



The Galle Medical Journal

Journal of the Galle Medical Association

March 2021 Volume 26 Number 1 ISSN 1391-7072

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SRI LANKA

ISSN 1391-7072

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<http://www.sljol.info/index.php/GMJ>

Editorial

Global quality assurance of medical education

In this issue we wish to draw your attention to an issue of vital importance raised by Kommalage in his correspondence with the *Galle Medical Journal*. In his letter, he focuses on the changes to the requirements and procedure of accreditation of medical schools/qualifications by the Educational Commission for Foreign Medical Graduates (ECFMG), the Foundation for Advancement of International Medical Education and Research (FAIMER), and the World Federation for Medical Education (WFME) and similar bodies. Some countries require ECFMG accreditation for a foreign medical graduate to work and/ or train in their respective health care facilities. These changes are to be effective from the year 2024, and at the moment there is no recognised local accreditation agency in Sri Lanka for this key purpose. The absence of adequate accreditation would potentially place the local medical graduates lost in the doldrums in the global medical arena. This calls for urgent, focused and purposeful action by the local medical fraternity.

Globally acceptable accreditation has become a necessity with more health care professionals (HCP) working in international settings; the increasing trend of private institutions providing education of HCP; and the demand for accountability and quality assurance in higher education. Traditionally accreditation process focused mainly on input and resources (*what it has*). Now the focus has pragmatically changed towards process and outcomes (*what it does*).¹

The requirement for maintaining highest standards of HCP education should not only be for purposes of international accreditation. They are founded on highest moral and professional grounds. The process

of medical education is bidirectional. The educators and trainers should formulate a relevant and practical medical curriculum with the assurance of an efficient and a purposeful process and constant audit of the process and outcomes. At the same time the undergraduates should be cognizant of the expectations of the society as future responsible HCP. This type of educational and learning commitments based on moral and professional grounds are bound to elicit automatic international recognition and accreditation.

Satish K Goonesinghe

Eisha I Waidyarathne

Editors in Chief/GMJ

ⁱ World Health Organization. *Transforming and scaling up health professional education and training; policy brief on accreditation of institutions for health professional education*. Geneva; 2013.

The Journal

The *Galle Medical Journal (GMJ)* is a peer-reviewed, open access journal published quarterly by the Galle Medical Association in the last week of March, June, September and December each year. The *GMJ* was first published in year 1996. Initially it was published annually coinciding with the Annual Academic Sessions of the Galle Medical Association, later, it was started to be published biannually in March and September from 2011 and quarterly publication commenced in 2020.

The mission of the *GMJ* is to promote the science and art of medicine and betterment of public health. The Journal publishes original papers, case reports, leading articles, perspectives and commentaries etc. which have relevance to medicine and allied sciences. The *GMJ* is committed to maintaining and conforming to the editorial and ethical standards recommended by the International Committee of Medical Journal Editors.

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Subscription Information

Copies of the *Journal* are provided free of charge to life members of the GMA. Annual subscription comprises four issues and includes postage. The rates are as follows.

Within Sri Lanka - SLR 2,000/-
Outside Sri Lanka - US \$ 50

Each previous copy can be purchased at SLR 600/- or US \$ 15 (excluding postage) from the GMA Office at Teaching Hospital, Karapitiya, Galle, Sri Lanka.

The electronic version of the *Journal* can be accessed free of charge at the website - <https://gmj.sljol.info/>

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Published by

Galle Medical Association

GMA Office,

Teaching Hospital Karapitiya,

Galle, Sri Lanka Tel: +94 91 2232560

E-mail: office@gma.lk

gmathk@gmail.com

Web site: www.gma.lk

Printed by

Print House Offset Printers

Dangedara, Galle

Sri Lanka

GALLE MEDICAL JOURNAL: INSTRUCTIONS TO AUTHORS

The *Galle Medical Journal* is published by the Galle Medical Association. The *Journal* is published quarterly in March, June, September and December each year. Submissions are accepted throughout the year. The aims of the journal are to foster co-operation among the medical fraternity and to be a forum to make literary contributions, share experiences encountered in medical practice, update their knowledge and have debates on topics related to all aspects of medicine. Also, we attempt to cater to the educational needs especially of the postgraduate trainees. The *Journal* publishes original articles, reviews, leading articles and case reports. When an article is submitted for publication, we expect that the work it reports has not been published, submitted simultaneously to another journal or accepted for publication elsewhere. All manuscripts will be reviewed anonymously before acceptance.

Manuscripts must be submitted with the text typed in 12-point Times New Roman font double spaced. Text and all illustrative material should be submitted in two hard copies and the electronic version in *Microsoft Word* document format. In order to avoid delay we require authors to comply with the following requirements. **All manuscripts should accompany a covering letter indicating the number of words in the manuscript, institution where ethical clearance was granted, conflict of interests and contact details of the corresponding author.**

Types of contributions:

Review articles and Leading articles: We encourage submission of review or leading articles which are less than 3000 words in length and address topics of current interest. They should be supported by no more than 20 references. Submissions may be subjected to external review before acceptance.

Original articles: Should normally be in the format of introduction, methods, results and discussion. Each manuscript must have a structured abstract of 200 words. The text should be limited to 3000 words and maximum of 5 tables/ figures taken together with no more than 15 references. Lengthy manuscripts are likely to be returned for shortening. The discussion in particular should be clear, concise and should be limited to matters arising directly from the results. Avoid discursive speculation.

Case Reports: These should not exceed 750 words and 5 references; no abstract is required. Case report should be informative and devoid of irrelevant details. Case report should have a clear message or learning point and this should be highlighted adequately. Rarity of the case does not mean it is suitable for publication. Written consent of the patient should be submitted together with the case report, especially when photographs are used.

References:

These should conform to the Vancouver style. The reference in the text should be numbered consecutively in Arabic numerals in parentheses in the same line of the text in the order in which they appear. The first five authors should be listed and if there are more than five, then the first three should be listed followed by *et al*. Examples are given below:

1. Kumar A, Patton DJ, Friedrich MG. The emerging clinical role of cardiovascular magnetic resonance imaging. *Canadian Journal of Cardiology*. 2010; **26**(6): 313-22.
2. Calenoff L, Rogers L. Esophageal complication of surgery and lifesaving procedures. In: Meyers M, Ghahremani G, eds. *Iatrogenic Gastrointestinal Complications*. New York: Springer, 1981: 23-63.

Website references too should conform to the defined Vancouver referencing format;

e.g.: Diabetes Australia. Diabetes globally [Internet]. Canberra ACT: Diabetes Australia; 2012 [updated 2012 Jun 15; cited 2019 Nov 5]. Available from: <http://www.diabetesaustralia.com.au/en/Understanding-Diabetes/Diabetes-Globally/>.

Units / Abbreviations:

Authors should follow the SI system of units (except for blood pressure which is expressed in mmHg). Authors should use abbreviations sparingly and they should be used consistently throughout the text.

Manuscripts that do not conform to these requirements will be returned for necessary modifications.

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Current management of Transient Ischaemic Attacks

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Submitted on 08.03.2021 and accepted for publication on 20.03.2021

Why talk about TIAs?

A transient ischaemic attack (TIA) is akin to a smouldering volcano that is waiting to erupt (1), and lead to a devastating stroke that can be fatal in approximately 20% and disabling in about two-thirds (2). About 15-25% of all ischaemic strokes are preceded by TIAs (3-5). Recent meta-analyses suggest that following a TIA, the risk of ischaemic stroke is ~9% at 3 months (6, 7). Most of this risk is seen in the very early stages after a TIA; 40% of all strokes during the 30 days after a TIA occur within the first 24 hours (8), and half of all strokes within 3 months after a TIA occur within the first 48 hours (2). Immediate management of TIAs, therefore, would be expected to minimise the risk of stroke. Data from recent studies have confirmed that this indeed is a realistic goal, and have highlighted the importance of emergent evaluation and treatment of TIAs (9, 10). This has led to a dramatic change, a virtual paradigm shift, in our approach to the acute management of TIAs, especially over the last two decades (11, 12).

Evaluation of TIA - what's new?

TIA remains a clinical diagnosis, based on the traditional time-based definition of the presence of transient neurological symptoms lasting less than 24 hours. However, in reality, most TIAs resolve within 60 minutes (3). If symptoms last more than 60 minutes, 30-50% of patients with classically defined TIAs show brain infarction on DW-MRI scanning (13). This has led to a tissue-based definition of TIA being proposed (13), but it is not routinely used in clinical practice due to the need for MRI scanning which has limited availability in many clinical care settings. A TIA is more likely when symptoms

clearly indicate a focal origin (hemiparesis, hemisensory symptoms, dysphasia, homonymous hemianopia or monocular visual loss). Non-focal symptoms, such as headache, dizziness, vertigo or confusion make a diagnosis of TIA less likely. It is important to consider and exclude TIA mimics such as hypoglycaemia, migraine aura and seizures (3, 14). Neuroimaging, preferably with DW-MRI is recommended. All patients need urgent evaluation for vascular risk factors and the likely underlying aetiology (large artery atherosclerosis, small vessel disease, cardiac source of embolism, or other uncommon causes).

Several risk scoring systems have been used for risk stratification of patients with TIA. The ABCD2 score is the most widely used among these. It stratifies patients into low, moderate or high risk, indicating a 48-hour stroke risk of 1%, 4% and 8% respectively (15). The rationale in using scoring systems is to triage patients and identify those requiring immediate evaluation and management. However, recent data suggests that triaging based on scoring systems is not optimal, and over 20% of recurrent strokes occur in patients classified as 'low risk' (ABCD2 score <4) (14, 16, 17). Limiting urgent assessment to TIA patients in moderate or high-risk categories (ABCD2 score \geq 4) would, therefore, miss 20% of those who would develop early recurrent strokes, and it is now recommended that all TIAs should be considered as 'high risk' deserving urgent attention (16,18).

Modelling analyses had suggested that optimal management could reduce recurrent stroke risk after stroke and TIA by as much as 80-90% (19).

Landmark studies such as the EXPRESS study and the SOS-TIA study have demonstrated that such impressive treatment effects are indeed achievable with emergent care of TIAs in specialised TIA clinics (9, 10, 20). Observational data from longitudinal cohorts such as the TIAregistry.org have confirmed that similar benefits can be attained in real-life clinical care settings (16, 21). Current recommendations are that all suspected TIAs should be evaluated within 24 hours by a specialist with experience in stroke care in a dedicated rapid-access TIA clinic with round-the-clock access or an emergency department (3, 17, 18).

Management of TIA - what's new?

Anti-thrombotic treatment (antiplatelet or anticoagulant therapy, depending on aetiology), medical risk factor management and lifestyle modification are the cornerstones of secondary stroke prevention following a TIA.

Anti-thrombotic treatment

Stroke risk reductions observed in recent times with immediate management of TIAs are largely attributable to the effects of early initiation of antiplatelet treatment of acute non-cardioembolic TIAs (20). The current antiplatelet treatment strategy for TIAs is fashioned on the results of two landmark trials (CHANCE and POINT) (22-24), and pooled analyses of their patient data (25, 26). Contemporary recommendations are to initiate acute treatment with dual antiplatelet therapy within 24 hours of symptom onset (with the combination of aspirin 300 mg stat and 75 mg daily, plus clopidogrel 300 mg stat and 75 mg daily), to be continued for only 3 weeks (1, 3, 25, 27, 28). This should be followed by long term antiplatelet treatment. Aspirin is the preferred antiplatelet agent for long term secondary prevention. It is the most effective antiplatelet agent in the acute phase following a TIA where stroke risk reduction is most crucial, and no other single antiplatelet agent performs better than aspirin in the acute phase. (1, 20, 25, 27). Clopidogrel is an effective alternative when aspirin intolerance, allergy or resistance is present. The combination of aspirin and clopidogrel is not recommended for long term secondary prevention, as it is associated

with excessive bleeding. (1,20,25,27). Intriguingly, the effect of aspirin is maximal within the first 6 weeks, and appears to wane after about 3 months (20). More interestingly, dipyridamole in combination with aspirin has been shown to be effective in reducing stroke risk after 3 months, especially disabling or fatal ischaemic stroke (20). As such, a combination of aspirin with dipyridamole is likely to be the most effective antiplatelet strategy for long term secondary prevention (1,20). Triple antiplatelet therapy with aspirin, clopidogrel and dipyridamole was studied in the TARDIS trial but was associated with excess bleeding risk (29).

Several newer antiplatelet agents have been studied over the recent years. In the SOCRATES trial, ticagrelor monotherapy failed to show any benefit over aspirin at preventing stroke (30). The THALES trial compared ticagrelor plus aspirin with aspirin alone, and the combination was associated with increased bleeding, especially intracranial bleeding (31). Cilostazol appears to be the most promising of the newer antiplatelet agents being studied; a systematic review and meta-analysis has shown it to be more effective than aspirin in reducing the risk of recurrent ischaemic stroke, especially lacunar stroke (32). The data on cilostazol has been mainly from Far Eastern countries where it is widely prescribed, but it is rarely used in other parts of the world.

Anticoagulation is recommended for TIAs of cardioembolic origin, especially non-valvular atrial fibrillation (3,17). Direct oral anticoagulants (DOACs) are preferred over warfarin because of their convenience in use and lower risk of intracerebral haemorrhage.

Risk factor management

Appropriate treatment for hypertension and diabetes are of paramount importance. Target blood pressure should be <140/90 mmHg, and <130/90 mmHg in the presence of diabetes or small vessel disease (3,17). Intensive lipid-lowering therapy with statins is recommended with a target LDL-cholesterol level of <70 mg/dl, especially in TIAs due to large-artery atherosclerosis (3). Patients with significant (>50%) ipsilateral extracranial carotid artery stenosis should be referred for revascularisation

(carotid endarterectomy or stenting), which needs to be performed within two weeks of the index TIA (3, 17, 18, 33). Lifestyle changes, such as smoking avoidance or cessation, regular exercise, healthy dietary habits and weight reduction if appropriate, are integral components of secondary prevention.

Can we do better?

TIAs are mini-strokes, and portend the likelihood of an impending stroke which can be disabling or fatal. Aggressive evaluation and treatment has been shown to be effective in dramatically reducing the risk of stroke following TIA. However, there is clear evidence that much more needs to be done. A systematic review of the time trends in TIA outcomes over the last five decades (1971-2019) has shown that following impressive stroke risk reductions in the early periods, stroke rates have been stagnating over the last decade or so in spite of significant new therapeutic advances (34). Ongoing research will undoubtedly generate new knowledge and new interventions leading to better care, but effective and universal implementation of what we have already learnt over the last two decades would go a long way in preventing smouldering TIAs from erupting as devastating strokes.

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How Australia deals with suicides: Lessons learnt and implications for Sri Lanka

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Submitted on 06.01.2021 and accepted for publication on 27.03.2021

Introduction

Suicide has emerged as a serious public health issue worldwide, with nearly 800,000 people succumbing to suicide every year (1). Suicides stood as the 16th leading cause of death globally while accounting for 1.4% of all deaths worldwide by 2016 (2). Sri Lanka is also experiencing the ‘suicide epidemic’ as nearly 4,000 deaths are reported each year. There were 4523 deaths by suicide in 2017 and the mortality rate was reported as 19.8 per 100 000 people (3). It is estimated that for each adult who dies by suicide, twenty more may have made an attempt. Suicides add a significant financial and social burden as well (4).

Several initiatives were taken by the government and health authorities to address this issue. Some of these strategies brought intended results as a decline in the overall suicide rates in Sri Lanka has been noted from 60 per 100,000 in 1995 to 18.5 per 100,000 people by 2011 (5). Recommendations suggested in the 1997 report of the Presidential Committee on the prevention of suicides were remarkable milestone in suicide prevention in Sri Lanka. Regulatory controls on the importation and sales of highly toxic pesticides were the most important contributing factor to this drop (6).

However, still suicides stand as a significant health issue in Sri Lanka. Therefore, recent changes in the social context of Sri Lanka like urbanisation, rise of information technology and substance use should be carefully addressed in managing this problem (5). Experiences and lessons from developed countries will provide a vital insight for designing and implementing prevention strategies.

Australia has been paying top priority for suicide prevention strategies over the last decade. Key priority has been extended and evidence-based interventions were implemented with a strategic vision (7). Promoting help seeking behaviour, active involvement of primary care, multi stakeholder involvement and reducing stigma can be identified as key factors behind the successful implementation of these preventive strategies (7). These interventions make several implications for the Sri Lankan context. This review is aimed at critically analysing the suicide prevention strategies in Australia and identifying implications for Sri Lanka.

Suicide epidemiology in Australia

More than 3000 Australians end their lives each year and it accounts for 8 deaths per day. There were 3,046 suicide deaths in 2018. Three fourths of these deaths are among males. Young suicides is another pressing issue in Australia as suicide ranks as a leading cause of death for Australians between the ages of 15 and 24 years while accounting for 36% of deaths in the particular age group. The suicide rate among Indigenous Australians is twice that of their non-Indigenous counterparts (8).

Policy directives and legislative support

Australia is governed under a Federal System and significant authority is vested on State Governments. However, the Federal Government provides important policy directives for key national health

issues. But State Governments enjoy the freedom to design and implement own actions based on national strategies (9).

The National Suicide Prevention Strategy (NSPS) provides the platform for Australia's national policy on suicide prevention with an emphasis on promotion, prevention and early intervention. The National Government declared a renewed approach to suicide prevention in November 2015 based on the recommendations of National Mental Health Commission Review (10). A new National Suicide Prevention Strategy was drafted and enacted.

To further strengthen the national response, The Fifth National Mental Health and Suicide Prevention Plan, which is popularly known as the Fifth Plan was endorsed by the National Government in August 2017 (11). This has reiterated the commitment from all State Governments to work together to achieve integrated planning and service delivery of mental health for suicide prevention.

Main aims

The suicide prevention strategy in Australia is based on three main aims; (i) raising awareness about suicide risk in the community, (ii) helping those at risk of suicide and (iii) supporting affected individuals including those who have lost someone close (10).

These aims provide a holistic guidance for the suicide prevention activities in Australia.

Key strategies

1 - Mental Health First Aid (MHFA) programme

The Mental Health First Aid (MHFA) programme was developed and implemented in Australia with the objective of training community members to help someone who is undergoing a mental health crisis situation that would lead to suicide (12). It has been showing promising results in reducing suicides (13). Because it enables the detection of problems early and encourage people at risk to seek help. So MHFA is particularly useful in suicide prevention. Over the last decade, MHFA has been successfully introduced to several developed and developing countries (13).

2 - Paying more attention on vulnerable groups

Identification of vulnerable groups is of utmost importance in planning public health strategies to prevent attempted suicides (14). A special Aboriginal and Torres Strait Islander Suicide Prevention Strategy was implemented focusing Indigenous Australians, considering the higher suicide rates among them (8). Youth is another key target group in the Australian suicide response. Youth suicide rates are known to be lower in areas with targeted suicide prevention activities in Australia (15).

3 - More responsibilities were assigned to Primary Health Networks (PHNs)

This was a key initiative to promote the involvement of primary care system for suicide prevention. Primary Health Networks (PHNs) have been tasked with commissioning regionally appropriate suicide prevention activities and services since July 2016 (10). PHNs were encouraged to work closely with local organizations to reach people who are at the risk of suicide. This approach focuses on effective local coordination and management, and allows for community needs and strengths to be recognised. Special training was given to General Practitioners (GP) to deliver support and preventive services. Delivering culturally appropriate care is a key principle at primary care level. Linking suicide prevention services with existing primary health care system is known to be effective (14).

4 - Multi stakeholder involvement

Multi stakeholder involvement is a key feature in national response against suicides in Australia (11). Several government institutes and non-governmental organisations work closely to a common agenda. Universities and research institutes make a crucial contribution by generating research evidence in order to guide actions. Australia follows a multilevel systems approach. This approach requires that components ranging from individual-level to public health interventions are implemented simultaneously in a localised region.

5 - Anti-stigma and awareness campaigns

Suicide and stigma are related in a two way direction in which suicide can cause stigma and stigma can also lead to suicidal thoughts (16). On the other hand, stigma has been identified as a major barrier in accessing services and hence prime attention has been focused on anti-stigma strategies. In order to ensure more people are accessing the help they require, mental health service providers should create a stigma free environment (17). The main objective of the anti-stigma and awareness campaigns was to promote help seeking behaviour of people in Australia.

6 - Crisis support services and help lines

Australia has a well-organised phone-based crisis support services which can be accessible 24 x 7. It provides crisis support services for anyone who experience a personal crisis or have suicidal thoughts. Lifeline is the main crisis support services which has a high utilisation. It consists of a national infrastructure with 40 centres and 4,500 crisis supporters (18). High utilisation is a factor to show the success of this service as every 30 seconds, a person in Australia reaches out to Lifeline for help. Assurance of confidentiality, professionalism shown by the supporters and 24 x 7 accessibility are the key factors contributing to its success. Because clients perceive that the 'Lifeline' listen to them without judgment and work together to explore options for the problem. On the other hand, general help seeking behaviour of the community promotes high utilisation. Because there is a general perception in the society that, "it is OK to have suicidal feelings and it is important to reach out and let someone know how you're feeling" (18).

7 - Supporting affected individuals including those who have lost someone close

Survivors of suicidal attempts and affected family members go through the complicated process of grief which is specifically characterised by the felling of guilt, shame, denial and anger (19). The grieving process, more often than in other causes of death, doesn't integrate but is complicated with prolonged grief. This is key aspect of suicide prevention strategy in Australia.

Several interventions have been implemented to help families and loved ones of those who committed or attempted suicide. Because they also undergo an immense psychological trauma as a consequence. So it is important to address their psychological well-being.

8 - Guiding responsible media reporting

Appropriate reporting of suicides in the media plays a crucial role in preventing suicide and increasing public understanding. Because inappropriate reporting can alienate members of the community, sensationalise the issue or inadvertently glamorize suicide. Royal Australian and New Zealand College of Psychiatrists (RANZCP) has introduced a comprehensive set of guidelines to advocate and guide media in responsible reporting of suicides (20).

Implications for Sri Lanka

1 - Strong and regular policy directive

Sri Lanka has been paying more attention on suicide prevention through policy and regulatory approaches (6). But like in Australia, a continuous commitment is needed. It is important to regularly update the national strategies. Obtaining active involvement of Universities is also important to ensure evidence-based policy making. Universities can contribute by offering research-based guidance. More responsibilities can be assigned to provincial and district health authorities in Sri Lanka.

2 - Promoting help seeking

A massive social marketing is warranted to promote the availability and accessibility to help services in Sri Lanka. Sri Lanka has suicide helplines. Though the facility delivers a commendable service, a gap exists between the demand and utilisation. Chandrasiri *et al.*, (2019), reported that only 5% of patients who admitted to hospitals following deliberate self-harm, contacted the helpline before the act (21). This indicates a huge gap. Lack of awareness and fear of stigma can be identified as main reasons behind. So exploring how Australia made such help services more usable will provide

important implications for Sri Lanka. There are posters and infographs about the importance of seeking help, when to seek help and how to seek help. They are displayed in public places in Australia and not restricted to health care settings.

3 - Culturally appropriate services

Cultural awareness and cultural sensitivity are two of the key attributes in Australian suicide prevention campaign. As most of the predisposing factors for suicides and self-harm are embedded with socio-cultural context of the person, showing cultural awareness is crucial while having a generic approach (22). Defining vulnerable groups and approaching them through culturally sensitive interventions is also important. Sri Lanka is showing a unique trends in suicide epidemiology as young and female suicides are rising (23). Therefore, targeted interventions which are designed in culturally appropriate manner is highly recommended.

4 - Delivering 'settings approach' for suicide prevention

Australia is promoting settings approach for suicide prevention as school and work place based programmes have been designed (7). This will be a good example for Sri Lanka as well. Because Sri Lanka has a well-organized school health system, it can be successfully utilised to deliver such programmes. Rising numbers of deliberate self-harm among adolescents is a known problem in Sri Lanka (23).

5 - Involvement of primary care services

As GPs play a key role in suicide prevention activities, Sri Lanka can also use the potential of primary health care system to deliver suicide prevention services. It is good to see that under the ongoing Primary Care Strengthening Project (PSSP) more attention has been paid on improving mental health services in primary care level. So, policy makers and health care planners can incorporate suicide prevention interventions to the PSSP package. As Sri Lanka doesn't have an organised GP system at the moment, 'family

doctors' (who is synonymous with GPs in Sri Lanka) who deliver outpatient care in private sector dispensaries can be empowered to deliver mental health services at primary care level. Sensitization and training should be done to enhance knowledge and skills of primary care work force. Gaps in the psychiatric care received by the patients who are admitted following DSH has been reported as only one third of such patients undergo psychiatric assessment in hospitals (21). Community-based outreach programmes will be another effective strategy to improve suicide prevention services provided for patients with psychiatric illnesses. Competencies on preliminary risk assessments and providing basic psychological support should be improved among primary care workforce including doctors and nurses (14).

6 - Promoting online services for awareness and prevention

Most of suicide prevention services in Australia interact with public and deliver their services online. This has several advantages like quick access and perception of confidentiality (24). This can be promoted in Sri Lanka as well. Lower IT literacy and poor internet access may arise as barriers. But the current policy directions by the government to promote IT use among general public provides a favourable situation.

7 - Reducing stigma

Anti-stigma interventions should be actively delivered to every suicide survivor (25). Mental health professionals free of stereotyping and should not be judgmental. More training opportunities on psychiatric management DSH patients should be given for doctors in curative sector (14). This issue should be incorporated into basic training of health professionals and more in-service training should also be arranged. This will ensure better accessibility to mental health services by public. Reducing stigma will also be helpful in improving social integration of survivors after the attempt (25).

8 - Advocating and providing guidance for responsible media reporting

Both availability of reporting and assurance of adhering to respective guidelines are important. Media professionals and health experts should work collaboratively to balance newsworthiness against the risk of encouraging modeled suicidal behaviour when reporting such incidents (20). Having a regulatory system is important with continuous surveillance.

9 - Introducing Mental Health First Aid (MHFA) programme

Implementing MHFA training in Sri Lanka will be helpful in supporting people with suicidal ideation (12). Because MHFA had shown successful outcome in several lower and middle income countries (13). Experience from Australia will be really helpful in identifying potential target groups for training. In the Sri Lankan context, primary health care workers like public health midwives and public health inspectors can be trained first. Then they can serve as trainers for community members.

Conclusions

Suicide has emerged as a serious public health issue worldwide and Sri Lanka is also experiencing the 'suicide epidemic' as nearly 4,000 deaths are reported each year. Despite several efforts to control, suicides continue to stand as a significant health issue. Experiences and lessons from developed countries who had succeeded in suicide prevention will provide a vital insight in designing and implementing prevention strategies. So this review was done with the objective of critically analysing the suicide prevention strategies in Australia and identifying implications for Sri Lanka.

The National Suicide Prevention Strategy (NSPS) provides the platform for Australia's national policy on suicide prevention. To strengthen the national response further, the Fifth National Mental Health and Suicide Prevention Plan, was endorsed by the National Government in August 2017. Mental Health First Aid (MHFA) programme paying more attention on vulnerable groups, assigning more responsibilities to Primary Health Networks (PHNs),

multi stakeholder involvement, anti-stigma and awareness campaigns, crisis support services and helplines, support affected individuals including those who have lost someone close and guiding responsible media reporting can be identified as successful strategies implemented in Australia to cope with the suicide.

Based on these practices, Sri Lanka can learn many lessons to strengthen the national response against suicides. A strong and regular policy directive should be made while assigning more responsibilities to provincial and district health authorities. Promoting a help seeking a social marketing campaign is also warranted. Ensuring cultural appropriateness of services delivered is important and delivering 'settings approach' for suicide prevention should be tried. Involvement of primary care services and community-based outreach programme will also be useful. Introducing measures to reduce stigma and promoting online services for awareness are equally important. Initiating Mental Health First Aid (MHFA) programme is another effective strategy by which many of who are at risk would benefit. Last but not the least, advocating and providing guidance for responsible media reporting should follow all the above activities.

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Different medico legal issues in deaths due to entrapment with animal electric traps; a study on selection of cases from the Southern Province, Sri Lanka

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Submitted on 15.06.2020 and accepted for publication on 11.12.2020

ABSTRACT

Introduction: Deaths due to electrocution involve both low and high voltage current and the manner of death is almost always accidental. Deliberate electrocution of wild animals by an unsafe extension of an electric line is made by drawing an electric connection from the low voltage utility bare lines. The entrapment of humans in these electric traps is observed in several geographical areas in Sri Lanka. The study intends to raise different medico legal issues pertaining to these deaths in a selected sample.

Methods: A descriptive, retrospective study was carried out on 13 outdoor electrocution deaths due to contact with animal electric traps. The medico legal autopsies were carried out by the researchers and the data were collected from the autopsy and scene visit findings, police reports and the inquirers' reports.

Results: All the victims were adult males. The electric entry mark which is the hallmark of forensic diagnosis of electrocution was observed in all 13 dead bodies. It was characterised by a groove with charring at the base in 12 deaths. The macroscopic and microscopic features of electrocution were observed even in severely decomposed bodies. The cause of death was in all cases was determined as electrocution and the manner of death was determined as accidental. The trappers in 9 incidences were identified but none of them were prosecuted for breaching the laws of the Electricity Act or the Fauna and Flora Protection Ordinance of Sri Lanka.

Conclusions: The scene visit examination was helpful to determine the manner of death and was determined as accidental which may be debatable according to the law of the country.

Introduction

Deaths due to electrocution involve both low and high voltage currents. But most of the deaths are due to low voltage current which is AC 220 – 240 V in Sri Lanka (1). The manner of death due to electrocution is almost always accidental while the suicides and accidents are rare or uncommon (1,2). The common circumstances for accidental electrocution are household accidents and work related accidents. A 5 year review of different facets of electrocution in India revealed that 14.9% of the total 5,431 deaths

were due to contact with non-insulated wires in public places or in farms for keeping the animals away (3).

In Sri Lanka, different methods are used for hunting wild animals for food and to protect crops which include different types of traps such as locally made gun traps. Another hunting method is using electric traps. Live non-insulated electric cables are laid across the known trails of animals with one end of the cable connected to the low voltage (230 V) utility bare lines with a metal hook (“Pahankokka”).

Knowing that the act is illegal, the trappers connect the electric current in the late evening and disconnect by the early morning. These electric trapping for hunting wild animals are observed in several geographical regions of Sri Lanka including several rural areas of Galle and Matara districts of the Southern province. The worst scenario of these electric traps is the entrapment of humans causing fatalities. Recovering of these dead bodies in outdoor trapping is usually late leading to several medico legal issues arising for the forensic pathologist. Furthermore, the alteration and removing the evidence from the scene causes great difficulties to the investigators. The medico legal issues related to these deaths affect the interpretation of the autopsy findings, determination of the cause and the manner of death.

This study intends to discuss different medico legal issues pertaining to the deaths due to entrapment in animal electrical traps. We hope that this study will serve as an eye opener for the legal and administrative authorities in the relevant fields who can contribute to prevent this illegal activity and thereby to prevent these electrocution deaths.

Methods

This descriptive, retrospective study was carried out on 13 selected outdoor electrocution deaths due to contact with animal electric traps. The autopsies of these 13 deaths were carried out by the researchers during the period of August 2018 to October 2019 at Base Hospital, Elpitiya and District General Hospital, Matara, in the Southern Province of Sri Lanka. In each case, a meticulous medico legal autopsy was performed following an Inquest. The sections of the skin from the entry mark were obtained for histological examination as a routine procedure of the autopsy examination to determine the cause of death. The data were collected from the post mortem records, histology reports and the crime scene examination records including the crime scene photographs. The data was also obtained from the investigating police records and the reports of the Inquirers into deaths.

The cases were evaluated in terms of age, gender, relationship of the deceased with the trapper, type and anatomical distribution of electric injuries, macro and microscopic features of injuries and scene

visit findings. All the data were coded and entered into data base created using SPSS (version 17.0) preserving the anonymity of the subjects and was analysed. The Ethical approval was obtained from the Ethics Review Committee, Faculty of Medicine, University of Ruhuna.

Results

All the victims were males and the age ranged from 17 to 75 years and the 6 out of the total were in the 50 to 75 year age range. When the relationship of the deceased victims with the trapper was concerned, 2 were trappers themselves, 4 were friends of the trappers while the rest (7) did not have any relationship with the animal trapper.

In one incident, there were three victims at the same scene and out of them, one person was the trapper himself and the other two were his friends.

The bodies were recovered from the original scene in 12 cases and one dead body had been removed from the original scene and was recovered from a marshy land several kilometers away. Nine dead bodies were located in abandoned marshy lands and two were found in paddy fields and one was found in a cinnamon cultivated land respectively.

The scene visit examination findings were used to understand the uniform mechanism of laying the electric cable traps. According to the 6 case findings where the cables were present at the scene; un-insulated cables have been laid around 10 – 12 cm above the ground level. Wooden sticks have been erected on the ground randomly to fix the cables above the ground level. One end of the cable was fixed to the low voltage utility bare lines using metal hooks.

Out of the 12 dead bodies which were recovered from the original scene, the electric cables were identified firmly gripping in the hands of the deceased in 5 cases and in one case the cable was lying on the ground (Figure 1). In 6 cases the cables had been removed by the time of the examination of the scene, but there were evidence of trapping such as presence of bundles of sticks or randomly erected sticks at the scene (Figure 2).

The bodies were in different stages of decomposition. While 3 dead bodies were fresh, 4 in early 3 in moderate (Figure 3) and 3 in advanced

states of decomposition. All the victims were identified by the relatives from the facial features, clothing and personal belongings.

The electric entry mark was present in all 13 victims. It was characterised by an elongated groove varying in length (Figure 4) in all cases. The base of the groove was charred in 12 cases and puckering of the surrounding skin with elevation of the margins were observed in 6 cases. When the part of the body affected was concerned, the electric entry marks were present on the upper limbs and lower limbs in 6 cases each and on the chest wall in one case (Table 1). The exit electric mark was absent in all 13 victims.

The histopathology of the electric entry marks revealed carbonization of the epithelium in all cases. There was dermo-epidermal separation in 12 cases and the elongation of cell nuclei of basal layer of epidermis was observed in 5 cases (Figure 5).



Figure 1: Body at the scene. Note the bundle of sticks and a roll of cable around the head shown with the arrow.



Figure 2: Electric mark on the leg. Note severe decomposition with peeling off of the skin



Figure 3: Elongated groove on the back of chest.



Figure 4: Close up photograph of cable with a hook at the scene.

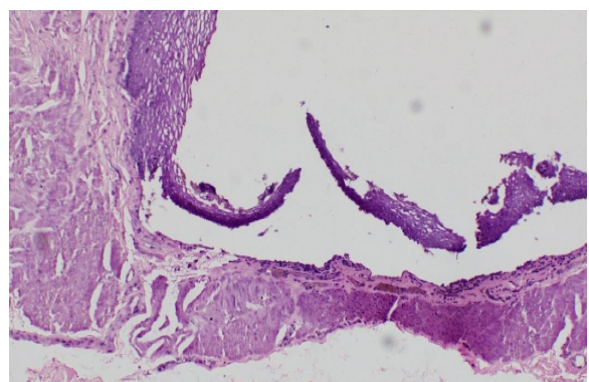


Figure 5: Photomicrograph of electric mark. Note grooving, epithelial carbonization, dermo-epidermal separation.

Table 1: Macroscopic features of electric entry mark in 13 cases

	Site of injury	Charring	Puckering	Decomposition state
1	Back of both ankles	×	×	Moderate
2	Inner aspect of the left wrist	✓	✓	Fresh
3	Front of both thighs	✓	×	Advanced
4	Right palm	✓	✓	Fresh
5	Back of right calf	✓	×	Fresh
6	Back of chest	✓	×	Moderate
7	Left thigh	✓	×	Moderate
8	Back of right forearm	✓	✓	Early
9	Left palm	✓	✓	Early
10	Right palm	✓	✓	Early
11	Back of right knee	✓	✓	Early
12	Left thigh	✓	×	Advanced
13	Back of right shoulder	✓	×	Advanced

There were no other antemortem injuries on the bodies. There were postmortem injuries due to animal attacks with removal of distal parts of the body which was in advanced state of decomposition.

The cause of death was determined as electrocution and the manner of death was determined as accidental. The cause and the manner of death in all cases were determined considering the typical scene visit findings, presence of macroscopic and microscopic features of electric mark and excluding the other injuries and any pathological conditions on the body which could have caused death. The trappers in 9 incidences were identified and were produced to the court of law by the police. They were bailed out after been filed cases in the Magistrate Courts. None of the cases were directed to the High Courts.

Discussion

The major medico legal issues which needed to be addressed in this study were the interpretation of the findings at autopsy, arriving at the cause of death and the manner of death. The diagnosis of deaths due to electrocution is commonly based on the

morphological findings, circumstances of the death and above all the electric mark which is the hallmark for forensic diagnosis of electrocution (4, 5). The electric entry mark or Joule burn due to contact with the domestic electric current has classical macroscopic as well as microscopic features. Macroscopically it is a thermal burn, characterised by a collapsed crater with grey or white ring or an elongated linear groove with elevated margins (6). It may reproduce the shape of the conductor and when there is a linear wire, the mark will be an elongated groove with elevated margins (7). The mark in all victims in the study was a groove which supports the electrocution.

The important finding in this study was that the electric entry mark was able to be observed even on moderate to severe decomposed bodies. Therefore the electric entry marks on the body is a valuable and identifiable macroscopic finding even in decomposed bodies to suggest electrocution.

The microscopic findings of electric mark includes thermal denaturation of collagen causing it to stain blue with haematoxylin, separation of microblisters within squamous epithelium forming intra-epidermal and epidermo-dermal separation,

stretching and narrowing of the contours of the nuclei of epithelial cells resulting in palisading type of appearance and burning and charring of the skin in prolonged contact with electric current (3,8). In our study sample, the epithelial carbonization was observed in all 13 cases and dermo-epidermal separation in 12 cases. An important observation of this study was that even in decomposed bodies the microscopic features of electric entry mark was identifiable where the epidermis has peeled off due to the process of decomposition

Entry mark around the knees and legs were compatible with the primary contact while trespassing the live cables which was able to interpret after the examination of the scene. Injuries in the fingers and the finger webs were of injuries of gripping the cables. It was evident in two cases where the cable was held in the clenched hands. This is a salient feature of sudden death described as cadaveric spasm which is an instantaneous rigor without preceding post-mortem flaccidity. The precise pathophysiological basis of this phenomenon called cadaveric spasm is still not known but observed in instantaneous unnatural deaths (9).

In most cases of accidental electrocution, injuries present on the hands (1, 3, 10). But in our study, the majority had the injuries on the lower limbs. The crime scene examinations were useful in observing the mechanism of laying the cables around the field of hunting and to interpret the injury pattern observed on victims. In one crime scene examination, the victim who was the trapper gone to lay the cables, had accidentally trespassed someone else's trap and sustained electrocution. There was a roll of cables and a bundle of sticks near the body. Live cables were not at the scene in six cases which means the offender responsible for laying cables or another person intervened and removed it from the scene. Several bodies have been moved from the original place of deaths. Therefore it is important to visit the crime scene examinations to understand and interpret different medico legal issues in forensic practice.

The cause of death was ascertained as electrocution after considering the findings of the crime scene investigations, presence of macro and microscopic features of electrocution, absence of other injuries or pathology at the autopsy.

The manner of death in all cases was concluded as accidental which might be debatable. The culprits have committed several offences. The Fauna and Flora Protection Ordinance of Sri Lanka provides for the protection, conservation and preservation of the fauna and flora of Sri Lanka. The Section 30 of the Ordinance which describes the offences related to mammals and reptiles state 'causing injuries or killing of a mammal using a trap is a punishable offence' (11). Its Sub Section 1 states that several mammals which includes wild pig/boars, rabbits and porcupines are grouped into the category of pests and the farmers could destroy these pests in their agricultural lands for the purpose of protecting their crops. Such incidences if happens should be reported to the police and the government agent's office of the area by the farmer.

The Electricity Act. No. 20 of 2009 states, licence to generate, transmit and distribute the electricity should be obtained from the Public Utilities Commission of Sri Lanka. The Section 7 of the Act states that without licence no one can generate, transmit and distribute electricity and the Section 49 of the Act states that any person who extracts electricity (which is in the course of distribution by a distribution licence) without license shall be guilty of an offence and liable for conviction after a summary trial before the magistrate (12).

The Section 298 of the Penal Code of Sri Lanka states 'whoever causes the death of any person by doing any rash or negligent act shall be punished with imprisonment, or with a fine or both' (13).

Therefore, the legal actions could be taken against the offenders under the above mentioned statutes. Out of the total number of 10 offenders in this study, 9 have been identified by the police and were produced before the courts and bailed out. None of the cases have been directed to the High Courts. None of the accused have been prosecuted for breaching the laws of the Electricity Act or the Fauna and Flora Protection Ordinance of Sri Lanka.

Conclusions

The morphology of electric entry marks is a hallmark of electrocution in the study sample and features were preserved even in decomposed bodies. There are legal provisions in Sri Lanka to prevent this

electrocution deaths, therefore the relevant authorities has a duty to be more proactive in exercising the legislative powers.

Limitations

Small sample size is the biggest limitation of this study in arriving at several conclusions. The study will be continued further by the researchers as a prospective study to obtain a bigger sample size to arrive at more substantial conclusions.

Acknowledgements

We would like to acknowledge;

Prof. Lakmini Mudduwa, Professor of Pathology, Department of Pathology, Faculty of Medicine, University of Ruhuna for reviewing the histology slides.

Dr. U.C.P. Perera, Senior Lecturer, Department of Forensic Medicine, Faculty of Medicine, University of Ruhuna for reviewing the Laws in the Penal Code of Sri Lanka.

Mr. R.M. Hettiarachchi, Chartered Electrical Engineer, Branch Manager, Lanka Electricity Company (Pvt.) Ltd., Kotte branch, for reviewing the relevant sections in the Electricity Act of Sri Lanka

Mr. Ajith Gunathunge, Park Warden, Bundala Natural Park, for reviewing the relevant sections of the Fauna and Flora Protection Ordinance of Sri Lanka.

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Knowledge, attitudes and practices of a selected group of parents on pre-hospital management of fever in children in a dengue-endemic area of Southern Sri Lanka

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 Submitted on 30.03.2020 and accepted for publication on 22.10.2020

ABSTRACT

Introduction: Dengue is one of the hyperendemic diseases in Sri Lanka with high morbidity and mortality. This study was aimed to assess knowledge, attitudes and practices of group of parents on pre-hospital management of fever in their children.

Methods: A cross-sectional study was conducted incorporating either one of the parents of 86 children with fever admitted to two paediatric units in Teaching Hospital Karapitiya and District General Hospital, Matara over two months during a dengue epidemic. A self-administered pretested questionnaire with demographic data and questions to assess knowledge, attitudes and practices regarding pre-hospital management of dengue was used.

Results: There were 81 (94.2%) females. The majority (69.76%) had educated beyond GCE O/L. Only 27.9% knew that they have a risk of dengue. The majority (66.28%) had excluded dengue due to the presence of respiratory symptoms. More than half of the parents (55.81%) knew that treatment with NSAIDs could aggravate dengue but 32.56% preferred NSAIDs, due to misconception of pyrexia related cerebral injury. A large majority (89.53%) knew proper hydration is needed and had hydrated their children. However, only 33.72% knew that hospital admission is needed if fluid intake is inadequate and only 19.77% knew that hospitalisation is needed if urine output is low. Only 30.23% knew that full blood count (FBC) should be done on day 3 of illness and 45.34% of the participants had got it done before admission. The majority (65.1%) knew dengue NS1 antigen test and out of them 75% had got it done before hospitalisation.

Conclusions: Despite living in an endemic area, only a few parents knew that their children were at a risk of contracting dengue. Inadequate knowledge about the symptoms, when to hospitalize and misconceptions on treatment of fever were highlighted. Therefore, educating the parents on specific facts is effective.

Keywords: Attitudes, dengue fever, knowledge, practices, Sri Lanka.

Introduction

Dengue virus infection is caused by four distinct, but closely related viruses, i.e., DENV-1, DENV-2, DENV-3 and DENV-4 which belong to the family Flaviviridae (1). *Aedes aegypti* and *Aedes albopictus*

mosquitoes transmit these serotypes (1). It is the most prevalent mosquito-borne disease globally and considered as hyperendemic in Sri Lanka since all four serotypes circulate in urban areas (2).

In 2020, total dengue cases reported in Sri Lanka was 31,162. In 2020, the number of dengue cases reported in Galle and Matara districts were 1671 and 545 respectively and most of the cases were reported in the month of January (2.)

Manifestations of dengue virus infection range from asymptomatic infection to the fatal dengue Shock Syndrome (DSS) (1). Symptoms of dengue fever (DF) include fever, frontal or retro-orbital pain, rash, myalgia, arthralgia, rhinitis, cough, vomiting and generalised lymphadenopathy. Dengue haemorrhagic fever (DHF) has two phases. The relatively mild first phase is characterised by fever, malaise, vomiting, headache and cough. This is followed by the critical phase. Symptoms of critical phase includes low urine output, cold extremities, faintishness, abdominal pain, bloody diarrhoea and bleeding from other sites (3,4).

Under these circumstances, fever in children who are living in dengue-endemic areas should be carefully managed with the suspicion of DF/ DHF from the onset. Children still present to the hospital with poorly managed fever at home, e.g. Non-Steroidal Anti-Inflammatory drugs (NSAIDs) misuse and dehydration. NSAIDs can lead to haemorrhage and liver toxicity in dengue patients (5). Dehydration results in shock and multi organ failure (3,4). Therefore, Parents' role is essential for the initial management of fever at home and identification of the gaps in parents' knowledge, issues of their attitudes and malpractices are important to reduce the dengue morbidity and mortality.

When knowledge, attitudes and practices of pre-hospital management of dengue is considered, there is only one study reported in Sri Lanka to date. It is a community-based study which was carried out in a suburban area in Colombo district - Boralesgamuwa in 2005 / 2006 incorporating 349 participants. This study has shown that more than 50% of the participants were aware of the high fever, headache, myalgia, vomiting and rash as symptoms of dengue. However, only less than 50% of the sample was aware of cough, cold, diarrhoea, melaena and thrombocytopenia as features of dengue infection. They have also shown that knowledge regarding the initial management of fever at home in the study sample was inadequate, only 2.2% were

aware of the importance of adequate liquid intake (6).

There are two other studies conducted in Sri Lanka to assess the knowledge, attitudes and practices regarding dengue in general. A hospital-based descriptive cross sectional study was carried out in Teaching Hospital Peradeniya in 2015 incorporating 500 outpatients to assess knowledge and attitude regarding dengue. This study showed only 38% and 6.8% of the participants knew fever and bleeding as symptoms of dengue respectively (7). Another hospital-based cross-sectional descriptive study was conducted among dengue patients admitted to two medical units of Teaching Hospital, Jaffna in 2017 to assess knowledge, attitudes and practices regarding dengue. This study reported that fever as a symptom of dengue was stated by only 76 out of 200 participants. Forty-nine patients could identify two other classical symptoms and 75 patients could identify one other clinical feature of dengue (skin rash, bleeding tendency) (8). Interestingly, a community-based cross-sectional survey conducted in central Nepal in 2011 / 2012 incorporating 589 participants revealed that 99% of them knew fever as a symptom of dengue (9).

However, in the latter three studies, they have not assessed the knowledge, attitudes and practices in pre-hospital management of fever. Therefore, it seems that there is a knowledge gap in pre-hospital management of fever which is crucial to reduce the mortality and morbidity of dengue infection.

The aim of our study was to assess the knowledge, attitudes and practices on pre-hospital management of dengue among a group of parents whose children were admitted to two selected hospitals of the Southern province during a period of approximately two and a half months amidst of an epidemic. We believe that targeting parents of febrile children admitted to the hospital would give us a better picture to assess the knowledge, attitudes and practices on pre-hospital management of dengue.

Methods

A cross-sectional study was carried out incorporating either one of the parents of 86 children who were admitted with fever to two Paediatric units in Teaching Hospital Karapitiya and District

General Hospital, Matara in Southern Sri Lanka, from 20th January 2016 to 30th March 2016.

The participants were randomly recruited using the convenience sampling method. One parent of each child, either biological or non-biological, who was there as the bystander for the child was selected for data collection after obtaining their written informed consent and they were ensured of the freedom of withdrawal from the study at any stage. Each child whose parent was selected for data collection had a body temperature of more than 100 °F on admission to the hospital.

The project proposal was reviewed and approved by the Board of Study in Paediatrics of Postgraduate Institute of Medicine, Colombo and the ethical approval was obtained from the Ethics Review Committee of Faculty of Medicine, University of Ruhuna.

A pretested self-administered questionnaire with both open and close ended questions was used for data collection. The questionnaire included questions to gather demographic data, knowledge regarding symptoms of dengue and pre-hospital management of dengue including identification of indications to admit, investigations to be done and treatment for fever at home. There were 16 questions to assess knowledge component, 5 questions to assess practices and, 6 questions to assess attitudes. Data were analysed using SPSS Version 25 and $p < 0.05$ was considered as statistically significant.

Results

A total of 86 parents were recruited in the study. Out of the participants 94.2% (n = 81) were females and 5.8% (n = 5) were males. The baseline characteristics of the study sample are tabulated in table 1. The majority (39.5%) belonged to the age group of 30-35 years. Among the study participants 36% (n = 31) had passed the G.C.E. (Ordinary Level) examination, and 33.7% (n = 29) had education beyond that.

Table 1: The baseline characteristics of the study sample

	Number (N=86)	Percentage (%)
<i>Gender</i>		
Female	81	94.2
Male	05	05.8
<i>Age groups (years)</i>		
<20	00	00
20 - 25	13	15.1
25 - 30	4	4.7
30 - 35	34	39.5
35 - 40	18	20.9
>40	17	19.8
<i>Level of education</i>		
< Grade 5	2	2.3
Grade 5 - O/L	24	27.9
Passed O/L	31	36.0
Passed A/L	25	29.1
Graduate	4	4.7

Knowledge on the risk of acquiring dengue

Out of the total study sample 19.77% (n = 17) didn't know whether they were living in a dengue endemic area or not. Therefore, they did not know whether they were at risk or not. Among the participants 51.16% (n = 44) claimed that their children are not susceptible to dengue because there are no reported dengue patients in their neighbourhood or their children has had dengue infection in the past. Only 27.9% (n = 24) of the parents knew that they are living in a dengue endemic area and hence, their children are susceptible to dengue.

Knowledge regarding the diagnosis of dengue

Among the participants 66.28% (n = 57) had excluded dengue due to the presence of respiratory symptoms in their febrile children. Dengue was excluded by the presence of diarrhoea by 4.65% (n = 4) of the parents and by the presence of convulsions by 1.16% (n = 1) of the parents. Another 1.16% (n = 1) of parents had excluded dengue in their children due to the normal platelet count, which was observed in the early part of the illness.

Knowledge and practice regarding the pre-hospital management

Out of the participants 89.53 % (n = 77) knew that proper hydration is required for dengue patients, and all the parents who knew that had taken effort to hydrate their children. However, none of them knew that the fluids should be given according to the body weight (maintenance fluid volume). Therefore, none of them had asked their doctors about the volume of fluid they should give their children per hour.

Only 33.72% (n = 29) knew that hospital admission is required if fluid intake is inadequate, and only 19.77% (n = 17) knew that hospitalisation is mandatory if urine output is low. Of the participants who knew that adequate hydration is vital in dengue fever, only 32.47% (n = 25) knew that hospital admission is required if fluid intake is reduced, and only 20.78 % (n = 16) knew that hospitalisation is needed if urine output is low.

Knowledge and attitudes regarding the treatment with NSAIDs

Among the participants 55.81% (n = 48) knew that treatment with antipyretics other than paracetamol i.e. NSAIDs could aggravate dengue. Out of them NSAIDs induced liver damage was known to 58.33% (n = 28) and the risk of haemorrhage was known to 16.67% (n = 8). There was a significant association between knowledge of side effects of NSAIDs and their use ($p=0.022$).

Out of all study subjects 32.56% (n = 28) had the misconception of high fever-induced cerebral injury and that was the main reason for them to request from their doctors for drugs other than paracetamol to reduce fever. More than a quarter of the subjects (27.9%) requested antipyretics other than paracetamol from their doctors because they could not bear the discomfort of their children undergoing due to fever. Only 6.98% of subjects were happy to treat their children with NSAIDs because of the fear of febrile convulsion. Mere 2.33% wanted to give NSAIDs as it was recommended by the doctor.

Knowledge and practices on investigations

Out of the study subjects, 30.23% (n = 26) knew that full blood count (FBC) should be done in a febrile child on day 3 of illness; and 30.23 % (n = 26) chose a day other than day 3. Only 18.60% (n = 16) did not know when to do the FBC. Thirty-nine children (45.34%) had undergone FBC prior to hospital admission. Majority of them (89.74%, n = 35) had done FBC as it was requested by the doctor. Among participants only 10.26% (n = 4) had done FBC as they knew that it should be done in febrile children.

A significant percentage 65.1% (n = 56) knew about the dengue NS1 antigen test. Surprisingly, most of the participants were educated about that by the media (53.58%) and 41% were educated by the doctor. Out of the parents who knew about dengue NS1 antigen test, 75% (n=42) had got it done to their febrile children.

Discussion

In Sri Lanka, except for our study, only one other study has been reported to date to study the knowledge, attitudes and practices of dengue pre-hospital management.

Our study reveals several important facts. We found that most of the parents had excluded dengue in their febrile children due to the presence of respiratory symptoms and some have excluded it as their children had diarrhoea, convulsions or normal platelet count which can be present in the early part of the illness. Gunasekara TDCP *et al.* also reported that most people were unaware about cough, cold and diarrhoea as symptoms of dengue infection. According to their study, only 1.72% of the sample was aware that diarrhoea can occur in DF/DHF. Cough as a symptom was recognised by 15.47% of their sample and cold was known as a symptom by 1.43% of their sample (6). Therefore, there is a high risk of poor domestic management of dengue patients who are having these symptoms before admission to the hospital. Moreover, a child who is having dengue with concurrent diarrhoea has a high risk of getting dehydrated. If the diarrhoea continues during the critical phase or dehydration which the patient has had in the febrile phase persists in to the critical phase, the risk of hypovolaemic shock and multi-organ failure rises (4).

The large majority (89.53%) of our participants were aware of the importance of the adequate hydration and had hydrated their children. In contrast to that, Gunasekara TDCP *et al.* reported that only 2.2% of their samples were aware of the importance of fluid intake (6). Kumanan *et al.* also found that out of their 200 participants only nine patients thought that drinking water was effective (8). However, none of our participants were aware that maintenance fluid volume needs to be given at home before hospital admission. Therefore, there is a risk of dehydration due to inadequate input and risk of fluid overload if large volumes were given during the critical phase before the hospital admission.

Most of them were unaware of specific facts in the pre-hospital management, such as the necessity for the hospitalisation of the child if the child's fluid intake is inadequate or urine output is low.

Jayalath T *et al.* showed that only 24.2% of their sample knew that they should avoid aspirin (7). In contrast, Gunasekara TDCP *et al.* reported that only 6% of their sample had recognised aspirin as a safe drug to treat dengue patients (6). In our study, 55.81% of the participants were aware that NSAIDs can aggravate the condition in dengue patients. However, only 16.67% our sample were aware of NSAIDs induced haemorrhage in dengue patients. In our questionnaire we referred NSAIDs as drugs other than paracetamol to reduce fever since some parents do not know them by names or by category. Most of the parents who knew about those adverse effects had not requested drugs other than paracetamol from their doctors. Therefore, educating the parents on specific facts is effective.

In our study, the main reason for the parents to treat their febrile children with NSAIDs was a myth of high fever- induced cerebral injury. Dengue infection causes a high fever which usually doesn't respond to paracetamol. Hence, there is a high risk of treating the children with NSAIDs when the parents do not suspect dengue and do not know about side effects of NSAIDs and when they believe the myth.

Even though FBC is a widely available test, most of the people were not aware that it should be done on day 3 of the illness and they had not done it. Most of the people were aware about dengue NS1

antigen and their practice was also high. Most of them have gained knowledge about the dengue NS1 antigen test through the media.

Kumanan *et al.* also reported that media as the main method of raising the public awareness. Thirty seven percent of their respondents were educated by the media while 36% patients have acquired knowledge from healthcare personnel (8). Dhimal M *et al.* who conducted their research in Central Nepal, also reported media as the major source of information. Eighty three percent of their participants had heard of DF through the radio and 81% by television (9). In contrast, Malhotra *et al.* who carried out their research in the rural and slum communities in a city in North India reported that 44.87% of their participants were educated about dengue by health professionals and only 32.75% were educated by media (10). This might be due to the socioeconomic background of their sample.

Limitations

There are some limitations of our study. Our sample size is small due to several reasons. Firstly, some hospitalised children were looked after by guardians who did not know how the children were managed at home. They were excluded from the study. Secondly, some parents who were caring for the children in the hospital were anxious due to their children's condition, sleep deprived and exhausted due to the day and night hourly oral fluid administration and the frequent measurement of urine output. Therefore, they were not in a good psychological state to answer the questions and were excluded from the study. Further, some of the participants' responses might have been influenced by information that they had received from the health staff after hospital admission.

Conclusions

Knowledge, practice and attitude on pre-hospital management of dengue, which is a cornerstone to reduce the dengue morbidity and mortality, is deficient in some areas. Hence more public awareness programs concentrating more on pre-hospital management should be conducted

providing specific information and mass media can be used effectively for this purpose. Furthermore people should be more educated regarding the myths circulating among them.

Acknowledgements

We are grateful to Dr. Champa Wijesinghe (Department of Community Medicine, Faculty of Medicine, University of Ruhuna) for advice on analysis of data. We also like to thank Dr. Dilini Gamage for her assistance in the data collection for the study.

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In-vitro evaluation of bactericidal activity of antiseptics and disinfectants commonly used in healthcare settings

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Submitted on 21.01.2021 and accepted for publication on 28.03.2021

ABSTRACT

Introduction: Healthcare-associated infections are common problems found in healthcare systems in most of the countries. Proper use of antiseptics and disinfectants is useful in reducing the magnitude of such infections. The aim of this study was to evaluate the bactericidal effect of different concentrations of selected antiseptics and disinfectants.

Methods: Bactericidal activity of different concentrations of antiseptics and disinfectants; isopropyl alcohol, povidone iodine, chlorhexidine gluconate, sodium hypochlorite, hypertonic saline, peracetic acid and mixture of 2-aminoethanol, dodecyl dimethyl ammonium chloride, potassium carbonate & bis(3-aminopropyl) dodecylamine were evaluated against nine strains of American Type Culture Collections and 11 strains isolated from the hospitals. Bacterial suspensions were prepared equal to 0.5 McFarland turbidity standards and 100 µl of each was mixed with 3 ml of antiseptic/ disinfectant solution. After desired contact time (1 minute, 15 minutes and 24 hours), 20 µl of reaction mixer was transferred into 4 ml of sterile physiological saline, mixed well and 20 µl of solution was evenly spread throughout Muller Hinton agar/ blood agar plates. Growth control was done using 3 ml of distilled water instead of 3 ml of antiseptic/ disinfectant solution. All plates incubated at 35°C ± 2°C for 18 – 24 hours. Colonies were counted and reduction percentage was calculated.

Results: All concentrations of isopropyl alcohol, povidone iodine, chlorhexidine, sodium hypochlorite, peracetic acid and the mixture of 2-aminoethanol, dodecyl dimethyl ammonium chloride, potassium carbonate and bis(3-aminopropyl) dodecylamine showed 100% bactericidal activities against all tested bacterial strains in 1-minute contact time. Bactericidal activity of hypertonic saline was varied against tested bacterial strains with higher bactericidal activity against Gram positive organisms than Gram negative organisms.

Conclusions: Currently using concentrations of antiseptics and disinfectants evaluated in this study have 100% bactericidal activity other than hypertonic saline.

Key words: *Antiseptics, bactericidal activity, disinfectants, healthcare associated infections.*

Introduction

Healthcare-associated infections (HAIs) and polymicrobial wound infections found in chronic wounds are common problems encountered in healthcare systems in most of the countries including Sri Lanka.

These infections have been recognised as a critical problem affecting the quality of health care settings over a century (1). HAIs cause to increase length of hospital stay, permanent disability and patient mortality. Infection rate ranges from one in five admissions in some developing countries to one in twenty admissions in developed countries (2). *Escherichia coli*, *Staphylococcus aureus*, *Enterococcus faecium*, *Acinetobacter baumannii* cause most of the multidrug resistant HAIs (3). Extended Spectrum Beta-Lactamase (ESBL) producing organisms are the challenge to healthcare practice around the world. On the other hand, polymicrobial infections in chronic wounds are another problem identified in healthcare systems. Polymicrobial infections can be identified in these wounds where Gram positive bacteria have become predominant than Gram negative bacteria. *Staphylococcus* spp., *Enterococcus* spp. and *Streptococcus* spp. are found as common Gram positive bacteria, out of which *S. aureus* has been reported as the most frequently isolated spp., whereas *Pseudomonas* spp. are the most common among the Gram negative bacteria (4, 5).

Antiseptics and disinfectants are used to curtail the healthcare associated infections. Different types of antiseptics and disinfectants are used in healthcare settings in Sri Lanka including alcohols, iodophores,

chlorhexidines, chlorine releasing agents, peracetic acids. Therefore, this study was planned to determine the bactericidal effect of different concentrations of selected antiseptics and disinfectants.

Methods

Test Strains

Nine strains of American Type Culture Collections (ATCC) were used. Namely Methicillin-sensitive *Staphylococcus aureus* (MSSA) ATCC 25923, Methicillin-resistant *Staphylococcus aureus* (MRSA) ATCC 43300, *Streptococcus pyogenes* ATCC12384, *Enterococcus faecalis* ATCC 29212, *Acinetobacter baumannii* ATCC 19606, *Escherichia coli* (Non ESBL) ATCC 25922, *Klebsiella pneumoniae* (ESBL) ATCC 700603, *Klebsiella pneumoniae* (Carbapenem resistance) ATCC BAA1705 and *Pseudomonas aeruginosa* ATCC 27853.

Eleven clinical isolates used in this study were as follows; *Staphylococcus aureus* (MSSA), *Staphylococcus aureus* (MRSA), *Enterococcus* spp., Group A Streptococci, Group B Streptococci, *Acinetobacter* spp., *Escherichia coli* (Non ESBL), *Escherichia coli* (ESBL), *Klebsiella* spp., *Klebsiella* spp., (Carbapenem resistant), *Pseudomonas* spp.

Test method

Different concentrations of selected antiseptics and disinfectants were prepared in laboratory using commercially available concentrations of each antiseptic and disinfectant. All concentrations are shown in Table 1.

Table 1: Concentrations of antiseptics / disinfectants

Antiseptics / Disinfectants	Concentration (v / v)			
	Lower 2	Lower 1	Already used	Higher
Isopropyl alcohol	40%	50%	60%	-
Povidone iodine	1%	5%	10%	-
Chlorhexidine gluconate	1%	2%	4%	-
Sodium hypochlorite	0.1%	0.5%	1%	-
Peracetic acid	1.22%	1.42%	1.62%	-
Mixture of [2-aminoethanol, didecyltrimethylammonium chloride, potassium carbonate, bis(3-Aminopropyl) dodecylamine]	1.5%	2%	2.5%	-
Hypertonic saline	-	-	1.9%	2.9%

Footnote: Lower 1: First lower concentration than already used concentration of antiseptics and disinfectants
Lower 2: Second lower concentration than already used concentration of antiseptics and disinfectants
Higher: Higher concentration than already used concentration of antiseptics and disinfectants

Following preparation of antiseptic and disinfectant solutions, test bacterial suspensions of each organisms were prepared equal to 0.5 McFarland turbidity standards (6). After preparing antiseptic and disinfectant solutions and test suspensions, 3 ml of different concentrations of antiseptic or disinfectant solutions were added into clean sterile bijou bottles. Afterwards, 100 µl of each bacterial suspension prepared was added into sterile bijou bottles separately containing tested concentration of antiseptics or disinfectants and thoroughly mixed using vortex mixer. After 1 minute contact time, 20 µl of aliquot was separated as soon as possible and was added into sterile bijou bottle containing 4 ml of sterile physiological saline. Following mixing of the contents thoroughly, 20 µl of solution was transferred on to Muller Hinton agar (MHA) plates and spread evenly throughout the plate using a sterile glass spreader. Blood agar plates were used for *Streptococcus* species instead of Muller Hinton agar plates. The plates were incubated at $35^{\circ}\text{C} \pm 2^{\circ}\text{C}$ for 18 - 24 hours. Thereafter 15 minutes and 24 hours contact time were achieved; same procedure mentioned above was followed. Yielded colonies were counted and reduction percentage was calculated (7-10).

Test control procedure was done as follows. Three milliliters of distilled water was added into clean sterile bijou bottle followed by 100 µl of bacterial suspension and thoroughly mixed using vortex mixer. From the above mixture, 20 µl was added into bijou bottles containing 4 ml of sterile physiological saline and mixed thoroughly. Muller Hinton agar plates were added 20 µl of mixed solution and spread evenly. Blood agar was used for *Streptococcus* species instead of MHA. The plates were incubated at $35^{\circ}\text{C} \pm 2^{\circ}\text{C}$ for 18 – 24 hours and colonies were counted. Test and control procedures were duplicated.

Reagent control was done by adding 3 ml of distilled water into clean sterile bijou bottles followed by mixing 100 µl of sterile physiological saline instead of bacterial suspension into bijou bottles containing distilled water. The same procedure as above was practiced thereafter. Sterility of MHA and blood agar plates were tested after incubating without spreading any solution.

All evaluated concentrations of antiseptics and disinfectants except hypertonic saline showed 100% bactericidal activity (Table 2) against all the standard strains and clinical isolates. Bactericidal activity of hypertonic saline was varied (Table 3 and Table 4). However it is more effective against Gram positive bacteria than Gram negative bacteria.

Table 2: Bactericidal activity of all tested concentrations of isopropyl alcohol, povidone iodine, chlorhexidine gluconate, sodium hypochlorite, peracetic acid and the mixture of 2-aminoethanol, didecyltrimethylammonium chloride, potassium carbonate, bis(3-aminopropyl) dodecylamine

Antiseptic / Disinfectant	Bactericidal activity against standard strains (1 min/ 15 mins/ 24 hrs)	Bactericidal activity against clinical isolates (1 min/ 15 mins/ 24 hrs)
Isopropyl alcohol (40% / 50% / 60%)	100%	100%
Povidone iodine (1% / 5% / 10%)	100%	100%
Chlorhexidine gluconate (1% / 2% / 4%)	100%	100%
Sodium hypochlorite (0.1% / 0.5% / 1%)	100%	100%
Mixture of 2-aminoethanol, didecyltrimethylammonium chloride, potassium carbonate, bis(3-aminopropyl)dodecylamine (1.5% / 2% / 2.5%)	100%	100%
Peracetic acid (1.22% / 1.42% / 1.62%)	100%	100%

After 24 hours contact time with 1.9% hypertonic saline, all Gram-positive organisms except *Enterococcus faecalis* (ATCC 29212), showed over ninety percent bacterial reductions. Further, all Gram positive organisms except *Enterococcus faecalis* (ATCC 29212) showed 100% bacterial reductions against 2.9% hypertonic saline.

Of Gram-negative organisms, *Acinetobacter baumannii* (ATCC 19606) showed 67.48% and 68.20% bacterial reduction against 1.9% hypertonic saline and 2.9% hypertonic saline respectively for 24 hours of contact time. However, other Gram-negative organisms did not show a prominent bacterial reduction against either 1.9% or 2.9% hypertonic saline (Table 3).

As far as the clinical isolates are concerned, all Gram-positive isolates except *Enterococcus* spp. showed over 80% reduction after 24 hours contact

time for 1.9% hypertonic saline and 100% reduction after 24 hours contact time for 2.9% hypertonic saline. None of the Gram-negative isolates showed 100% reduction for either of the tested concentrations of hypertonic saline at any contact time. The best reduction was recorded in *Acinetobacter* spp. where it shows 66.27% after 24 hours of contact time for 2.9% hypertonic saline (Table 4).

Figure 1 shows control growth of the *streptococcus pyogenes* (ATCC 12384) on blood agar plates after 18-24 hours of incubation. Figures 2, 3 and 4 show test growth of *streptococcus pyogenes* (ATCC 12384) against 1.9% hypertonic saline after 1 minute, 15 minutes and 24 hours respectively. Figure 5, 6 and 7 show test growth of *streptococcus pyogenes* (ATCC 12384) after 1 minute, 15 minutes and 24 hours respectively against 2.9% hypertonic saline.

Table 3: Bactericidal activity of hypertonic saline against American Type Culture Collection strains

Name of organisms	1.9% Sodium chloride			2.9% Sodium chloride		
	1 min	15 min	24 hours	1 min	15 min	24 hours
Gram positive organisms						
<i>Streptococcus pyogenes</i> ATCC 12384	6.42	7.71	92.11	8.07	20.55	100.00
<i>Enterococcus faecalis</i> ATCC 29212	1.49	2.13	21.70	2.13	6.38	22.13
<i>Staphylococcus aureus</i> (MSSA) ATCC 25923	5.80	36.81	99.71	8.70	39.71	100.00
<i>Staphylococcus aureus</i> (MRSA) ATCC 433000	4.32	24.16	99.72	5.62	30.90	100.00
Gram negative organisms						
<i>Acinetobacter baumannii</i> ATCC 19606	0.97	0.73	67.48	0.97	9.47	68.20
<i>Escherichia coli</i> (Non ESBL) ATCC 25922	0.00	0.53	4.52	3.46	3.99	7.45
<i>Klebsiella pneumoniae</i> (ESBL) ATCC 700603	0.54	1.08	2.97	3.24	3.78	9.19
<i>Klebsiella pneumoniae</i> (carbapenem resistant) ATCC BAA1705	0.00	0.59	3.85	2.07	0.89	5.03
<i>Pseudomonas aeruginosa</i> ATCC 27853	0.27	0.54	1.34	5.36	8.31	9.92



Figure 1: *Streptococcus pyogenes* (ATCC 12384)
Test Control growth

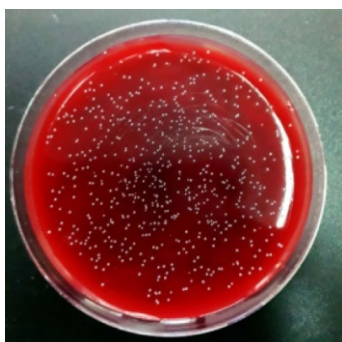


Figure 2: *Streptococcus pyogenes* (ATCC 12384)
After 1 minute contact time against
1.9% hypertonic saline



Figure 5: *Streptococcus pyogenes* (ATCC 12384)
After 1 minute contact time against
2.9% hypertonic saline



Figure 3: *Streptococcus pyogenes* (ATCC 12384)
After 15 minutes contact time against
1.9% hypertonic saline

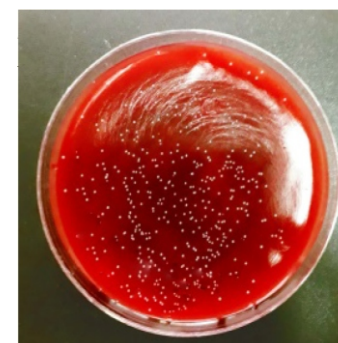


Figure 6: *Streptococcus pyogenes* (ATCC 12384)
After 15 minutes contact time against
2.9% hypertonic saline

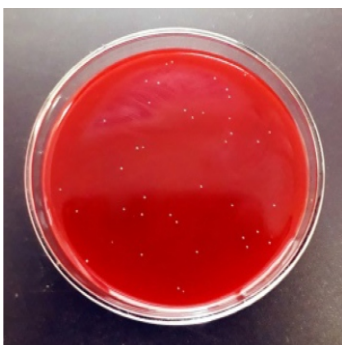


Figure 4: *Streptococcus pyogenes* (ATCC 12384)
After 24 hours contact time against
1.9% hypertonic saline



Figure 7: *Streptococcus pyogenes* (ATCC 12384)
After 24 hours contact time against
2.9% hypertonic saline

Table 4: Bactericidal activity of hypertonic saline against clinical isolates

Name of Organisms	1.9% Sodium chloride			2.9% Sodium chloride		
	1 min	15 min	24 hours	1 min	15 min	24 hours
Gram positive organisms						
Group A <i>Streptococcus</i>	4.74	7.3	87.77	7.30	13.87	100.00
Group B <i>Streptococcus</i>	1.01	4.64	86.90	3.02	18.75	100.00
<i>Enterococcus</i> spp.	2.87	5.50	26.32	4.07	8.13	32.54
<i>Staphylococcus aureus</i> (MSSA)	0.91	14.81	99.54	5.01	22.55	100.00
<i>Staphylococcus aureus</i> (MRSA)	0.00	7.87	99.31	3.47	10.42	100.00
Gram negative organisms						
<i>Acinetobacter</i> spp.	2.89	5.78	63.61	1.69	7.71	66.27
<i>Escherichia coli</i> (Non ESBL)	2.17	5.26	13.93	3.10	8.05	21.36
<i>Escherichia coli</i> (ESBL)	2.03	3.77	6.38	2.90	4.35	14.2
<i>Klebsiella</i> spp.	3.43	5.58	18.03	3.43	7.73	21.89
<i>Klebsiella</i> spp. (carbapenem resistant)	0.83	4.13	22.31	5.79	14.46	33.88
<i>Pseudomonas</i> spp.	2.38	5.56	15.34	2.12	7.94	16.67

Discussion

Present study evaluates the bactericidal activity of commonly used antiseptics and disinfectants and hypertonic saline against ATCC strains and clinical isolates. Different concentrations of antiseptics/disinfectants have been used in this study; the currently used concentration and two lower concentrations in case of antiseptics/ disinfectants and a higher concentration in case of hypertonic saline.

Isopropyl alcohol is used to disinfect skin and for cleaning of surfaces in healthcare setting along with general purpose detergents. Ten percent povidone iodine is used to disinfect skin and used as active wound dressings (11).

Chlorhexidine is commonly used in antiseptic products such as handwashes and mouth washes (12) and 4% solution is used for skin preparation (11). In a previous study, Sassone *et al.*, showed that 0.12% chlorhexidine solution cannot eliminate *Enterococcus faecalis* at any time tested which is immediately, after 5 minutes, 15 minutes and 30

minutes of contact. However, 1% chlorhexidine could eliminate the *E. faecalis* after immediate contact (8). Vianna *et al* reported 100% bactericidal effect of 1% chlorhexidine after 15 seconds contact time against *S. aureus* and *E. faecalis* (7). Current study illustrated 100% bactericidal activity of the solution in all tested contact durations, 1 minute, 15 minutes and 24 hours.

One percent sodium hypochlorite is used to disinfect spills of body fluid and blood and 0.1% is used as an environmental disinfectant (11). Sassone, *et al.*, had shown that 1% sodium hypochlorite can eliminate bacterial growth of *E. faecalis*, *E. coli*, *S. aureus*, etc after immediate contact (8). Similarly, the current study reported bactericidal activity of the compound in all concentrations and contact durations.

Endoscopes are used as a diagnostic and therapeutic tool in medical practice. These instruments do not withstand heat and recommended reprocessing method is use of high level disinfectants such as glutaraldehyde containing chemicals (13).

Considering the probable adverse effect of to healthcare staff, glutaraldehyde free high level disinfectants such as peracetic acid, are used for reprocessing of endoscopes (11). Therefore, bactericidal activity of peracetic acid and the mixture of 2-aminoethanol, didecyldimethylammonium chloride, potassium carbonate & bis(3-aminopropyl) dodecylamine is used in healthcare settings were evaluated in the current study. Similar to previously mentioned solutions, these chemicals too showed 100% bactericidal activity. In a previous study, Baldry had determined antimicrobial activity of different concentrations of peracetic acid and they had obtained 10^6 factor reduction against 1.3 mmol/L of peracetic acid within 1 minute (14).

Hypertonic saline is also used to treat wounds with the concentration of 1.9%. According to results of present study, hypertonic saline is more effective to Gram positive organisms than Gram negative organisms. Michon *et al.* had evaluated bactericidal activity of different concentrations of sodium chloride (NaCl). They had shown that all of the *Pseudomonas* species tested have been inhibited by 6% NaCl solution after 24 hours incubation. Multidrug resistant isolates had displayed lower minimum inhibitory concentrations (MIC) compared to non-multidrug resistant isolates. The same study showed that NaCl exhibits a rapid and growth phase dependent bactericidal activity with 69%. Biofilm forming, strongly adherent isolates getting inhibited by 3% or more of NaCl (15).

According to the results of the current study, types of antiseptics and disinfectants commonly used in healthcare settings in Sri Lanka can be considered as effective to control HAIs in hospitals. However, bactericidal activity of currently used concentration of hypertonic saline is not satisfied.

Conclusion & recommendations

Currently using concentrations of isopropyl alcohols (60%), povidone iodine (10%), chlorhexidine gluconate (4%), sodium hypochlorite (0.1% and 1%), peracetic acid (1.62%) and mixture of 2-aminoethanol, didecyldimethylammonium chloride, potassium carbonate and dodecylamine (2.5%) showed 100% bactericidal activity. Further, all lower concentrations tested also showed 100%

bactericidal activity. However, lower concentrations cannot be recommended to use in healthcare settings as the dynamics of microorganisms are expected to be different in vivo. Further evaluation of bactericidal activity against anaerobic bacteria and fungicidal activity of these chemicals is very important before lower concentrations are recommended for healthcare systems.

However, bactericidal activity of currently used concentration (1.9%) of hypertonic saline is not satisfactory. It is noteworthy that higher concentration of hypertonic saline is more effective than already used concentration. However, this result too to be evaluated further considering other factors such as cytotoxicity of the compound.

Limitations

Although lesser concentrations of selected antiseptics and disinfectants other than hypertonic saline have shown similar bactericidal activities, those cannot be recommended for clinical use without further studies. There may be several other biological factors contributing to the bactericidal activity in vivo applications.

Conflict of interest

The authors disclose that there is no conflict of interest.

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Recurrent vomiting in a toddler; oesophageal food bolus impaction

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Submitted on 22.07.2020 and accepted for publication on 27.12.2020

Introduction

Vomiting is common in children. Vomiting or emesis, is the actual oral expulsion of gastrointestinal contents as a result of contractions of the gastrointestinal and the thoracoabdominal wall musculature (1). Vomiting centre in medulla oblongata comprises of reticular formation and the nucleus of the tractus solitarius. Motor pathways descend from vomiting centre trigger vomiting when stimulated. These efferent pathways travel within the 5th, 7th, 9th, 10th, and 12th cranial nerves to the upper gastrointestinal tract, within vagal and sympathetic nerves to the lower tract, and within spinal nerves to the diaphragm and abdominal muscles. The vomiting centre can be activated directly by irritants or indirectly following input from four principal areas: gastrointestinal tract, cerebral cortex and thalamus, vestibular region, and chemoreceptor trigger zone (CRTZ) (1). Local causes such as gastrointestinal infection or obstruction, pharyngitis and systemic causes such as sepsis, increased intracranial pressure and chemotherapy can give rise to repeated episodes of vomiting by triggering the vomiting centre. Oesophageal food bolus is a rare cause of vomiting in children (2). One study had estimated that the incidence of upper gastrointestinal food bolus impaction is 13 per 100,000 populations (3). More than 80% of children with oesophageal food bolus impaction have an abnormality in the oesophagus (2). We describe a case of a toddler with recurrent vomiting due to oesophageal food bolus impaction.

Case presentation

A previously healthy twelve-month-old boy with sudden onset of recurrent vomiting was transferred from a regional hospital for surgical evaluation of possible intussusception. He has had cough and coryzal symptoms for four days prior to the presentation. He had a normal bowel motion on the day of admission prior to attending day care. On the day of admission, he had attended to his regular day care centre and had developed non-bilious vomiting during his stay there.

He has had all immunisations for the age according to New Zealand immunisation schedule. He had achieved developmental milestones at appropriate age. On examination at the regional hospital, his temperature was 36.9 °C, he was drowsy and lethargic. His pulse rate was 132 beats/min, respiratory rate was 24 breaths/min and oxygen saturation was 99% on air. His Abdomen was soft, non-tender with normal bowel sounds. A sausage shaped mass was felt in central abdomen. Rest of the examination was normal. Chest and abdominal radiographs and urine analysis were normal. He was started on 0.9% saline + 5% dextrose maintenance fluid and transferred to Starship Children's Health, Auckland for surgical opinion on suspicion of intussusception.

On arrival, his temperature was 36.5 °C, pulse rate was 130 beats/min, respiratory rate was 26 breaths/min and Oxygen saturation on air was 97%.

He continued to vomit despite intravenous ondansetron 100 µg/kg and also required and 20 ml/Kg of 0.9% saline. An ultrasound scan (USS) of the abdomen did not show any evidence of intussusception. He remained pale and floppy with intermittent vomiting 10 hours after the onset of his symptoms. CT scan of the brain was done to exclude an intracranial pathology such as space occupying lesion as a cause for vomiting. It was normal. He had full septic screen including urine analysis and culture, full blood count, C-reactive protein, blood culture and cerebrospinal fluid analysis with culture to exclude sepsis as the cause for lethargy and vomiting. Septic screen was normal. Intravenous amoxicillin 50 g/kg 6 hourly and cefotaxime 50 mg/kg 6 hourly were started empirically while awaiting septic screen results.

Sixteen hours after the onset of vomiting, he developed mild stridor with difficulty in breathing and oxygen desaturation to 84% in room air. Air entry was equal on auscultation of his chest. His oxygen saturation corrected with oxygen 10 L/min via a face mask.

Lateral neck radiograph showed compression of trachea with a possible food bolus in oesophagus (Figure 1).

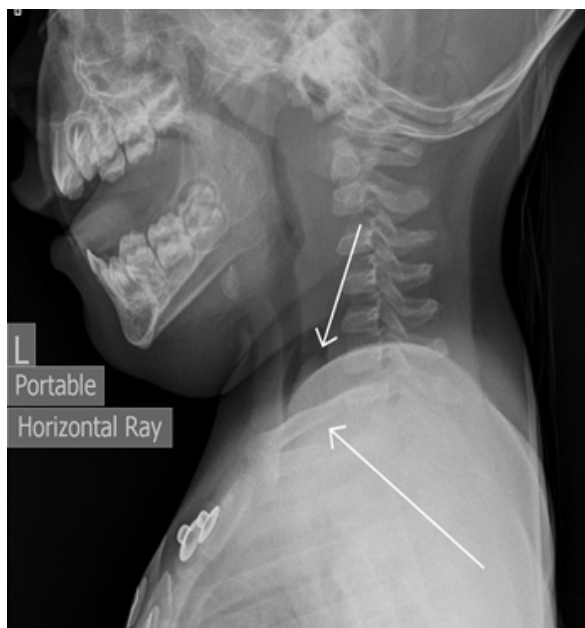


Figure 1: Lateral neck X-ray showing a food bolus (marked in arrows) in oesophagus with compression of trachea

An oesophagoscopy under general anaesthesia revealed a dried apricot lodged in the oesophagus. The apricot was difficult to extract as it was swollen and the surrounding tissue was oedematous. It was dislodged and pushed into the stomach. Rest of the oesophagus was normal. The child had an uneventful recovery.

A history of a choking or gagging incident could not be obtained retrospectively. On further inquiry it was revealed that the child had dried apricots for lunch at day care centre.

Discussion

Recurrent vomiting and lethargy with concurrent illness in a toddler has wide differential diagnoses. Intussusception was considered as there was an abdominal mass with vomiting. Target lesion appearance in USS of abdomen is seen in 98% of children with confirmed intussusception (4). Intussusception is unlikely in a child with a normal abdominal ultrasound examination. Our child had a normal ultrasound scan of abdomen which made intussusception unlikely. The presence of concurrent illness was noted in 30% at presentation of intussusception (5).

Oesophageal foreign bodies are a cause of stridor and difficulty in breathing (3). The dried apricot became larger in the oesophagus with time as swollen with saliva causing tracheal compression leading to stridor and desaturations.

Factors that determine food impaction include the state of the oesophagus and the nature of the food that has been swallowed (6). Food bolus impactions have underlying oesophageal pathology in 88% to 97% of adult patients evaluated (6). Coins are the commonest ingested foreign body in children worldwide (7). A study in a single centre in Sri Lanka showed that peak age of foreign body ingestion in children ranged from 1 - 5 years (8). Most common ingested foreign bodies were button batteries (24%) and coins (17%) and upper gastrointestinal endoscopy was needed in 22% of children to remove foreign body (8). An abnormality of the oesophagus such as eosinophilic oesophagitis or narrowing at the site of prior oesophageal or oesophageal-related surgery was found in more than 80% of paediatric

patients with oesophageal food bolus impaction (5). Endoscopy did not reveal any anatomical abnormality in our patient. Biopsies were not done as oesophagus was morphologically normal.

Large dried fruits such as whole apricots which cause oesophageal food bolus in this case, are not safe food for infants and toddlers due to choking hazard. Fruits such as *Veralu*, dates, and ripe Jack fruit may have a chance of causing food bolus impaction in Sri Lankan Setting. It is important to consider the size of the food given and the ability of the child to chew to minimise the risk of food bolus impaction. At the same time, close supervision of children during meal time can minimize such hazards.

Acknowledgements

We would like to thank Department of Radiology and Department of Surgery in Starship Children's Health for the support in managing our patient.


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Bacterial wound infections leading to bacteraemia with *Vibrio vulnificus* and *Morganella morganii*; two unusual cases

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Submitted on 23.01.2020 and accepted for publication on 01.03.2021

Case 1

A 84-years-old female diagnosed with cancer of the epiglottis admitted for a course of chemotherapy to Teaching Hospital Karapitiya (THK) in October 2019.

She was afebrile on admission, however, developed redness and swelling at the cannula site few days later. Next day, she fell in the hospital toilet and landed on the infected forearm. This toilet was a squatting type with water sourced from the local municipal council supply. There was no visible faecal contamination. Three days later, she developed severe infection with blister formation at the infected site with high fever spikes (Figure 1). There was no history of any local treatment to the site including ayurvedic preparations or salt.



Figure 1: Wound Site A - Regressing blister, B - Ruptured blister

Her white cell count was $7.17 \times 10^3/\mu\text{L}$ with 95% neutrophils, while C-reactive protein (CRP) level was 204 mg/L. Intravenous (IV) ceftriaxone and clindamycin were started, but with poor response changed to IV imipenem 500 mg 6 hourly when the blood culture was flagged as positive for a Gram-negative organism. It grew a non-lactose fermenting, oxidase positive organism with *Shigella* pattern on Kligler's agar. Automatic identification machine VITEK[®] 2 COMPACT confirmed it as *Vibrio vulnificus* with sensitivity to all tested antibiotics including co-amoxiclav, cefotaxime, ciprofloxacin, gentamicin and imipenem. However, considering the immediate response following the administration of imipenem and her immunosuppression following chemotherapy, we continued imipenem with oral doxycycline 100mg 12 hourly for 14 days until the wound healed with normal CRP.

Vibrio vulnificus

Vibrio vulnificus is a halophilic organism, and found in seawater, oysters, crabs and plankton. It caused severe bullous wound infections at the site of skin breaches in the Asian tsunami survivors in 2004. Patients at risk of developing severe sepsis by *Vibrio vulnificus* are immunosuppressed, with co-morbidities; chronic liver disease (especially cirrhosis), end-stage renal disease, and haematopoietic disorders.

Interestingly, *Vibrio* species can also be one of the predominant flora not only in sea water, but also in sewage water (1). In this case, after inspection of the place and upon inquiring, we could not exclude the possibility of contamination of the toilet floor with sewage water and there was no any other identifiable source for this infection either. Due to immunosuppression and the contamination of the breached skin, she must have developed typical bullous infection and subsequent sepsis. There was another case known to the author; a middle-aged woman with diabetes admitted to the Sri Jayawardenapura General Hospital in November 2008 with orbital cellulitis following a fall into a sewage pit, had *Vibrio vulnificus* in her pus culture (unpublished). Therefore, the clinicians should consider *Vibrio* infection in bullous wounds and cellulitis developing after possible contamination with sewage water (1,2).

Case 2

A 60-years-old previously healthy male presented following an unidentified snakebite on his left foot in October 2019. On arrival to the local hospital, he went into respiratory arrest, ventilated, and was transferred to the intensive care unit, THK where he had anti-venom. Next day he developed a large necrotic area over the bite site and underwent wound debridement thrice subsequently.

On admission, his white cell count was $12.97 \times 10^3/\mu\text{L}$, but went-up to $19.7 \times 10^3/\mu\text{L}$ with CRP of 233 mg/L in 2 days. Blood culture collected on admission was flagged as positive after 20 hours incubation and yielded a non-lactose fermenting, oxidase negative Gram-negative bacterium, which was, identified as *Morganella morganii* by the VITEK® 2 COMPACT machine. The organism was sensitive for cefotaxime, gentamicin, amikacin, ciprofloxacin and meropenem. Pus aspirated from the wound was positive for the same isolate. He was treated with IV meropenem 1g 8 hourly for 14 days and IV amikacin 15 mg/kg daily for 7 days until CRP became normal, and wound became healthy undergoing successful skin grafting.

Morganella morganii

Morganella morganii is an uncommon cause of community acquired infections but can cause a range of infections including urinary tract infections, sepsis, pneumonia, wound infections, musculoskeletal infections, central nervous system infections, pericarditis, chorioamnionitis, endophthalmitis, empyema, spontaneous bacterial peritonitis and nosocomial outbreaks.

Enterobacteriaceae including *Morganella* are an important part of the mouth flora of snakes (3-5), because, the prey often defaecates inside snake's mouth. Hence, the same flora may contaminate the wounds of the humans following snakebite. Extensive tissue necrosis can be seen following some snakebites as hump-nosed viper in Sri Lanka and India (6, 7) and *Bothrops* (vipers) around the globe (4), which may be attributed to the faecal contamination of snake mouth.

Despite sensitivity, cephalosporines were avoided as *Morganella* has the potential to develop resistance during treatment. Considering the bacteraemia and the severity of the wound infection, a carbapenem with an aminoglycoside were chosen. Therefore, in snakebite wound infections it is always better to perform cultures and to cover faecal flora empirically with an antibiotic regime like co-amoxiclav plus an aminoglycoside.

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Accreditation beyond 2024: A major challenge for Sri Lankan medical graduates

A considerable proportion of medical graduates from Sri Lankan medical schools opt to work in other parts of the world such as the UK, Canada, Australia, New Zealand, USA etc. Moreover, the majority of the postgraduate training programmes conducted by Postgraduate Institute of Medicine (PGIM), University of Colombo consist of foreign training components which require the trainee to undergo training or gain work experience for a period of 1 to 2 years in an overseas medical facility or establishment. In order to practise medicine overseas, Sri Lankan medical graduates are required to obtain registration and a license to practise with a medical practitioner-registering body in the respective country such as the General Medical Council (GMC) in the UK, the Australian Health Practitioner Regulation Agency (Ahpra) etc.

Applications for registration submitted to some of the practitioner-registering bodies in those countries are directed to the Educational Commission for Foreign Medical Graduates (ECFMG) in Philadelphia, USA for evaluation. The ECFMG acts as an accreditation agency for many medical practitioner-registering bodies globally (such as GMC, Ahpra). The Foundation for Advancement of International Medical Education and Research (FAIMER), is a non-profit foundation committed to improving world health through education and it was established by the ECFMG in the year 2000. The FAIMER creates and maintains data resources on medical education worldwide. The FAIMER together with World Federation for Medical Education (WFME) have developed and maintained the World Directory of Medical Schools.

All medical schools in Sri Lanka get routine requests from the ECFMG for clarification about their graduates whose applications are being processed by the ECFMG. Sri Lankan medical schools send details about their graduates to the ECFMG, at least few per week. The current practice of the ECFMG to recognize a medical graduate

is very simple. The ECFMG considers any medical school recognized by the local practitioner-registering body of the country as a legitimate medical school. Therefore, Sri Lankan medical graduates who have obtained registration from the Sri Lanka Medical Council (SLMC) could gain registration required to practise in overseas following stipulated assessments / examinations, if any. However, in 2010, the ECFMG announced that from 2023 it will recognize graduates only from 'properly' accredited medical schools and introduced a four-phase plan for a complex mechanism for registration. Later it was deferred to 2024 due to the global COVID-19 pandemic. More specifically, the ECFMG will approve graduates only from the medical schools accredited by a local or regional accrediting agency that is officially recognized by WFME. To facilitate the process, accreditation status of each medical school will be indicated in the World Directory of Medical Schools from 2021.

Currently a local accrediting agency that can be recognized by WFME, based on the newly defined criteria, is not available for Sri Lanka. None of the Sri Lankan medical schools are accredited by any foreign accrediting agency that is recognized by WFME. Therefore, graduates from Sri Lankan medical schools are unlikely to get registration to practise in other countries if the ECFMG applies its new registration criteria in the future; PGIM trainees will not be able to undergo their foreign training.

Sri Lankan medical schools need to plan for accreditation by an accrediting agency that is officially recognized by WFME. Agencies that can accredit overseas medical schools are available in some Asian countries. Therefore, Sri Lankan medical schools could apply for accreditation to such an agency and undergo a rigorous and a expensive evaluation process. The other option is to establish a local agency that could accredit medical schools in the country. Fortunately, the

SLMC has initiated a process to create a local accrediting agency under the Council. With the establishment this new agency, each medical school will have to apply for accreditation and there will be an evaluation process according to the WFME-prescribed standards. Contributions from foreign evaluators will be required for this process. The WFME recommends a set of global standards in medical education that include 9 areas with a total of 35 subareas. These areas are defined as process, structure, contents, competencies, assessment and learning environment of medical education. Each medical faculty has to show evidence that above requirements are at an acceptable level. Some medical schools may need additional human resources and physical resources development, curriculum changes, etc. depending on the circumstances.

Some of these activities such as the establishment of a local accrediting body, evaluation of each medical school acquiring resource and other developments for a medical faculty to meet criteria for accreditation will take considerable time. The challenge is that whole process should be completed by 2024 to ensure that Sri Lankan medical graduates get ECFMG recognition in the future. If not, future medical graduates from Sri Lanka will not be able to work or obtain training in other countries.

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Submitted on 05.01.2021 and accepted for publication on 15.03.2021

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