34 endemic species (4), 219 species of reptiles with 159 endemic species (5), 120 species of amphibians with 109 endemic species (5), and 190 species of freshwater fish (6) with 53 endemic species (7). The term endemic species refers to species found only in Sri Lanka and any serious threat to these species will lead to total extinction of these species. Thus we have an even greater responsibility to protect these endemic species from extinction.

The IUCN Red List published in 2019 had already listed 20 species of frogs and one species of plant as extinct in Sri Lanka (8). This List also cautioned that it contained only the species assessed for the IUCN Red List and the actual number of extinct species could be much larger. With the high levels of endemism in the country and Sri Lanka now facing extensive loss and degradation of the natural ecosystem as a result of extensive land use changes due to human activities, Sri Lanka has been identified as one of the 36 global biodiversity hotspots (9). The term biodiversity hotspots refers to regions where success in conserving species can have an enormous impact in securing our global biodiversity (10). Unfortunately most of us in Sri Lanka are not aware of the significance of biodiversity in our country.

Six major threats to biodiversity in Sri Lanka have been identified: **river diversion, habitat loss, pollution, invasive species, overexploitation and climate change** (11).

River diversion is a major threat to freshwater fish and other aquatic species. Continuous deforestation has led to extensive habitat loss. From 2002 to 2022, Sri Lanka lost 10.7 kha of humid primary forest, making up 5.2% of its total tree cover loss in the same time period (12). Habitat loss and habitat fragmentation has become a serious threat to several rare species including Sri Lankan leopard, purple-faced langur, and Sri Lankan frogmouth (13). It has also led to conflicts with humans such as seen in the case of elephants (14). Consequently, the highest number of deaths of elephants (463) was reported in 2022 (15). Deforestation also leads to climate change and drought (16).

Pollution of freshwater ecosystems by organic, inorganic and plastic waste leads to environmental degradation and loss of biodiversity. Plastic waste has become a serious threat to marine ecosystems and Sri Lanka is ranked as the fifth greatest polluter (17). Plastic in the oceans can interfere with the oceans capacity to absorb and impound carbon dioxide, thus leading to climate change and global warming (18). On the other hand air pollution from industrial emissions leads to acid rain and contamination of water as well as soil, resulting in loss of biodiversity. Unfortunately emissions from Indian cities cause air pollution in the northern parts of Sri Lanka

due to the close proximity and due to the wind blowing directions (19).

Invasive Alien Species (IAS) not only damage the ecosystems but also can affect the crop yields and can lead to the spread of diseases such as filariasis. There are 32 flora species such as Water Hyacinth, Giant Salvinia, Guinea Grass, Prickly Pear, Lantana, and 7 fauna species such as Rainbow Trout, Tank Cleaner fish, which compete with the endemic plants and fish to damage the biodiversity. IAS have invaded almost all freshwater aquatic ecosystems of Sri Lanka (20).

Logging of mature natural forests, dynamiting of corals to catch fish (21), sales of rare orchids and fish are typical examples of overexploitation of biological resources in Sri Lanka. With the current economic crisis and the resultant increase in poverty, there is an increased risk of overexploitation.

Climate change caused by deforestation and pollution leads to a vicious cycle by reducing rainfall and drought. The triple planetary crisis – Climate Change, Air Pollution, and Biodiversity Loss – has been identified as the most significant health threat of the 21st century. It threatens the essential ingredients of good health such as clean air, safe drinking water and nutritious food supply. The World Health Organization has warned that these three factors are expected to endanger billions of lives and livelihoods across every continent (22).

As medical professionals it is our bounden duty to advise and provide advocacy to the policy makers and population on the importance of biodiversity to protect human lives. In other words it is the same doctrine of right livelihood of protecting the environment and being kind to other creatures as preached in Buddhism, Hinduism and Catholicism.

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Management of heart failure and chronic kidney disease in T2D patients

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It is known that patients with type 2 diabetes (T2D) are generally at risk of developing heart failure and chronic kidney disease (CKD). Clinicians often try to control hyperglycaemia, hypertension, and hyperlipidaemia to prevent cardiovascular complications of T2D patients. However, it has been observed that those patients with T2D who have well controlled blood glucose, hypertension and normal lipid levels also develop heart failure. Many new guidelines now recommend the use of treatments such as sodium-glucose co-transporter-2 inhibitors and non-steroidal mineralocorticoid receptor antagonists, in addition to currently recommended therapies, to promote cardiorenal protection through alternative pathways as early as possible in individuals with diabetes and cardiorenal manifestations.

Heart failure incidence in T2D patients can be as high as 30% with a high mortality. Diabetic kidney disease (DKD) is observed in approximately 40% of patients with T2D, and is the leading cause of end-stage kidney disease (ESKD). Cardiovascular and renal complications associated with T2D can arise together and co-exist as a cardiorenal syndrome (CRS). Heart failure results in kidney damage and reduce glomerular filtration (GFR). On the other hand, progressive kidney disease can lead to heart failure and vascular congestion.

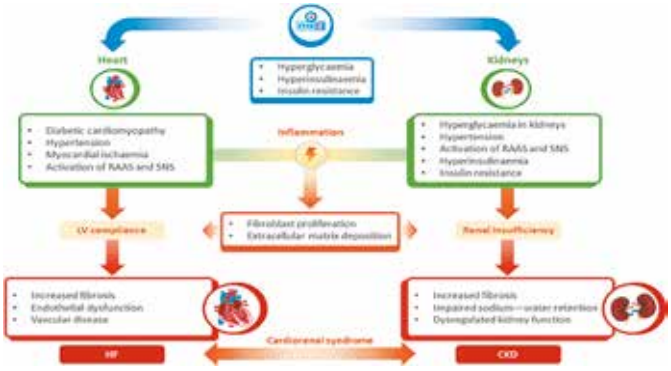

Figure 1. Disrupted metabolic pathways in HF and CKD in patients with T2D.

The presence of hypertension, coronary artery disease and diabetic cardiomyopathy contributes to HF in T2D patients. Cardiac ischaemia, whether attributable to large or small vessel disease, is responsible for pathophysiological changes in the myocardium. This myocardial dysfunction, combined with hypertension, leads to fibrosis and dysregulated systolic function; the process being further aggravated by activation of the renin–angiotensin system (RAS) and the SNS. Furthermore, macrovascular complications such as myocardial infarction and peripheral vascular disease too are common in T2D patients. Vascular dysfunction which promotes oxidative stress leads to endothelial dysfunction and pro-inflammatory and pro-fibrotic environment, which causes cardiac and renal dysfunction.

Mineralocorticoid receptor (MR) activation in the endothelial cells results in oxidative stress and inflammatory left ventricular remodelling. Aldosterone is also known to promote fibrosis and decreased contractility of cardiac myocytes.

In T2D patients, the abnormal glucose metabolism and dysregulated intracellular signalling also contribute to inflammation, fibrosis, and endothelial and epithelial injury, resulting in CKD.

Screening

American Diabetes Association (ADA) Guidelines recommend an annual assessment of urinary albumin levels and eGFR in all patients with T2D, regardless of treatment. Guidance from the 2023 ADA Standards of Care for CKD and risk management also advise that patients with established DKD should be monitored multiple times a year to guide therapy.

Masked HTN (MHTN) is associated with CVD risk, a risk that is similar to that of permanent HTN and is common in patients with T2D. The results revealed that systematic screening for MHTN through 24-hour blood pressure monitoring in patients with T2D provided an insightful indication of the CVD risk. This investigation emphasizes the need for screening tools to ensure optimal monitoring of cardiorenal risk to facilitate timely clinical intervention for patients with T2D.

Treatment

SGLT2 inhibitors in the management of HF and for improving renal outcomes

Sodium-glucose co-transporter-2 (SGLT2) inhibitors can improve cardiorenal outcomes through reductions in blood pressure, arterial stiffness and endothelial dysfunction. Research has shown that the cardio

protective characteristics of dapagliflozin observed in diabetic cardiomyopathy may involve modulation of ion homeostasis as a way to reduce fibrosis and inflammation and improve systolic function.

Renal benefits of SGLT2 inhibition include its positive effect on glomerular haemodynamics, which leads to long-term preservation of kidney function. SGLT2 inhibitors target mechanistic pathways that reduce intraglomerular pressure and the glomerular filtration rate. For patients with T2D, HF and CKD, treatment selection will need to be patient-specific and may depend on the CKD stage of the patient, as well as the presence of co-morbidities. SGLT2 inhibitor treatment can lead to higher rates of hypoglycaemia at higher doses. Hence careful dose adjustment is necessary.

The role of Mineralocorticoid Receptor Antagonists (MRAs) in the reduction of CV and kidney outcomes

Selectivity of MR antagonism varies between MRAs. Although it shows lower selectivity, the first-generation steroidal MRA spironolactone is more potent than the second-generation MRA eplerenone. Fibrosis and inflammation are caused by overactivation of the MR(Mineralocorticoid receptor). Patients with T2D and HF exhibited clinical improvements following MRA treatment compared with non-MRA therapy, with lower all-cause mortality, including CV mortality. Finerenone (non-steroidal MRA) treatment resulted in a lower risk of CKD progression and CV events in patients with CKD and T2D compared with placebo. However, the risk of hyperkalaemia is high with the use of Finerenone and blood sugar should be carefully monitored.

UPDATED GUIDELINE RECOMMENDATIONS FOR THE MANAGEMENT OF PATIENTS WITH T2D

Patients with T2D and HFrEF

Medication Guidance Source (ADA care 2023)

blocker Treatment of individuals with HF with reduced ejection fraction should include a blocker with proven cardiovascular outcomes benefit, unless otherwise contraindicated.

Patients with T2D and HFrEF or HFpEF (Source ADA Standards of Care 2023)

SGLT2 inhibitor

IIn patients with T2D and established HFpEF or HFrEF, an SGLT2 inhibitor with proven benefit in this patient population is recommended to reduce the risk of worsening HF and cardiovascular death

Recommendation 10.42b was added to recommended treatment with an SGLT2 inhibitor in individuals with T2D and established HF with either preserved or reduced ejection fraction to improve symptoms, physical limitations and quality.

Metformin

In patients with T2D with stable HF, metformin may be continued for glucose lowering if the estimated glomerular filtration rate remains > 30 mL/min/1.73m2, but should be avoided in unstable or hospitalized individuals with HF.

Management recommendations for patients with T2D and CKD

Metformin

Metformin is contraindicated in patients with an eGFR < 30 mL/min/1.73m2

While taking metformin, eGFR should be monitored

The benefits and risks of continuing treatment should be reassessed when eGFR decreases to < 45 mL/min/1.73m2

Metformin should not be initiated for patients with an eGFR < 45 mL/min/1.73m2

Metformin should be temporarily discontinued at the time of or before iodinated contrast imaging procedures in patients with eGFR 30-60 mL/min/1.73m2.

RAS inhibitor (at maximal tolerated dose)

An ACE inhibitor or an ARB is not recommended for the primary prevention of CKD in people with diabetes who have normal blood pressure and a normal urine albumin: creatinine ratio

SGLT2 inhibitor- recommended for patients with eGFR ≥ 20 mL/min/1.73m2 and urinary albumin

≥ 200 mg/g creatinine to reduce CKD progression and CV events.

	Additional risk-based therapy
GLP-1 RA	For additional CV risk reduction, a GLP-1 RA can be considered if eGFR ≥ 25 mL/min/1.73m2
	Non-steroidal MRA
	For people with T2D and CKD with albuminuria treated with maximum tolerated doses of ACE inhibitor or ARB, addition of finerenone is recommended to improve CV outcomes and reduce the risk of CKD progression.
	Steroidal MRA
	MRAs are now recommended along with other medications for CV and kidney protection rather than as alternatives when other treatments have not been effective.

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Commemorating World Diabetes Day
14th November

Control of PPH is essential for achieving recommended HbA1c goals[1]

2014 IDF guidelines recommend that individuals with diabetes maintain an HbA1c level of <7%[2]

To achieve target HbA1c <7%, individuals with diabetes often require intervention (pharmacological and/or nutritional)

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References:
1. Woerle HJ et al. Diabetes Res Clin Pract 2007
2. Ceriello A et al. Diabetes Res Clin Pract 2014

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Management of a patient with poisoning

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Introduction

Poisoning is a significant concern in Sri Lanka, with an annual rate of approximately 75,000 admissions due to poisoning. Timely and structured initial management is crucial for saving lives and minimizing complications. This article offers comprehensive guidance on managing poisoning cases, with special attention to prehospital care, suited for our setup.

Poisoning can occur in various circumstances:

- **Intentional:**
  - Deliberate self-harm (suicidal or homicidal)
  - Recreational use or abuse
- **Unintentional:**
  - Accidental (household or occupational)
  - Environmental pollution

Management of patient with poisoning

Poisoning is a medical emergency. Prompt attention without delay is needed to prevent and minimize the complications due to poisoning. Management of a patient with a poisoning or suspected poisoning begins at the site of the poisoning and the very first moment the poisoning is suspected. Management could be commenced by the victim himself, if victim is stable to do so, or by someone else. Follow standard management guidelines when a toxic exposure is suspected (an example is given in Figure 01). Management of a patient with poisoning (or suspected of poisoning) has basic steps that a clinician should follow in our setting.

1. Recognize
2. Resuscitation - Assessment and stabilization of vital functions (ABCDE)
3. History and Identification of the poison (**R**isk assessment)
4. Decontamination and prevention of further poisoning
5. Supportive care and Monitoring
6. Transfer of the patient to an equipped facility for further management if needed
7. Initial management in the hospital
8. Investigations
9. Administration of antidote
10. Enhanced elimination
11. Disposition
12. Subsequent care and management of complications
13. Medicolegal management
14. Psychological assessment and support

There is a mnemonic used widely to remember the general approach in a patient presented with poisoning **"Resus RSI-DEAD"**: **Resus**citation, **R**isk assessment, **S**upportive care and monitoring, **I**nvestigations, **D**econtamination, **E**nhanced elimination, **A**ntidotes and **D**isposition. Follow the link to read more on this approach https://litfl.com/approach-to-acute-poisoning/. By following the 'Resus RSIDEAD' approach health care professionals can systematically and effectively manage patients presented with poisoning. This method could ensure timely and appropriate care while minimizing the risk of further harm, improving patient outcomes in poisoning.

1. **Recognize (R):** The first step in managing poisoning cases is recognizing the signs and symptoms. Recognition entails identifying signs, symptoms, and the patient's history while considering the context of poisoning. Swift recognition is the foundation of effective management

2. **Resuscitation - Assessment and stabilization/ management of vital functions (ABCDE)**

Follow the Basic Life Support (BLS) Guidelines for resuscitation of the patient before coming to the hospital (an example is given in Figure 02)

- **A – Airway**

  Assessment - Check for patency – Some poisons can increase the secretions and cause vomiting. Also, as poisons can reduce the Level of GCS

patient may fail to maintain patency of airway. There could be ingested poison, collection of saliva and secretions, dentures, foreign matter or vomitus in the mouth or throat, which could obstruct the airway.

Stabilization – Remove the obstructive material including artificial dentures, secretions and keep the patient left lateral. Semi-recumbent position is favoured in case of possible obstruction to airway due to falling tongue.

- **B – Breathing**

  Some poisons can depress the respiratory centre in the brain. Breathing rate as well as pattern of breathing is important in assessment of breathing.

  Assessment – Feel for air flow through nose. Observe the chest movements and listen to the chest (with or without stethoscope) for breath sounds.

  Stabilization – if breathing is inadequate or absent, mouth to mouth ventilation could be given in the absence of resources. If there is a risk of contamination from the patient to the rescuer, this may be avoided.

- **C** – Circulation

  Poisoning can lead to various kinds of circulatory problems. It may range from bradycardia, tachycardia, heart block, hypertension, hypotension to cardiac arrest.

  Assessment – Check central (Carotid) pulse. Listen to heart. Assess for circulatory problems, ranging from bradycardia and tachycardia to heart block, hypertension, hypotension, or cardiac arrest.

  Stabilization – Absent central pulse indicates the necessity for chest compressions. If pulse is of low volume, needs intravenous fluid as soon as possible. If no IV access take the patient to the nearest hospital while keeping the leg up head low (tilted) position.

- **D – Disability**

  Assessment – Check for Glasgow Coma Scale (GCS), pupil size and reaction, any limb disability or nerve palsies. Neck or spinal damage if the incidence involves any physical injury. Disability may be due to hypoglycaemia or seizure.

  Stabilization – depending on the particular disability apply the first aid recommended, as an example, neck or spine stabilization with a spinal board and use log rolling when transferring the patient and correction of hypoglycaemia.

- **E – Exposure**

  Assessment – Carefully assess the patient to detect the areas of contamination, contaminated clothes, flushed or dry skin, look for sweating including axillary region, measure temperature if possible and look for injuries associated with the incidence.

  Management – if clothes are contaminated with a poison, remove all the clothes and cover with new clothes. If any wounds or injuries identified use appropriate first aid recommended.

During resuscitation it may be necessary to correct hypoglycaemia, hyperglycaemia, electrolyte imbalances, hypothermia and control any seizures with appropriate management regimes.

3. **History and Identification of the poison (Risk assessment)**

Once the patient is stabilized, subsequent treatment decisions depend on the specific poison type and amount of exposure, situation of exposure and the route of entry of the poison. Important to take quick but comprehensive history using "**Wh**" questions.

Who:

1. **Who is the patient?** Patients information
2. **Who else was present during the incident?** (Relationship to the patient)
3. **Who is providing this history?** (Patient or another person)

What:

4. **What poison or substance was involved?**
5. **What was the quantity or amount ingested (if known)?**
6. **What was the route of exposure?** (Oral, inhalation, dermal, ocular, parenteral)
7. **What other substances, including alcohol, were ingested simultaneously?**
8. **What comorbidities does the patient have?** (e.g., hepatic or renal impairment)

When:

9. **When did the poisoning incident occur?** (Time and date)
10. **When did the patient decide to take the poison?** (For deliberate self-harm cases)

Where:

11. **Where did the poisoning incident take place?** (Geographic location)

Why:

12. **Why did the patient ingest the poison?** (Associated details or motives)

What Happened:

13. **What symptoms followed the poisoning?** (e.g., vomiting, drowsiness, seizures)
14. **What treatments have been administered so far?**

Once the patient is stabilized, subsequent management depends on the specific type of the poison, amount of exposure, situation of exposure and the route of entry of the poison. Therefore, this information should be sorted as much as possible. (Table 01). Identification of the poison may be difficult in most of the situation due to various reasons.

Table 01. Information to elicit regarding the poison exposure – common toxins we encounter.

Common toxins we encounter	
1.	**Household an industrial chemicals** – Lysol, Prinso , detergents, rat killers. Mosquito coils, sanitizer, glue, Acids, Alkali, petroleum products m, etc..
2.	**Pesticides** – Eg Organophosphate , Carbamates, Glyphosate, MCPA
3.	**Natural toxins** – poisonous plants Niygala, yellow Oleander, Habarala. Lucky plant; mushroom etc.Animal- Snakes Insects, and sea animals…
4.	**Medicines and abusive substance**- ('Ice'), etc..
	Over the counter medicine – Paracetamol, etc..
	Prescription medicine – Antidiabetics, Antihypertensives, Lithium, NSAIDs, etc Drugs
	Recreational drugs and alcohol abuse – Heroin, Cocaine, Methamphetamine

This information could be collected from the patient, relatives, bystanders, neighbours, police or others presented with the patient. Rest of the management is dependent on the gathered information. Sometimes there will be no information available and the patient will be brought as 'found unconscious'. In such cases the diagnosis of toxin and exposure information should be done based on the findings of examination, vitals of the patient and the situation. There could be more than one toxin exposures at the same time, as an example; antidiabetics, paracetamol and NSAIDs could be taken at together. Alcohol could be there together with other toxins, especially in cases of DSH.

Victim may not aware the name or may not be in a sound mind to tell what kind of poisoning he has exposed due to effects of poisoning or alcohol. Sometimes the patient may not be willing to divulge the information, or he/ she may have associated psychiatric illness. In some instances, they might bring the container, but label may not be there, and it may not be the original container.

1. **Decontamination and prevention of further poisoning**

It is important to prevent further contamination and further poisoning by doing decontamination as soon as possible. If ocular contamination is present, the decontamination is done by washing the eyes with running water for 15 minutes. If dermal contamination has occurred, then remove the contaminated clothes and wash the area with soap and water. It is not recommended to induce vomiting as it carries a high risk of aspiration. Administer activated charcoal (AC) or perform gastric lavage if the patient is alert and presented, within 1-hour post-ingestion. This time frame can be extended if the patient has ingested a sustained-release medication or if the ingestion includes agents that are known to slow gastric emptying. Following are some contraindications for above decontamination methods.

- Clinically unstable
- Uncooperative patients
- Unable to protect the airway
- Bradycardia
- Known oesophageal diseases

Some toxins are contraindicated to offer gastric lavage as they could cause further irritation and burning of oesophagus and oro-pharynx and could lead to aspiration and chemical pneumonitis. Petroleum products like petrol, kerosene oil, diesel, acids and alkali, are some toxins that we should not practice gastric lavage or activated charcoal. Ingestion of harmless substances or very small quantities of gastric lavage or activated charcoal is not indicated. Gastric lavage after alcohol or heavy metal poisoning like Iron or lithium has not shown benefit but has risk of aspiration.

Whole bowel irrigation is commonly using gastric decontamination method with isotonic solution, polyethylene glycol electrolyte solution (PEG-ES) may be useful to empty the bowel from Iron, lithium, ingested buttons, batteries, illicit drug packets, overdose of sustained release or enteric coated drugs. Inhalational damage could be minimized by removing the patient from the site, washing the patient and taking them to a safer environment.

2. Supportive care and Monitoring

Provide comprehensive supportive care and monitoring tailored to the patient's needs and the identified risks, including maintaining vital functions, stabilizing circulation, and addressing symptoms and complications as they arise. Continues monitoring is very important as vital parameters can change rapidly following poisoning. Depending on the situation, type of poison and whether there is associated other injuries, there will be needs for physical and psychological support for the patient. (Table 02)

Table 02. Physical and psychological support

Physical support and monitoring	• Monitoring of vital parameters • Left lateral/ Recovery position (if not for CPR) • Physical care for any associated injury, haemorrhage or disability • Intravenous access and fluids if indicated and facilities are available • Care for unconscious patient if they have lost their consciousness • Bowel, bladder, skin, oral and eye care
Psychological support	• Always there is associated psychological stress in case of poisoning – it is important to reassure and calm down the patient to get the maximum cooperation and to minimize the psychological damage • There could be pre-existing psychiatric illness in some patients (e.g., Bipolar affective disorder in case of a suicidal attempt) – one might need the psychiatrist involvement from the earliest possible.

3. Transfer of the patient to an equipped facility for further management

It is important to admit the patient to an equipped healthcare facility for further care, because, at the site of the incidence there could be minimal facilities and there is possibility of complications which will develop later. During transport make sure to accompany supportive personals and equipment to support life. Best way to transfer by an ambulance. (e.g., Dial 1990 for toll free ambulance support)

4. Initial management in the hospital

Initial management depends on the status of the patient at the time of arrival to hospital. Some might need life support while some might be stable on admission. For unstable patients provide advance life support. Follow the ALS guidelines for this (an example is given in Figure 03)

Decontamination in the hospital should be done depending on the route and the type of the poison. Gastric lavage could be offered if the victim is presented only within an hour of ingestion of the poison, as there is no benefit after an hour and rather may be harmful. Activated charcoal will be administered to minimize the absorption of ingested substances. Skin contamination should be minimized by removing contaminated clothes, bathing and changing to new clothes.

5. Investigations

Laboratory assessment is needed to identify or to exclude the poison, detect complications, to establish the indication for antidotes or plan the specific management, monitor response to treatment and prognosis. Toxicology screening may be indicated in some situations. Other investigations are dependent on the comorbidities that the patient is having.

6. Administration of antidotes

Antidotes are available for many poisons and should be administered in appropriate situations. Table 03 shows some examples of antidotes with the relevant poison. There are many other antidotes used based on the substance which should be sought with the **National Poisons Information Centre** of the National Hospital of Sri Lanka (NHSL) for further details (http://www.nhsl.health.gov.lk/web/index.php?option=com_content&view=article&id=100&Itemid=298&lang=en). You may call this centre using +94 112 686 143

Table 03. Antidotes for common poisons (a list of examples)

Poison	Antidote
Acetaminophen	Acetylcysteine
Anaesthetics	Lipid emulsion (Fat emulsion)
Aniline	Methylene blue
Anticholinesterases (i.e. Organophosphates)	Atropine, Pralidoxime (2-PAM)
Tricyclic antidepressants (TCA)	Sodium bicarbonate, Lipid emulsion
Noncyclic antidepressants (SSRI, SNRI, Bupropion, Venlafaxine)	Sodium bicarbonate, Lipid emulsion
Arsenic	Dimaval
Benzodiazepines	Flumazenil
Beta-blockers	Atropine, Insulin, Calcium, Glucagon, Lipid emulsion
Calcium channel blockers	Atropine, Insulin, Calcium, Lipid emulsion
Cyanide	Hydroxocobalamin (Cynokit), Sodium thiosulphate
Digoxin	Atropine, Digoxin immune Fab
Ethylene glycol	Fomepizole, Pyridoxine, Sodium bicarbonate
Glycol Ethers	Fomepizole
Hydrofluoric acid burns	Calcium gluconate
Iron	Deferoxamine (Desferrioxamine)
Isoniazid	Pyridoxine
Lead	Dimaval
Mercury (inorganic or elemental)	Dimaval
Methanol	Fomepizole
Mushrooms (Amanita phalloides) - hepatotoxic	Acetylcysteine
Mushrooms (Gyromitra or Hydrazine containing) -Seizure inducing	Pyridoxine
Nitrates or Nitrites	Methylene blue
Opioids	Naloxone
Salicylates	Sodium bicarbonate
Sodium channel blocking drugs (wide QRS)	Sodium bicarbonate, Lipid emulsion
Sulfonylurea (oral hypoglycaemic)	Octreotide

Please follow the following link to access the table and further information:

https://atlanticcanadapoisoncentre.ca/poison-and-antidote-chart.html

7. Enhanced Elimination

There are different elimination methods to get rid of the toxins which are already absorbed and cannot neutralize by antidotes effectively. Alkaline diuresis, haemodialysis, peritoneal dialysis, plasma paresis and haemo-perfusions are elimination methods used in poisoning.

8. Disposition (D):

Plan the patient's disposition, whether it involves further hospital care, specialized treatment, or outpatient follow-up, based on their condition and the outcome of the management.

9. Subsequent care and management of complications

Hospital management is a multidisciplinary team management and these and highly specific for each situation and patient. This is not delt in this article.

Medicolegal management and **psychological assessment and support** will be provided by the relevant experts in the hospital ensuring the holistic care of the patient.

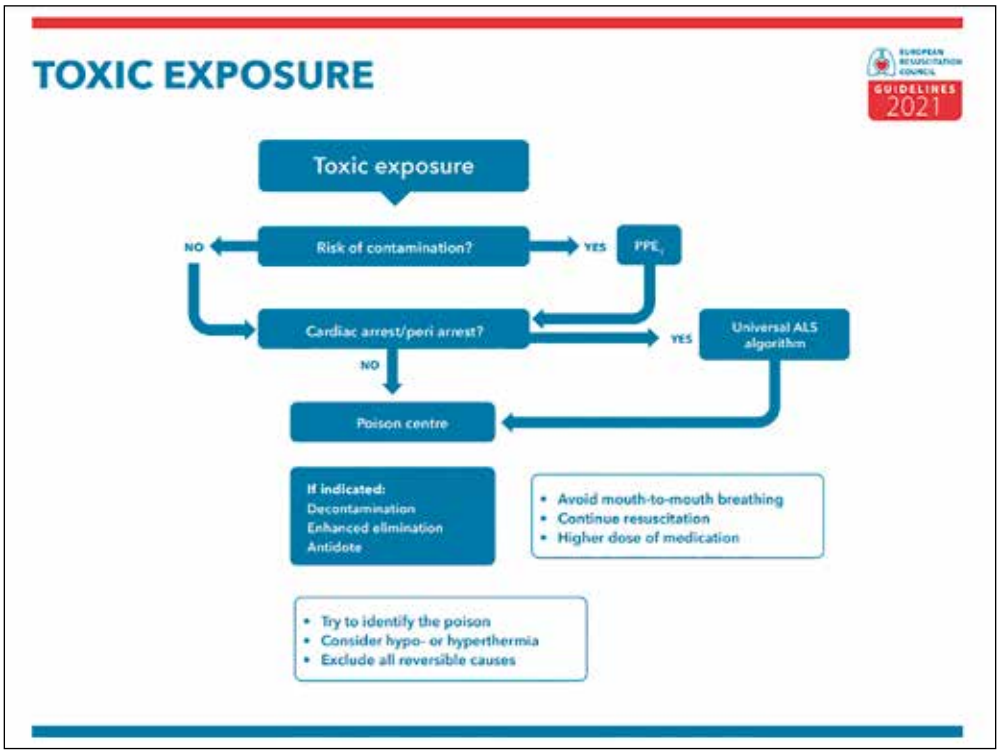

Figure 01. European Resuscitation Council (ERC) guidelines – flow diagram on initial management approach to a patient with toxic exposure

Figure 02. Basic Life Support (BLS) Guidelines by European Resuscitation Council 2021

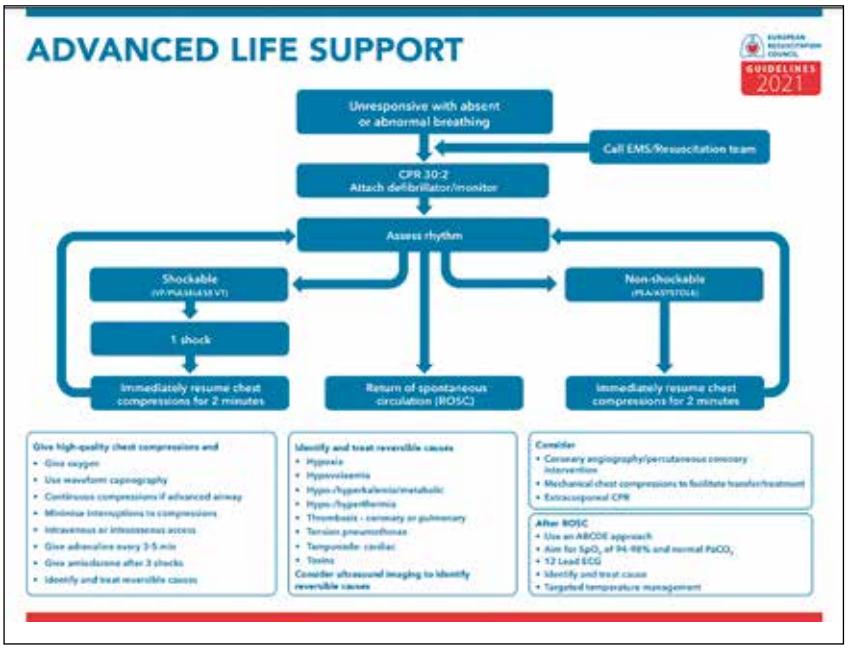

Figure 03. ERC guideline on Advanced Life Support (ALS)

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