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Contents

1. EDITORIAL

Identifying voids and remedying defects in forensic investigations in Sri Lanka i – ii

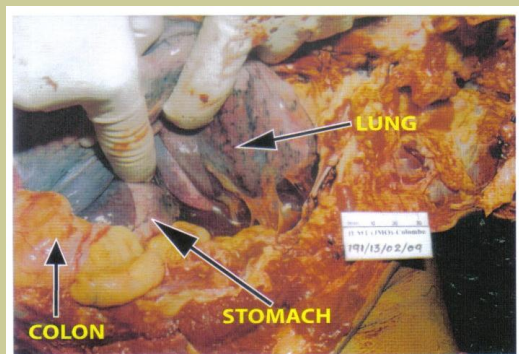
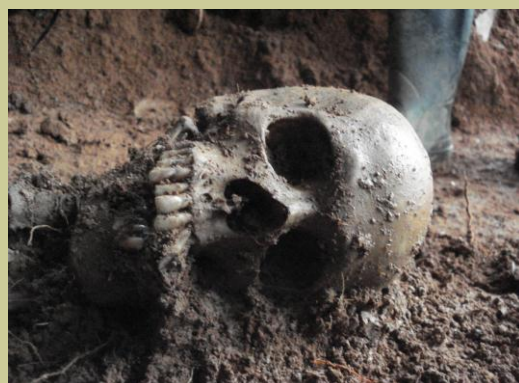
2. Acute severe suicidal poisoning by herbicide pendimethalin; A rare case report from rural India
Alok Kumar, Archana Verma 1 – 5

3. Competencies expected from a medical officer in performing medico legal duties:
The results of a Delphi study conducted among Judicial Medical Officers in Sri Lanka
Edussuriya D.H, Marambe K.N., Abeyasinghe N. & Jayawickramarajah P.T 6 – 14

4. Challenges in defining the “Child”, “Juvenile” and “Juvenile Delinquency” in the International and Sri Lankan domestic law.
Induwara Goonerathne 15 – 21

5. A death due trans-diaphragmatic hernia years after firearm injuries.
Dayapala A. 22 – 26

6. Instructions to Authors 27



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EDITORIAL

IDENTIFYING VOIDS AND REMEDYING DEFECTS IN FORENSIC INVESTIGATIONS IN SRI LANKA

Induwara Gooneratne

The object and purpose of this article is to highlight some major defects in respect to forensic investigations in Sri Lanka and to propose remedial measures to those identified voids. The substances for this article are those that the author personally observed as a member of a forensic investigation team, as an academic in forensic medical science and as a lawyer.

Main stake holders in a forensic investigation are the police, forensic experts and the courts. The victim, accused and their families and the public in general also play a vital role in the forensic investigation. The police department plays the key role in a crime investigation and therefore plays a pivotal role in a forensic investigation. Scene visits, scene of crime management, collecting evidence, custody and transport of specimens, liaison with forensic experts, presenting evidence in courts are part and parcel of the responsibility of the police. Having worked with police in forensic investigations as a forensic expert and having involved in training police officers for many years in Sri Lanka, I have noticed that many police officers do not possess a clear objective idea as to what their role and purpose is in a crime investigation or in regard to forensic investigations. Due to this reason many a time the police prosecutions have failed at the trial level. One reason for this is their lack of training in handling forensic evidence and criminal investigations. Other than the initial in house training they had in the police training schools at the time of their recruitment, they are not exposed to formal continuous professional development training program in their service. Seldom, outside organizations will conduct some short term seminars or training sessions for the police. On the one hand those trained police officers will be internally transferred from one

department to another, for example a police officer who worked in a criminal unit can be transferred to an administration department or a welfare unit of the police station. Then the training he obtained while he was in the criminal unit on crime investigations or forensic investigations become in vain as such training will not be applicable in the unit he is currently attached after the transfer. Therefore, it may be worthwhile to look into possibilities of developing a carrier path for police in a respective area, for example criminal investigations. The new police officer who resumes duties will have to learn from the beginning if he had not worked in a criminal unit before. Another issue is the high politicization of police department and the undue influence and the pressure the politicians and the rich, place on the police officers. Often the police department is alleged to be non-independent, bias and corrupt. The other issue is the lack of understanding of police officers on forensic disciplines/experts other than the judicial medical officers. Not only the police but also the judges and the lawyers too are unaware that there are several other important specialities / disciplines in forensic investigations other than the judicial medical officer. They are aware of the Government analyst department, however the government analyst's unit in Sri Lanka does not have experts on DNA, odontology, anthropology or entomology, botany, archaeology etc. It is important that those who handle criminal matters be aware of police, scientific and legal fraternity) the locations of such other experts so that specimens can be referred whenever a need arises. It is also observed that the police who handle criminal matters lack the understanding of basic principles of criminal law and the procedural guidelines for investigating a crime.

Another issue that prevails is the lack of experts in certain areas of forensic investigations. For example there is no forensic entomologist nor there is a forensic psychiatrist or a forensic psychologist in Sri Lanka trained for legal purposes. The lack of modern equipment also is a hurdle for advanced forensic investigations. For example a DNA sequencer, facial profiling software or a confocal microscope can add to the research and service function in forensics.

The restrictions by statute, the practice of certain forensic specialities to certain units restrains diversity of opinion, defence opinions and research. For example fingerprint analysis is restricted by statute to the finger print analyst who is attached to the police department. Similarly the toxicological analysis is to be carried out by the government analyst, by statute. This has restricted the services of other trained personnel in these areas who are not attached to government analyst department. Forensic specialities other than forensic pathology or the government analyst are not recognised by the local system. This situation has created a power imbalance amongst practitioners. Also the private forensic laboratories are not duly recognised for medico-legal investigations. A defence medical practitioners presence is not welcome at an inquest or autopsy. These issues not only restrict a defence opinion but also due process entitlements of the accused and victim. This situation has even compelled world class local experts in forensic investigations such as forensic toxicologists, forensic entomologists, forensic scientists and forensic DNA analysts to migrate. The state attitude and structure impose utmost trust and honesty on the state forensic practitioner, however, ironically many a times there are bribery and corruption charges against several state officials in different state sectors. There is no established quality assurance in regard to forensic investigations in Sri Lanka. Mere appointment to a government position unduly assumes integrity quality competence and standards.

Inadequate number of forensic experts reduces the quality of service. Ordinary

medical graduates with no specialty training are performing major medico-legal functions. This situation leads to reduced quality of care and risks a fair trial. The legal fraternity assumes that all government medical officers are competent to perform medico-legal functions. There are medical officers who would be performing medico-legal duties in their first appointment having no previous stand alone experience.

Government analyst department is inundated with samples from all over the country and this leads to less quality of service, undue delay and false results. Decentralizing and opening up toxicological, ballistics and other forensic science services in universities will reduce the burden of the government analyst department. This can be in cooperated with opening up forensic science degrees in local universities

The delays in forensic reports have been an issue for many years for court as well as for victims in claiming insurance pensions etc.. The high workloads, lack of facilities as well as several other factors such as lack of support staff contribute to this. The lack of understanding of forensic sciences by lawyers lead to “no questions” in the court room often. This situation can be improved by their participation in forensic courses offered by universities, using internet and reading foreign cases.

These are some important issues to be addressed in order to improve the forensic service functions. Finally, adequate financial, resource and man power allocation to forensic units are important while capacity building of experts on modern analytical methods becomes pertinent. There are several key areas of forensic disciplines that need to be developed in the country. The authorities, practitioners courts and the general public should get together in order to establish unavailable services and experts and maintain the quality of service.

These concerns need urgent attention in order to move forwards with the rest of the world in the name of administration of justice.

ACUTE SEVERE SUICIDAL POISONING BY HERBICIDE PENDIMETHALIN; A RARE CASE REPORT FROM RURAL INDIA

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INTRODUCTION

In India, an agricultural country with a predominance of rural population (60-80%), acute agrochemical toxicity is a major health problem as they are freely available and extensively used. Agrochemical compounds pose an important community health hazard throughout the world, particularly in the Asia-pacific region. Due to their severe intrinsic toxicity, new compounds of low toxicity and high potency are continuously being developed to replace them.

Pendimethalin is such a compound which is widely-used as herbicide for the control of annual grasses and certain broadleaf weeds in commercial crops¹. It claims to exhibit least human toxicity and has been classified as a group C possible human carcinogen by the United States environmental protection agency². Only a very few cases of its toxicity have been reported till date around the world, invariably due to its deliberate ingestion³. Its toxicity is mainly manifested by head ache, drowsiness, nausea, vomiting, sore throat, retching and haematemesis etc. Here we report a patient who suffered gastro duodenal injury along with significant neurological manifestation after its deliberate self ingestion. This case is being reported on account of its rarity and significance for community health.

Case report

A young male farmer aged 25 years, was brought to emergency at 7.30 pm with an acute episodes of intractable vomiting which was watery in nature, and altered sensorium. He had no previous history of any premorbid illness. According to the history given by the

relatives, the patient was completely alright at 4.00 PM when he told his wife that he had consumed some chemical to end his life. The amount taken was around 50 ml. Since then he was having recurrent episodes of vomiting along with other features like headache, burning sensation and pain in throat and stomach. Later on he became drowsy followed by altered sensorium. He was taken to some local hospital but could not be relieved and referred to U.P. RIMS & R, Saifai.

At hospitalization, he was restless, confused, and delirious. Relatives denied consumption of any drug, poison or medications except the deliberate ingestion of some liquid which was later on found to be the herbicide GADAR (P 30% E.C.). Vital signs revealed temp 98 F, pulse rate of 74/ minute, blood pressure of 122/80 mmHg, respiratory rate of 21 per minute. Neurological examination revealed GCS of 9 /15 (E2V3M 4) with reduced movements of all four limbs. Pupils were normal size and reacting to light. Examination of chest revealed bilateral vesicular breathing. The examination of other systems was within normal limit.

The laboratory investigations included complete blood count, GBP, erythrocyte sedimentation rate, routine chemistries, liver and renal function test were within the normal limits.

In this case the diagnosis of Pendimethiline poisoning was made by reliable information from the victim, his relatives, used containers of the poison brought by them and the clinical findings. This was later on confirmed by the lab investigations.

Empirically, he was treated symptomatically with IV fluid, Omeprazole, and Antacids along with broad spectrum antibiotics and showed dramatic response. On the next day he regained consciousness, and there were no sensory motor deficit noticed. He was irritable and having burning sensation in throat and epigastrium. On the third day his psychiatric reference was done for his irritable behavior and found to be suffering from depressive symptoms with impulsive personality and advised Tab. Escitalopam 10 mg HS and Tab. Zolpidum 10 mg SOS.

After talking to relatives as well as the patient, this unfortunate incidence was found to be purely suicidal in nature. All the legal protocols were done as per the institutional rules.

What is pendimethalin?

pendimethalin ($C_{13}H_{19}N_3O_4$) is a dinitroaniline herbicide, its chemical name is n-(1-ethylpropyl) - 2,6-dinitro-3,4-xylidine and cas no. is 40487-42-1. It is a yellowish orange crystal-like solid with a faint nutty or fruit-like odor⁴. Pendimethalin is available in emulsifiable concentrate, wettable powder, or dispersible granule formulations.

A - Trade and Other Names: in India it is available as Gadar, Panda, Pendi etc in other countries its trade names include AC 92553, Accotab, Go-Go-San, Herbadox, Penoxalin, Prowl, Sipaxol, Stomp and Way-Up⁵.

B - Regulatory Status: Pendimethalin is a slightly toxic compound in EPA toxicity class III. Its products must bear the Signal Word CAUTION or WARNING, depending on the formulation. Pendimethalin is listed in the K1-group according to the HRAC classification and is approved in Europe, North America, South America, Africa, Asia and Oceania for different crops including cereals (wheat, barley, rye, triticale), corn, soybeans, rice, cotton, potato, tobacco, legumes, fruits, vegetables, nuts as well as lawns and ornamental plants.

Mode of Action

Pendimethalin acts during both pre & early post-emergence phase. It controls the weed population and prevents weeds from emerging, particularly during the crucial development phase of the crop. It is absorbed by plant roots and shoots and hampers their growth by inhibiting cell division and cell elongation⁶. Once absorbed into plant tissues, its translocation (move throughout to other plant parts) is limited and it breaks down by sunlight, microbes and oxidation⁶.

Uses

Pendimethalin is a selective herbicide used to control most annual grasses and certain broadleaf weeds in fields which interfere with growth, development, yield and quality of agricultural and horticultural crops by competing on nutrients, water and light. Thereby it protects certain crops like wheat, corn, potatoes, rice, cotton, and other as mentioned earlier. Incorporation into the soil by cultivation or irrigation is recommended within 7 days following application⁵. Its application is highly valuable in areas where weed infestation is particularly high.

The health and Toxicological Effects

Pendimethalin has caused thyroid problems in rats. In addition, it has also been classified as a "possible human carcinogen" by U.S. EPA based on benign thyroid tumors⁵. In animal studies Pendimethalin is highly toxic to fish and aquatic invertebrates, slightly toxic to birds^{6,7} and nontoxic to bees⁴. It generally demonstrates low toxicity on ingestion and very low toxicity if it is inhaled or gets on the skin. It is also toxic if it gets in the eyes.

Fate in humans and animals

Pendimethalin is largely unabsorbed from the gastrointestinal tract, and excreted unchanged in the feces⁸ its absorbed part is also rapidly metabolized in the kidneys and liver and is then excreted via urine⁸. It does not bioaccumulate (build up) in mammals.

Harmful levels of exposure

Pendimethalin is said to be slightly to practically nontoxic by ingestion, or by skin exposure^{4,6}, with reported oral LD50 values of 1050 mg/kg to greater than 5000 mg/kg in rats^{4,6}.

DISCUSSION

Different compounds, developed to protect crops are now themselves causing significant health hazards. Acute agrochemical poisoning is a global public health problem and a leading cause of mortality and morbidity in the developing countries of Asia - Pacific region including India. This is mostly due to exposure to organophosphates (most common in India), organochlorines, and aluminium phosphide compounds which are an integral part of agriculture within this region and are readily available at very cheap rate. Due to their intrinsic toxicity, new chemicals of high potency and low toxicity continue to be developed e.g. Imidacloprid, Pendimethalin, and Pencycuron etc., but they are released to the market without appropriate data on direct human toxicity. Instead, human toxicity is often extrapolated from toxicological studies in animals, the relevance of which is poorly defined. They are classified as a "moderate toxic", and generally demonstrate low human lethality but at times they may be hazardous⁹.

Pendimethalin generally exhibits very low human toxicity even in large ingestions. However co-ingestions with other similar chemicals may be hazardous. There is dearth of literature on pendimethalin toxicity, and available reports indicate that the pendimethalin toxicity is invariably associated with oral ingestion.

A study of 71 cases identified only 2 incidences resulting from skin and eye contact and the rest from swallowing intentionally or accidentally. Among them, 20 remained asymptomatic, 38 had mild effects (nausea, vomiting and sore throat) and only 7 patients develop significant toxicity in the form of

severe retching, vomiting of blood etc. Four patients died as a result of also taking other herbicides and because of inadequate airway management³.

In another case, a 73-year-old man has been reported to develop nausea and epigastric pain and corrosive gastroduodenal injury after accidental ingestion of the diluted (300 times with water) pendimethalin formulation. As he was chronic alcoholic for years and had no history of gastro duodenal ulcer, the accidental ingestion was supposed to cause this injury¹⁰.

Poisoning in India

The exact incidence of poisoning is not known in India due to lack of central registry but approximately it accounts for 10% of admissions in medical emergency. Poisoning is typically suicidal in nature which is ranked as third leading cause of death in age group 15-44 years. It was responsible for around 600,000 deaths in 1990s¹¹. In the past 50 years suicide rates have increased by 60%¹². After accidents and maternal mortality; suicide is the leading cause of death among the young in India, with a high prevalence in rural areas. Suicide is second leading cause of death among young people and with the decline in maternal death rates; it could soon become the leading cause of death among young women in India. Ingestion of agrochemical compounds is the principle mode for suicide. Of the 1.87000 people who committed suicide in India in 2010, around half (49% men and 44% women) consumed poison, mainly pesticides¹³.

Most of these toxicities occur due to exposure to (OP), organochlorines and aluminium phosphide. Among them, organophosphates OP poisoning is most common in India and chiefly presents as deliberate self ingestion in young population (20 -30 yrs) for suicidal purpose and quite uncommon in aged people more than 50 yrs. A case of a 55 yrs old farmer has also been reported, who developed significant toxicity by accidental inhalational

exposure during handling of multiple OP pesticides¹⁴.

Acute poisoning is a medical emergency, which poses a major threat to life. Its type, associated morbidity and mortality varies from place to place and changes over a period of time. The incidence of poisoning is rising in India. More than 50,000 people die of poisoning every year¹⁵. In India, OP compounds are the commonest class of pesticides which have been implicated in cases of poisoning, as ours is an agriculture based society and pesticides are readily available at a cheap rate. The OP toxicity chiefly presents as suicidal attempt by oral ingestion other routes of administration and modes of poisoning are very uncommon.

There is dearth of literature on pendimethalin toxicity, it is a urea derivative fungicide of very low toxicity. However co-ingestions with other similar chemicals may be hazardous. In case of Systemic poisoning the treatment is principally symptomatic as there is no specific antidote.

Emergence of such entirely new poisoning by the so called non toxic compounds is a big challenge to community health especially in rural population. Their clinical outcomes rely on early recognition, prompt referral and aggressive treatment in collaboration with different specialties. Awareness programs about such new toxicities should be implemented at different levels. This article illustrates that ingestion of these so called non toxic and safe compounds may also lead to significant toxicity which has not been reported earlier. The treating physicians should have a close watch and pay more attention to these patients⁹.

Such incidences are alarming as the clinical consequences of poisoning with such relatively newer and nontoxic compounds are not very well described, therefore such information / case reports are valuable for clinicians and concerned authorities and may help to save a number of precious lives⁹.

CONCLUSION

Substitution of existing highly toxic agrochemical compounds by the newer non/less toxic compounds in affected areas may help to save a number of precious lives. But such occurrence by these so called non toxic compounds is a big challenge to the community health. Their clinical consequences are not very well described and outcomes rely on early recognition, prompt referral and aggressive treatment in collaboration with different specialties. Therefore such information / case reports may help to improve clinical management and inform pesticide regulators of their relative toxicity. Awareness programs about such new toxicities are also highly valuable.

Though the appropriate and timely management has vital role, the importance of preventive measures and public awareness can not be ignored in saving precious lives and should be implemented at different levels.

Key message

The exposure of so called non toxic compound should not be ignored as this case illustrates that they may also be hazardous. The treating physicians should be vigilant and must have a close till full recovery of these patients.

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COMPETENCIES EXPECTED FROM A MEDICAL OFFICER IN PERFORMING MEDICO LEGAL DUTIES: THE RESULTS OF A DELPHI STUDY CONDUCTED AMONG JUDICIAL MEDICAL OFFICERS IN SRI LANKA

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INTRODUCTION

In Sri Lanka and other South Asian countries, much of the medico-legal work is done by government medical officers who do not have a post-graduate qualification in forensic medicine. No matter what branch of medicine or surgery the graduate enters he will always have to face medico legal problems. If he is in general practice these may occur daily. Sometimes when a doctor evaluates a patient with a violence-related injury, whether it is at the emergency care unit, surgical unit or any other unit, it is unknown whether the case will have a medico legal outcome. Some of these patients have injuries or conditions that have criminal or civil forensic medical implications and the prospect of courtroom sequelae. It has been observed that many practicing doctors are not very confident about performing routine medico-legal duties. Those medical officers not trained in the area of medico legal work have insufficient experience of such work which results in destroying, throwing away or losing pertinent evidence, illegible records, partial documentation, or incomplete medical records, delayed forensic examination, missing subtle injuries because of lack of pattern recognition and making “educated guesses” about the mechanism of injury which all result in the medical evidence not being properly presented in court (Wiler & Bailey, 2007).

Undergraduate curricula cannot include all aspects of a specialty and the criteria for including content into the undergraduate curricula should not be based purely on the

enthusiasm of teachers. Medical curricula should be focused on outcomes and supported by a strong foundation of educational theory and research. It is therefore necessary to develop an evidence based approach to making decisions on the content that is to be included in undergraduate curricula. It is expected that such interventions will improve education and help learners achieve the competencies pertinent to their profession (Thomas P, 1999).

OBJECTIVE

To identify competencies expected from a medical officer in performing medico legal duties

METHOD

The Delphi technique was employed to identify competencies that are expected from a medical officer in performing medico-legal duties (Brown et al., 2006 ; Brown et al., 2005).

This included the following stages

(1) Designing the first round questionnaire

A questionnaire was designed to include statements that have been identified from the following sources, as medico-legal duties of ‘medical officers’¹;

1. Circulars of the ministry of health: Medico-legal duties of medical officers in the ministry of health Sri Lanka as

documented in the Manual of management of District Hospitals, Peripheral units and Rural hospitals and the Manual of management of provincial hospitals, 1995²

2. National benchmarked consensus standards 2004³
3. The criminal procedure code⁴
4. The evidence ordinance⁵
5. Literature review (Harden and Dent, 2005, Schwarz and Wojtczak, 2002, Simpson et al., 2002).

These statements were collated into a single list. Statements in the list were grouped and assessed for similarity, and similar attributes were amalgamated and grouped into 09 broad educational outcome domains. Each competence was accompanied by a five point competency category scale; Definitely not important (1), Probably not important (2), Undecided (3), Probably important (4), Essential (5).

A pilot study was undertaken and changes were made to the original questionnaire based on the feedback.

(2) Selection of “expert panel”

The “expert panel” consisted of those who satisfied the following selection criteria.

1. Successful completion of the MD in Forensic Medicine **OR**
2. Board certified in forensic medicine, in the absence of an MD
3. Agreement to be a part of the expert panel

(3) First round of the Delphi survey

The modified questionnaire was distributed by electronic and postal mail to 52 “experts” who consented to participate. They were requested to define the standards required by a medical officer in performing medico-legal duties, to be judged competent. The respondents were encouraged to rate each competency according to the five point competency

category scale. The respondents were also prompted to add any other competencies that they felt were necessary or remove any items they felt inappropriate or unnecessary, and provide any further comments. Information on the number of years of judicial medical service, approximate number of autopsies conducted and the approximate number of clinical medico-legal cases examined were also accessed via the questionnaire.

The responses were anonymous. The questionnaires were coded to ensure that non-responders could be contacted and to ensure that the feedback from the first round questionnaire could be given accurately via the second round questionnaire. Subsequent written, email and personal telephone reminders were made to the non-responders after 4 weeks.

The ratings given by the respondents in the first round were summarized by calculating percentages for each statement from the total responses to the questionnaire.

Free text comments were assessed for any common recurring themes.

(4) Second round of the Delphi survey

The second round questionnaire was created by excluding statements which received 80% or more for the competency category 5 (essential). The remaining statements were included with information of the percentage response to the categories definitely not important, undecided and essential, for each statement together with a reminder of the respondents own previous score. The second round questionnaire was re-circulated among the experts who responded to the first round questionnaire, by electronic and postal mail. Each expert was asked to study the group response and indicate whether their individual opinion remained unchanged or should be modified in the light of the responses made by the other members of the panel. Further modifications or additions to the statements were not sought.

Subsequent written, email and personal telephone reminders were made to the non-responders after 4 weeks.

The responses to the statements in the second round were compared with the first round responses. The percentages were calculated for each statement in each category considering the cumulative response in both rounds. The percentage change in response was calculated for each statement.

DEFINING CONSENSUS

In order to distinguish the more important statements a *group agreement* was defined as, if the statement under consideration received a total agreement of $\geq 80\%$ in the essential category in the first Delphi round.

The *net change* in agreement between Delphi rounds will be used as a measure of the *level of agreement* between the panel members. *Group consensus* was defined as total agreement $\geq 80\%$ in the essential category after the second Delphi round with a net change of less than $\pm 10\%$.

If both these parameters (*group agreement* and *group consensus*) are satisfied, *group consensus agreement* will be established and the statement will be defined as an essential

competence for medico-legal practice (Brown et al., 2005).

VALIDATION

A committee forum was conducted with a validation sample of 4 experts who were requested to provide their views upon the list of competencies identified as “essential”, subsequent to the 2 postal rounds.

RESULTS

Essential competencies for medico-legal practice
Twenty five questionnaires were received (response rate 69.5%).

Demographic data of the experts

One Judicial Medical Officer had not responded to the demographic details requested.
Mean number of yrs in judicial medical service 14.5 yrs.
Mean number of autopsies conducted 2790
Mean number of clinical medico-legal cases examined 10,481

Table 6
Statements which received group consensus agreement as essential competencies

Develop clinical skills		Definitely not important	Probably not important	Undecided	Probably important	Essential	Change
1.1	Take a history, for medico-legal purposes, using a thorough approach	0	0	0	4 (11)	32 (89)	
1.2	Physically examine patients, for medico-legal purposes, in a thorough and sensitive manner	0	0	0	1 (3)	35 (97)	
1.3	Observe clinical phenomena accurately	0	0	0	4 (11)	32 (89)	
1.4	Refer relevant cases for inquests	1 (3)	1 (3)	0	5 (14)	29 (81)	
1.5	Identify a judicial from a pathological post mortem	0	1 (3)	1 (3)	2 (6)	31 (86)	

1.6	Conduct an autopsy using routine dissection procedures	0	1 (3)	0	1 (3)	34 (94)	
1.7	Conduct an autopsy using special dissection procedures	0	1 (3)	0	5 (14)	30 (83)	
1.8	Observe autopsy phenomena accurately	0	0	0	1 (4)	34 (94)	
1.9	Differentiate postmortem changes from ante mortem phenomena	0	0	0	2 (6)	34 (94)	
1.10	Estimate time since death	0	0	1 (3)	4 (11)	31 (86)	
1.11	Determine the cause of death	0	0	0	0	36 (100)	
1.12	Identify abnormalities in the body that occur due to trauma	0	0	0	0	36 (100)	
1.13	Describe injuries for medico-legal purposes	0	0	0	2 (6)	34 (94)	
1.14	Interpret injuries and injury patterns for medico-legal purposes	0	0	0	1 (3)	35 (97)	
1.15	Understand the etiology and natural history of diseases	0	0	2 (6)	4 (11)	30 (83)	
1.16	Investigate a sudden natural death	0	0	0	5 (14)	31 (86)	
1.17	Identify the possible cause for a negative autopsy	0	0	0	4 (11)	32 (89)	
1.18	Identify the living and the dead for medico-legal purposes	0	0	1 (3)	2 (6)	33 (92)	
1.19	Investigate a case of suspected criminal abortion for medico-legal purposes	0	0	1 (3)	3 (8)	31 (86)	
1.20	Investigate asphyxial deaths for medico-legal purposes	0	0	0	2 (6)	34 (94)	
1.21	Investigate a scene of crime	1 (3)	1 (3)	0	4 (11)	30 (83)	
1.22	Investigate a mass disaster	1 (3)	1 (3)	1 (3)	4 (11)	29 (81)	
1.23	Perform an exhumation/excavation	2 (6)	0	1 (3)	3 (8)	30 (83)	
1.24	Investigate a case of poisoning for medico-legal purposes	0	0	0	2 (6)	34 (94)	
1.25	Investigate a case of drunkenness/substance abuse	0	0	1 (3)	1 (3)	34 (94)	
1.26	Justify the selection of appropriate investigations	0	0	2 (6)	4 (11)	30 (83)	
1.27	Identify abnormal human behavior	0	0	1 (3)	5 (14)	29 (81)	+2 (6)
1.28	Diagnose and certify death	2 (6)	0	0	5 (14)	29 (81)	+2 (6)
1.29	Document the cause of death according to the WHO format	0	0	0	5 (14)	31 (86)	+3 (8)
1.30	Identify abnormalities in body structure/ function	0	0	0	4 (11)	30 (83)	+2 (6)

Demonstrate an analytical approach and evidence based attitude in professional activities							
2.1	Analyze and interpret findings in order to solve problems	0	0	0	3 (8)	31 (86)	
2.2	Work with awareness of the power and limitations of scientific thinking	0	0	0	5 (14)	29 (81)	+2 (6)
2.3	Work with awareness of complexity, uncertainty and probability in decisions in medico-legal practice	0	0	0	4 (11)	30 (83)	+3 (8)
2.4	Determine the scientific basis for clinical and autopsy findings	0	0	0	2 (6)	32 (89)	
Work efficiently within the medico-legal framework and laws related to medical practice							
3.1	Work with awareness of how the medico-legal system is organized	0	0	0	5 (14)	30 (83)	
3.2	Utilize facilities/services related to medico-legal practice appropriately	0	0	0	2 (6)	33 (92)	
3.3	Demonstrate knowledge of laws applicable to medical practice	0	0	1 (3)	4 (11)	30 (83)	+2 (6)
3.4	Maintain chain of custody in communicating with relevant institutions	0	0	0	0	35 (97)	
3.5	Maintain confidentiality in communicating with relevant institutions	0	0	0	1 (3)	34 (94)	
Communicate effectively and sensitively							
4.1	Communicate with patients in a sensitive manner	0	1 (3)	0	3 (8)	31 (86)	
4.2	Communicate appropriately in difficult circumstances such as breaking bad news and discussing sensitive issues	0	0	0	5 (14)	30 (83)	+2 (6)
4.3	Communicate effectively with court	0	1 (3)	0	1 (3)	33 (92)	
4.4	Communicate effectively with colleagues, police, lawyers, community and other sectors	0	0	0	3 (8)	32 (89)	
Practice medicine ethically and in accordance with the standards set by the Sri Lanka Medical Council							
5.1	Handle patients and their relatives in an ethical manner	0	0	0	1 (3)	34 (94)	
5.2	Recognize the rights of people	0	0	0	1 (3)	34 (94)	
5.3	Identify what amounts to medical negligence and the defenses available to the practitioner against a charge of medical negligence	0	0	0	4 (11)	30 (83)	
Handle vulnerable groups effectively (elder abuse, child abuse, infanticide, SIDS, domestic violence, violence in custody)							
6.1	Identify signs that suggest abuse/neglect	0	0	0	1 (3)	35 (97)	
6.2	Investigate a suspected case of abuse/neglect	0	0	0	2 (6)	34 (94)	

6.3	Know what action to take to safeguard the welfare of the abused/ neglected	0	0	0	6 (17)	30 (83)	
6.4	Investigate a victim alleging sexual abuse for medico-legal purposes	0	0	0	1 (3)	35 (97)	
Maintain accurate, legible and complete medical records							
7.1	Maintain records of relevant communications with patients/relatives, colleagues and courts	0	0	1 (3)	4 (11)	31 (86)	
7.2	Record data and observations accurately, legibly in the relevant documents	0	0	0	1 (3)	35 (97)	
7.3	Synthesize and present information appropriate to the needs of the audience	0	0	1 (3)	5 (14)	30 (83)	+2 (6)
7.4	Ensure safety of documents	0	0	0	1 (3)	35 (97)	
7.5	Ensure easy and quick access to records	0	0	0	4 (11)	32 (89)	
Ensure personal development							
8.1	Develop professional values like responsibility, honesty and commitment to scientific methods	0	0	0	0	36 (100)	
8.2	Seek out information rather than to wait for it to be given	0	0	0	6 (17)	30 (83)	+3 (8)
8.3	Recognize one's own personal and professional limits and seek help	0	0	1 (3)	5 (14)	30 (83)	
8.4	Recognize the need for continuous self-improvement	0	0	1 (3)	3 (8)	32 (89)	
8.5	Resolve conflicts in a professional manner	0	0	0	5 (14)	31 (86)	
Contribute to the development of the specialty of forensic medicine and the medico-legal system							
9.1	Demonstrate basic skills and positive attitudes towards teaching	1 (3)	1 (3)	0	4 (11)	30 (83)	+3 (8)
9.2	Ensure the safety of health care workers working in your team	0	0	0	5 (14)	31 (86)	

Opinion of the validation sample

The validation sample confirmed the above competencies as essential.

Table 8

The responses to outcome categories in round 1 (R1) and round 2 (R2)

Outcome	No. of competencies in R1	No. (%) of items considered as essential in R1	No. of items considered as essential in R1 & R2
Develop clinical skills	33	26 (79)	30 (91)
Demonstrate an analytical approach and evidence based attitude in professional activities	9	2 (22)	4 (44)
Work efficiently within the medico-legal framework and laws related to medical practice	5	4 (80)	5 (100)

Communicate effectively and sensitively	7	3 (43)	4 (57)
Practice medicine ethically and in accordance with the standards set by the Sri Lanka Medical Council	3	3 (100)	3 (100)
Handle vulnerable groups effectively (elder abuse, child abuse, infanticide, SIDS, domestic violence, violence in custody)	6	4 (67)	4 (67)
Maintain accurate, legible and complete medical records	5	4 (80)	5 (100)
Ensure personal development	9	4 (44)	5 (56)
Contribute to the development of the specialty of Forensic Medicine and the medico-legal system	4	1 (25)	2 (50)

INFERENCE

There is more emphasis on outcome categories of clinical skills, medical law, ethics and maintaining records while there was less emphasis on critical thinking, communication, handling vulnerable groups, ensuring personal development and contributing to the development of the specialty.

DISCUSSION

This research established specific, expert derived, evidence and competency based learning outcomes for medico-legal practice. The fact that information was accessed, in this study, from a number of sources and techniques (identifying critical elements of behaviour via accessing expert judgement, identifying medico-legal needs based on circulars issued by the ministry of health, the benchmark statement of the university grants commission, the criminal procedure code and the evidence ordinance) and the fact that information was gathered systematically makes the data more valuable and useful than random impressions.

It is accepted that the qualifications and experience of an expert may give credibility to the services provided by that expert. However it is seen that in routine medico-legal issues the same degree of expertise is expected from a generalist as from a specialist. Therefore in the process of identification of competencies required for medico-legal practice, this study did not differentiate between the competencies

required by specialists and generalist but on the identification of competencies needed for 'medico-legal practice' in general.

A modified version of the Delphi technique was used in the present study, for accessing expert judgement where the first round questionnaire itself was structured with a few open ended questions. Even though a questionnaire with open ended questions would have increased the richness of the data this hybrid method was preferred to strike a balance between representativeness and accuracy. The validity and reliability of the questionnaire was improved by utilising multiple sources (circulars of the ministry of health, the ministry of higher education, the ministry of justice, other literature) for its construction and pilot testing the questionnaire. The fact that there were no sufficiently frequent themes in the free response section to justify modification of the second round questionnaire and the fact that comments made merely endorsed what was already included reflects the satisfaction of the experts with the questionnaire and provides further corroboration of the accuracy and validity of the items included.

In spite of the fact that there is greater generation of data as the number of participant's increases, there is very little actual empirical evidence on the effect of the number of participants on the reliability or validity of consensus processes. Inclusion of a limited number of participants (since there are a limited number of specialists satisfying the criteria for inclusion in Sri Lanka) for this study maybe justified by the fact that

representativeness in Delphi studies is assessed on the qualities of the expert panel rather than its numbers (Hasson et al., 2000). Since the respondents of this study (the experts) consisted of those attached to the ministry of health (consultant judicial medical officers) as well as those attached to the ministry of higher education (university teachers) and had significant experience in medico-legal work (a mean of 14.5 years of service in medico-legal work with a mean number of medico-legal cases examined being 10,480 and a mean number of autopsies conducted 2790) indicates that they are broadly representative of those suitable to identify competencies.

Even though there are no firm rules for determining when consensus is reached in Delphi studies, the level at which panel agreement became consensus was considered carefully in this study. This study utilised the concept of empiricism. Initially a cut off level of 90% was considered and a short workable list of competencies was identified. However this resulted in exclusion of some competencies that were considered important in medico-legal practice (eg., the entire outcome category of; "Demonstrate an analytical approach and evidence based attitude in professional activities"). Therefore the researcher considered a more inclusive set of competencies using 80% as a cut off. This resulted in a longer but workable set of competencies. Even though empiricism is considered to introduce a degree of subjectivity to the result the researcher attempted to minimise this by introducing strict inclusion criteria in selecting the panel and monitoring the attrition rates to ensure that the range of expert opinion is adequately represented in successive rounds and that response bias is reduced.

However, even though successive rounds show an improvement in the numerical strength of consensus, it is unclear whether this actually reflects the accuracy of the group's decision making (Greatorex and Dexter, 2000). The possibility of the "Halo effect" "majority opinion" or 'Social

desirability bias' where the panellists may be persuaded to conform rather than express true agreement and 'tactical voting' where the group tries to swing the conformists towards their opinion in later rounds was acknowledged (Yeates, 2010). However the issue of this potential bias was minimised in the interpretation of data by excluding statements with a *net change* in agreement between Delphi rounds of more than +/-10% (3 out of 30). (Greatorex and Dexter, 2000) The fact that the net change in opinion is within +/-10% for a majority (27 out of 30) of competencies enhances the validity of the results of this study. The reason for lower level of agreement (higher net change) of the competencies "Use communication and information technology to assist in the administration of justice", "Understand the application and limitations of information technology" and "Conduct medical research with knowledge of the ethical principles" may be the lack of insight of the more senior experts into the importance of information technology and research in medico-legal practice. The effect of the 'social desirability bias' too cannot be excluded. The conduct of a committee forum with a validation sample added strength to the results of this study.

The response rate in this study was moderate. Even though Greatorex and Dexter (2000) identified disagreeing with the design and content of the study and lack of faith in the initial results as reasons for high attrition rates, the fact that a pilot study was conducted, there was no criticism regarding the design and content of the study in the free response section and the fact that diversity of opinion was low between the two rounds indicate that this is not the case. The possible reasons for attrition in this study maybe participant fatigue and low motivation. Attrition was influenced in this study by limiting the number of questionnaire rounds to two, by following up the non-respondents closely and by removing statements with a response of over 80% in the first round in order to avoid duplication resulting in panel fatigue in the second round. This study addressed the issue of a moderate response

rate (69.2%) by the inclusion of a validation sample of respondents who were requested to provide their views upon the series of statements already identified by the experts (Broomfield and Humphris, 2001). The consensus between the two groups of respondents gave some reassurance about the efficacy of the study.

When considering identification of the importance of outcome categories by the experts several interesting findings were revealed. Ethics scored highly with all its competencies being identified by the experts as essential in the first round itself. Clinical skills, maintaining records, and medical law followed closely with all the competencies in the latter two categories being accepted in the second round. However areas such as analytical approach, communication skills, personal development and contributing to the development of the speciality scored low in the list. A significant proportion of the competencies in the outcome categories analytical approach (55.6%), communication skills (42.9%), handling vulnerable groups (33.3%), personal development (44.4%) and contributing to the development of the speciality (50%) were considered “non-essential”. This is probably due to a number of reasons. Firstly, the group consisted mainly of “clinicians” with an active service component but with minimum teaching and research experience. Second, the traditional nature of the curricular which the experts themselves have experienced and finally a background culture of more traditional legal practice which they are exposed to where the doctors’ conduct and opinion as an expert witness was hardly challenged due to the respect for the doctor and the lack of medical background of the lawyers. However, since all the panellists, fulfil strict expert selection criteria, it is important to consider the responses of the expert group as a whole to ensure an appropriate balance of opinion and therefore an objective conclusion. Certainly there would be many in the medical education community who would strongly support the inclusion of some of the rejected competencies (eg., competencies related to outcome “Demonstrate an analytical approach

and evidence based attitude on professional activities”). It is important to note at this stage that even though there were 19 competencies identified as “non-essential” by experts a significant proportion (25%) considered them as “probably important” with little diversity of opinion within the expert group (the % change between the 2 rounds is more than 10 in only 3 competencies). This acknowledges the fact that these competencies have been considered as important’ but not ‘essential’.

CONCLUSION

The standards that are required by an expert medical witness to be judged competent, in Sri Lanka, have been established. This would provide an evidence base to determine what needs to be included in undergraduate medico legal curricula. A similar methodology maybe adopted when identifying what needs to be included in curricula of other disciplines.

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CHALLENGES IN DEFINING THE “CHILD”, “JUVENILE” AND “JUVENILE DELINQUENCY” IN THE INTERNATIONAL AND SRI LANKAN DOMESTIC LAW.

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The concepts of “Child” “Juvenile” and “delinquency” are three notions that legal and medico-legal communities categorically deals with. The concept of child is not only relevant to medico-legal practice in terms of managing child abuse but also dealing with juvenile delinquents. The Term child has diverse significations in the literature. These include and not limited to ‘persons under the age of eighteen years of age’, ‘those who have not reached “majority”’ and ‘those who are under the age of fourteen’. Many “terms” such as “minor”, “infant” “juvenile” “sub adult” are used interchangeably and confusingly to denote the “child” semantically, while each term tend to own its own literal meaning . Such terms may have different connotations all together in contexts of law.

The aim of this paper is to examine and evaluate the concept of “child” ,the concept of “juvenile” and the concept of “delinquency” and their definitions as applied in the law. Although several other disciplines (e.g psychology) may have many different additional terms to denote a “child” or a “juvenile”, it is not the scope of this paper to examine such other disciplines other than the discipline of law. This conceptual analysis therefore is limited to the use of the term “child” and “juvenile” and similar terminology to denote a child or a juvenile in the legal literature and medico- legal case work.

The analysis and discussion of the above three major concepts in this study becomes important and relevant as it can highlight the confusing nature of the definitions and understanding of the terms, their limitations, issues and practical difficulties one can anticipate in applications of those terms in the

juvenile justice process at the grass root levels especially in a developing country.

It is also important and relevant to understand as to how the notion of “child” “juvenile” or “delinquency” are perceived formed and shaped in the Sri Lankan culture. The definitions and the cultural acceptances of these notions tend to form an image of the “child” and “juvenile” in the society .If the image of the notions under study is not formed exactly as indicated by the international law, then the expectations of the international law would not be met. For example, if the cultural tendency is to treat older children as adults in the society in general, then it will be not plausible to reflect treatment of all children equally as children by the juvenile justice administration.

Three main arguments made are;

1. There is no consensus on the age limitation of childhood or juvenile in the law. Different laws have indicated different legal ages for identifying “children” which makes interpretation and appreciation quite confusing.
2. As a result of the variability of the age cap of a juvenile in the international law and local legal scenarios, the application of juvenile justice principles and child rights can vary. This situation undermines the universality nature of human rights and juvenile justice administrations.
3. The idea of delinquency is ambiguous in regard to children and unequally used between adults and children

International laws and domestic laws categorically use terms such as “child” and “juvenile” in official texts. For example in the

“United Nations (UN) Child Rights Convention – (UNCRC) ” the term “child” is predominantly used where as in Beijing Rules (UN Minimum Rules for the Administration of Juvenile Justice,1985) and Riyadh Guide Lines (UN Guidelines for the Prevention of Juvenile Delinquency,1990”, the term “juvenile” is used to denote children and young people. Ironically, in research articles and in literary texts, terms ‘child’ and ‘juvenile’ are used interchangeably at times.

Biologically, a child (plural: children) is generally a human being between the stages of birth and puberty. But some vernacular definitions of a child include the foetus (as well), as being an unborn child.¹ The legal definition of "child" generally refers to a “minor”, otherwise known as a person younger than the age of majority. "Child" may also describe a relationship with a parent (such as sons and daughters of any age or, metaphorically, an authority figure, or signify group membership in a clan, tribe, or religion; it can also signify being strongly affected by a specific time, place, or circumstance, as in "a child of nature" or "a child of the Sixties". Such varieties of terms being used to denote a “child” in the literature confuses a reasonable and a prudent individual who attempts to articulate “who actually a “child” is in true sense”? Having a dichotomy in the definition and perception of this pivotal concept within this thesis makes the juvenile justice practitioner hesitant or rather bias in either provision or ensuring protections or guarantees ensured in the juvenile justice jurisprudence. Having a mixed mindset in regard to who a child is invariably leads a juvenile justice practitioner for an ambiguous state especially when dealing with children in older ages. In other words, when the age is more towards the upper end of the spectrum, for example in “Straight 18” approach towards the age of 18 (see below) their tendencies to be treated as adults are greater.

The Merriam Webster Dictionary 2012 online version provides the following (among others) as the meaning of the term “child”.

1. An unborn or a recently born human person
2. A young person especially between infancy and the youth
3. A person not yet of age
4. A son or a daughter of human parents

Examining the meaning provided for the term “child” in this well accepted dictionary it is apparent that this term is used vaguely to denote human beings ranging from foetuses to young age. An age at which a child becomes an adult is not stated in this definition and remains silent. As “any son or daughter of human parents” can include adults, this definition of child can be extended to include all human beings, as they are sons or daughters of ‘some’ “human parents”. The inference that can be deduced according to this definition is that in general terms the upper age limit of the child is implicit wage and silent.

Merriam Webster English dictionary online version (2012) defines the term “Juvenile” as;

- a) reflecting psychological or intellectual immaturity
- b) physiologically immature or underdeveloped
- c) relating or suitable for children.

Considering the above well accepted dictionary definition, a reasonable question arises as to whether those intellectually and psychologically disabled adults such as those who suffer from conditions such as “Autism” etc are also considered “juveniles” irrespective of their age merely taking into account their intellectual disability. Critically looking at the above dictionary definition of a juvenile, another reasonable question arises as to whether the term juvenile is a synonym for children. It is worth considering whether these two terms “child” and “juvenile” are used to mean the same “thing” or “person” in the law. The main international law that defines a “child” is the CRC (the UN Convention of the Rights of the Child). In the CRC the article 1 defines a child as “a child means every human being below the age of eighteen years unless under the law applicable to the child, majority is attained earlier”.

Considering the above international legal definition of a child two facts are relevant.

1. A child is a human person under the age of 18 years. This means that those who have already attained 18 or above are not considered children according to this law.
2. There is a provision provided within this definition for states to define when human persons could attain the age of majority. In other words if a state has already defined the age of majority to be lower than 18, children in that particular state would be those under such age of majority defined in the local law. For example, if a state has defined in its local law that the age of maturity/majority is 16 years hypothetically, for that particular local context “children” would be those under 16 years. Those above 16 would be considered adults in that particular state. The disadvantage of this provision is that those persons between the age of 16 and 18 will not be able to technically enjoy the protections guaranteed by the UNCRC in that particular country. However the international law does not allow the age of a child to be higher than that of 18 years. Further those who have attained majority are no longer children.

Two different other issues arise with this definition. The states are not provisioned to increase the age of majority above 18. Also, for those who do not have accurate recordings of their birth dates or who do not have valid documentations of proof of their age has a legitimate problem of enjoying the rights of the CRC. This affects mainly those who are around 15 – 18 years of age. In criminal cases what generally happens is that such “children” who are unable to prove the age are produced to a medical practitioner to estimate the age. It has been accepted scientifically that an accurate “age” pointing to a particular year cannot be made on an individual based on biological evidence due to biological and other variations exist in human beings. In these instances those “children” would not be able to enjoy such privileges of CRC or juvenile justice.

According to the article 1 of the CRC it is obvious that those persons who have already reached the age of 18 will not be covered under CRC hence its protections as “a person should be below the age of 18 to enjoy the privileges of UNCRC

The Age of the Child and the International Law

The development of international human rights law and humanitarian laws have shaped and remodelled an internationally acceptable definition of a child. The main international legal instrument that categorically defines a child is the UN (United Nations) Convention of the Rights of the Child- CRC). This is the most widely accepted and widely ratified UN human rights instrument. The binding nature of the CRC on the nations that have ratified provides a legal obligation for the states to comply with its provisions and to ensure and protect the rights that have been guaranteed by it. The CRC attempts to present a “straight 18” definition for a child, which means that the age of the child could range from birth up to the age of 18 and not beyond the age of 18. According to the CRC article 1 the definition of the child is stated as

“for the purposes of the present convention a child means every human being below the age of eighteen years of age unless under the law applicable to the child, majority is attained earlier”.

The UN minimum rules for the administration of juvenile justice also known as “Beijing Rules” define a “juvenile” as follows under its general principles: section 2.

“A juvenile is a child or a young person under the respective legal systems may be dealt with for an offense in a manner which is different from an adult”

In analyzing this “definition” it is obvious that there are two distinct categories that this international legal instrument deals with: Children and young persons. In other words, both children and young people belong to the

category of “juvenile” according to the above international law. Thus, a juvenile is a child (one below 18 years of age) or a young person. As to “who is a young person”, the Beijing rules or other international rules such as Havana Rules or Riyadh Guide lines concerning juvenile justice are silent,. What the international law has attempted in this situation is that, it has given provisions and discretion to individual states to define who a “young person” is that would suit each socio-cultural context of the state. Therefore, there can be diversity in defining who a young person is in different states. For example, a young person can be those who are below 18 in accordance to one state’s wish or it can be those who are between 18 years to 22 years. For example CYPO (the Children and Young Persons Ordinance in Sri Lanka) a child is a person under the age of 14 years and a young person is between the age of 14 to 16 years. The CYPO there for have no provisions for children between 16 to 18. They are neither considered children nor young persons: Are they then adults?

As a result, a juvenile offender according to Beijing rules means a child offender or a young person who is alleged to have committed or who has been found to have committed an offense.

In accordance to the international acceptance, juvenile justice means the entire process of the management and administration of justice involving children or young persons as suspects / convicts and convicts². However, by tradition and conception juvenile justice primarily involves children or young persons who are in conflict of “criminal law”³. Although there can be children or young people who can be in conflict with civil law, such offenders are not dealt within this specialized branch of law.

In accordance to the latest publication by “Save the Children, UK” , known as “ Juvenile Justice- Modern concepts of working with children in conflict with the Law” , the purview of juvenile justice extends beyond the management and administering crimes

committed by juveniles to examining root causes of offending behaviour and taking measures to prevent such behaviours. Therefore Juvenile Justice scope has two distinct focus: prevention and protection of juveniles. The prevention aspect involves methods to ensure that the children do not come into conflict with the law in the first place and therefore do not come in to contact with the formal criminal justice system. Prevention aspect also includes addressing the issues of recidivism amongst child offenders. The focus of protection deals with measures that are needed to protect children and young persons who are already in conflict with the law and also to prevent them from re offending. This scope includes ensuring their basic human rights, procedural safeguards such as due process and best interest. The aim of the scope of juvenile justice is to ensure that the child offender is rehabilitated and integrated to the society in a useful manner⁴

It must also be mentioned that terms such as “youth” “adolescent” “minor” “infant” “sub adult” are also used in the society to include young people. However the usages of these terms are not unanimous and not consistent within societies. Therefore the use of the terms “juvenile” and “child” make sense in the law as they have been defined categorically for legal purposes.

The idea of “straight 18” position indicated through the UNCRC is widely accepted in the international law. However in the international laws governing war or humanitarian laws attempt to prohibit engagement of children as child soldiers who are under the age of 15. These ideas were extended through the protocols additional to the UNCHR. The additional protocols to the UNCHR or the Humanitarian law did not attempt to define a child but categorically indicated that “no child under the age of 15 can be used for combat – related purposes”(CRC optional protocol,1). This situation creates an issue/tension regarding general values of human rights law. In the human rights law child conscription prohibition is accepted as a general value. The human rights law regards all persons under 18

years of age as children. However, the optional protocol 1 of the UNCRC and Vienna Convention allows (thus indirectly) children over 15 years (15 years to 18 years to be specific) to be engaged in combat related activities. This seems the laws applying to war or armed conflict prefer to identify children as those who are above the age of 15 and as a result children between 15 to 18 years as adults?

Ideas about childhood and ideas about legal rights of children vary significantly among cultures. Many sovereign states and scholars have stressed and argued for a national definition of childhood in the law and enabling sovereign states to have discretion on establishing laws concerning childhood depending on individual cultural acceptances. It is with respect to this move especially from the eastern wing of the UN that the provision “unless under the law applicable to the child, majority is attained earlier” came about in the definition of child in the UNCRC article 1.

Another relevant International Law in this aspect of age of a child is the Minimum Age Convention 1973. The aim of the Minimum Age Convention (MAC) is to introduce a general legal framework on the subject of the minimum age for employment with a view to achieving the total abolition of child labour. Thus, each State Party is to “pursue a national policy designed to ensure the effective abolition of child labour and to raise progressively the minimum age for admission to employment to a level consistent with the fullest physical and mental development of young persons” (article 1). States Parties must specify a minimum age for admission to employment or work, subject to certain exceptions set forth in the MAC. That minimum may not be less than the age of completion of compulsory schooling and, in any case, less than fifteen years, but it may initially be set at fourteen years if a state’s economy and educational facilities are insufficiently developed (article 2). Exceptions to the age limits may also be permitted for light work or for such purposes as participation in artistic performances

(articles 7 and 8). If the employment may be hazardous to a young person’s health, safety, or morals, the minimum age is generally not to be less than eighteen years (article 3(1)). If the aim of this important international law was to abolish child labour completely (its preamble) why then the instrument itself suggests an age around 15 as a minimum age for employment. This situation suggests that although in general terms persons under 18 years are considered to be children (UNCHR) in the general international law under special circumstances and for special purposes the age of children seem to be lowered to 15(or to 14) . In the labour situation and in the law of war situation “children” between 15 to 18 are considered no longer children and more or less treated as adults.

This misleading situation makes it possible for juvenile justice practitioners to treat older children more like adults which is contrary to the expectations of the international law on children and juvenile justice.

In the US there are several judgments concerning the age of a “child”. One such important case is *Sheffield et al v Franklin* 9 1907) Aa, 44 So Rep.373. In this adoption case the court held that the word “child” is used in the sense of relationship and not of infancy. At the time of adoption the age of the child was 26 years and the court held that he belongs to the category of a “child”. Also in *Markover v krauss*, 132 Ind.297. 31 N.E !047,17 L.R.A.806 holds that the word “child” includes one having passed his majority because a child does not cease to be one’s child after it has attained its majority. In *Williams V Knight*, 18 R I 333. 27 Atl 210: In *re Moore*, 14 R I 38 the court held that the term: child” means a minor child and not those who have attained majority. In this case three judges descent on the ground that “the word “child” can be and should be held to mean an infant. An infant according to this decision is a person under twenty one years, which was the age of majority.

The African Charter on the Rights and Welfare of the Child 1990 on the other hand

categorically adopts the “straight 18” status for children age. It does not include a discretion for the state concerned to establish an age of maturity below the age of 18 (the UNCRC allowed a discretion). The African Charter on the Rights and Welfare of the Child 1990 stipulates

“For tile purposes of this Charter. a child means every human being below the age of 18 years. (article-1)”

The European Convention on the ‘Exercise of Children’s Rights 1996’ introduces the child as (in article-1) “this convention shall apply to children who have to reach the age 18. This instrument also categorically applies the “straight 18” rule as per the age of children.

The Sri Lankan situation in law regarding children and juveniles

There are several statutes that deal with children specifically in Sri Lanka.

1. Adoption of Children’s Act 24 of 1956 which had several amendments subsequently.
2. Children and Young person’s Act (CYPO) 48 Of 1956- the main instrument that deals with juvenile justice
3. Convention on Prevention and combating trafficking in women and children for prostitution 30 of 2005
4. Employment of Women Young persons and Children 47 of 1956
5. Lanka Children and Youth theatre foundation

When perusing these laws it is clear that the Sri Lankan law recognizes two distinct groups as “children” and “young persons”. The Adoption of Children’s act in Sri Lanka does not specify the upper limit or lower limit age of a ‘child’ who can be adopted. The act seems to accept the general legal conditions prevailing in the country regarding the age span of child. Therefore this act does not provide a definition for a child or a juvenile but impliedly rely on the general accepted law

as to the definition of a child. In the CYPO, which is the main local legal instrument that deals with juvenile justice in Sri Lanka, under interpretation section of the act, a child has been defined as “a person under the age of 14 years” .This interpretation is contrary to the UNCRC definition of a child which shall be under 18 years of age. The age of majority in Sri Lanka is 18 years of age. Since Sri Lanka has ratified the CRC, it is bound to comply with the provisions of the CRC. Further, in CYPO, a young person is identified as (section 88) “a person who has attained the age of fourteen years and is under the age of 16 years. Thus the children between 16 and 18 are excluded and seemingly redundant in this act in terms of child rights in the realm of juvenile justice. For those youthful offenders belonging to the age group from 16 years to 22 years, the Youthful offenders Training Schools Act (28 of 1956) applies. In this act, a youthful offender is identified as “a person who has attained the age of 16 and who has not attained the age of 22 years. On principle it is apparent that as the CYPO does not cover children between 16 years and 18 years are not eligible to be heard in a juvenile court. According to the Youthful Offenders Training School act a detention order can be given by any court and not necessarily by the juvenile court.

It is important and relevant for this study to appreciate as to how the childhood is understood in the international law and compare/contrast it with the domestic law in Sri Lanka.

Age is the deciding factor of the categorization of adults and children in any sphere. According to the foregoing discussion it is apparent that the international law and the domestic law have confusing and conflicting ideas about defining a child. However, for general purposes a child is defined as a person under 18 years (UNCRC). But the same international law that defines a child attempts to provide a provision for states to declare an age of majority (on its own peril) in which case the maximum age of a child could be arguably lower than 18 years of age. On the

other hand, there are other international law that deals with children, for example those that are concerned with law of war and labour that indirectly identifies a child to be less than 18 years. A similar confusing situation exists in Sri Lankan law. The CYPO which is the main domestic law that deals with juvenile justice recognizes persons under 14 years as children and those who are within 14 years to 16 as juveniles. Further, there is an additional statute known as youthful offenders training school act 28 of 1956 which identifies those who have reached the age of 16 and who have not yet reached the age of 22 as youthful persons. In other words, the Sri Lankan law recognizes 3 categories, namely children (those who are under the age of 14) then the juveniles (ages between 14 to 16) and the youthful offenders (those who are between 16 and 22 years.) This dichotomy and confusing situation makes the task of implementing juvenile justice principles difficult, ambiguous and unequal.

Therefore, the “non consensus” on the age limitation of childhood or juvenile in the law that allows different laws to indicate different legal ages for identifying “children” and “young people” can make interpretation and appreciation of the law quite confusing thereby risking the application of juvenile justice principles to ‘ambiguous’ age groups.

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A DEATH DUE TRANS-DIAPHRAGMATIC HERNIA YEARS AFTER FIREARM INJURIES

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INTRODUCTION

Effects of penetrating injuries including firearm injuries can be very variable. Deaths after such injuries can occur immediately after the incident or after a variable period of time. Deaths due to delayed uncommon complications especially after apparent recovery can raise various medico-legal issues.

In these cases, interpretation of the findings by the forensic pathologist can be extremely important in police investigations and subsequent court proceedings. Hence the pathologist must exercise utmost care in analyzing the history and autopsy findings. He must take trouble to review the literature if there is a possibility of alternative explanation for the pathology found in the autopsy. Poor awareness about such complications among the medical profession can make them liable for medical negligence charges.

HISTORY

A 34 year old man has been admitted to General Hospital Batticaloa with abdominal pain, vomiting, constipation and difficulty in breathing proceeded by an episode of cough and cold. He did not have fever at that time. There he has been kept under observation with symptomatic treatment. As the condition worsened, the relatives themselves have brought him to the National Hospital in Colombo three days later.

On admission, he was dehydrated, febrile and had difficulty in breathing. He has divulged a history of firearm injury to the chest four years back.

Blood investigations revealed Polymorphonuclear leucocytosis with normal hemoglobin and platelet counts. Blood urea and prothrombin time were raised. X-rays showed a fluid level in the left side of chest with the shift of mediastinum to the opposite side. There was no gas under the diaphragm. Magnetic Resonance Imaging has been reported as "Appearance suggestive of diaphragmatic hernia probably with diaphragmatic rupture". The condition rapidly deteriorated and he died on the fifth day of his illness.

The body was referred for autopsy after the inquest.

Before the autopsy, when inquired about the old scars seen on the chest and right buttock, the history of gunshot injury to the left side of chest which has happened four years ago (during the separatist war) managed only with inter-costal tube and wound suturing under local anesthesia in a private hospital was confirmed.

AUTOPSY

The body was average built and the height was 174cms. A brownish discharge was noted at the nostrils and the mouth. There were no fresh injuries in the body.

The following scars were found on the body.

1. Shiny brownish, raised, elliptical scar, 3cm x 1.5cm horizontally placed on the left side of the front of the chest below the nipple level, 8cm left to midline and 128cm above the heel level. (Overlying 5th intercostals space) (**Fig-1**).

2. Shiny brownish scar, 2cm x 1cm horizontally placed in anterior axillary line lateral to scar No.1 (**Fig -1**).
3. Shiny brownish raised scar, 3cm x 1.5cm horizontally placed at the back of the left side of chest, 11cm left to midline and 126cm above the heel level (Overlying 7th intercostals space) (**Fig-2**).
4. Shiny brownish scar, 3cm x 1.5cm horizontally placed across the lower margin of the right buttock.

One hundred and fifty milliliters of brownish fluid was found in the left side of the chest cavity. There was congestion of parietal pleura and whitish exudates on the visceral pleura.

The left lung was found compressed and consolidated with the displacement of the mediastinum to the right. The fundus and body of stomach and a part of the transverse colon was found herniated into the chest cavity through a hiatus (a defect measuring 4cmx5cm) in the left side of the diaphragm. A part of the greater omentum has herniated into the chest cavity through a smaller hiatus (2.5cm x3cm) 2.5cm in front of the previous one. (**Fig-3 , Fig -4**) The hiatus had margins with adhesions to surrounding structures.

There was a patch of blackish discoloration measuring 3cm x3cm in the fundus of the stomach. (**Fig -3**)

The stomach was distended with 400ml of blackish fluid. The mucosa showed superficial erosions.

Right and left lungs weighed 300g and 600g respectively with oedema and consolidation of the left lung.

The Brain was congested and weighted 1200g The heart, spleen, kidneys, liver and other organs were macroscopically unremarkable.

No fresh or old fractures were noted in the ribs.

Histology showed pneumonic changes in the left lung, fatty changes in the liver and congestion in the brain and kidneys. The right lung was oedematous.

The edges of the hiatus showed no evidence of acute inflammation or malignancy.

The histology of the other organs was unremarkable.



Fig. 1 – Well healed scars on the front of the left side of the chest.



Fig. 2 – Well healed scar on the back of the left side of the chest.

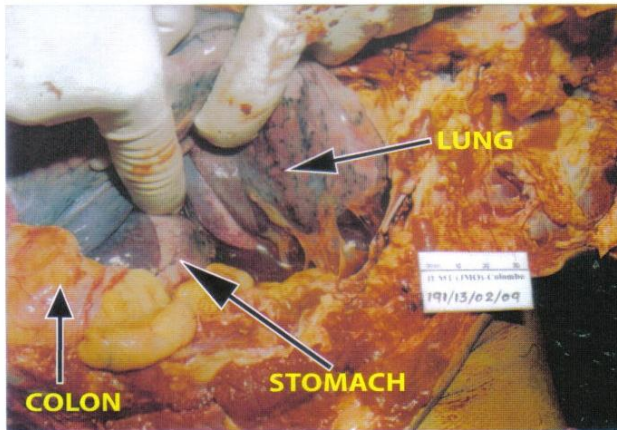


Fig. 3 – Herniation of Stomach, Colon and Omentum into the left chest cavity with adhesions and exudates



Fig. 4– Hiatus in the left side of the diaphragm

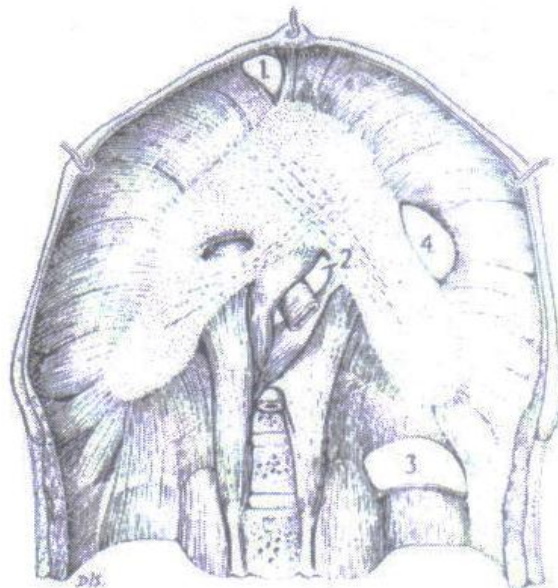


Fig. 5 – Usual sites of congenital diaphragmatic herniae. 1. Foramen of Morgagni, 2. Oesophageal hiatus, 3. Foramen of Bochdalek (pleuro - peritoneal hernia), 4. Dome (after Gray)

DISCUSSION

The deceased has initially had developed gastro intestinal symptoms and respiratory symptoms following an episode of cough and cold. Initially he did not have fever. Therefore it is prudent to assume that his subsequent deterioration and death is mainly due to complications of diaphragmatic hernia and his lung consolidation is a secondary event.

The signs, symptoms and the immediate cause of death of this case could be explained by

herniation of abdominal viscera into pleural cavity. The pneumonic changes in the lungs can probably be following respiratory embarrassment and accumulation of secretions in the airways due to restricted movements as the result of diaphragmatic hernia¹. Necrotic changes taking place in the fundus of the stomach due to ischemia too could have evoked inflammatory response in the adjacent tissues.

Our main task is to discuss the underlying cause of death, more specifically the cause for

the trans-diaphragmatic hernia as well as the cause for its delayed presentation and medical and legal issues which can arise after this death.

Trans-diaphragmatic hernia of abdominal viscera into chest cavity can occur through congenital or acquired defects. Congenital herniations occur through well recognized points in the diaphragm, namely Foramen of Morgagni, oesophageal Hiatus, Foramen Bochdalek and the Dome of the diaphragm^{2,3} (**Fig. 5**). Such herniae have well defined sacs and adhesions are uncommon. Other congenital malformations may also be present in these persons².

The acquired group is either traumatic or post operative and can occur anywhere in the diaphragm. In these cases extensive adhesions are common. A peritoneal sac is usually not present. There can be a delay in presentation for some considerable time¹. They can follow blunt or penetrating trauma such as stabs or firearm injuries^{4,5}.

This case has a history of firearm injury to the chest four years back which had been managed only with wound suturing and intercostal tube drainage. The scars on the left side of the chest were consistent with the given history and duration. Lateral location of the scars indicates that the projectiles might have damaged the left lung resulting haemo-pneumothorax which was treatable with intercostal drainage. It is the usual practice in uncomplicated cases. As the tract of the shot had been located lower down in the chest, it could have either directly gone through the diaphragm twice resulting two defects. It is also probable for the cavitation effect of the bullet to bruise the diaphragm forming defects sometime later. Damage to the diaphragm during intercostal intubation is another possibility. But two hiatus are located in antero-posterior direction. This direction is more in line with the scars due to the entry and the exit of the shot than the direction of the intercostals tube insertion. (**Fig. 4**)

Traumatic diaphragmatic hernia is sometimes diagnosed many years after trauma. In some instances the deterioration can be sudden^{1,4,5}. At times the delay may be due to sealing effect of the omentum or other abdominal contents⁴. In this case the cough and cold episode might have precipitated the herniation via existing defects. Due to the silent nature of diaphragmatic lesions, the diagnosis may be easily missed or difficult even in open surgery^{4,5}. Symptoms and signs can occur due to the obstruction or the strangulation of alimentary tract or due to respiratory embarrassment⁴.

Lack of awareness of the medical profession about such rear and delayed complications of trauma can lead to the failure or delay in diagnosis and treatment. This can raise the issue of medical negligence^{6,7}.

On the other hand, initially the charge for the shooting might have been attempt to commit culpable homicide or attempted murder as the victim had apparently survived the shooting⁸. Four years after the shooting incident, the victim died of a direct and medically recognized complication of the firearm injury. Then isn't it reasonable to consider that the accused is culpable for the death of the victim? This issue can only be resolved by court of law and medical evidence will be scrutinized in detail in this endeavour.

SUMMARY

A Death due Trans-diaphragmatic Hernia years after Firearm Injuries

This is a case of post traumatic trans-diaphragmatic hernia causing signs and symptoms four years after sustaining a through and through firearm injury to the chest. He died due to direct complications of trans- diaphragmatic hernia five days after developing symptoms and signs in a tertiary care hospital. This has happened years after apparently recovery from initial trauma.

This case confirms the probability of developing delayed fatal complications years after penetrating trauma to the chest. It also raises the legal issue of culpability of the assailant for the death of the victim even after apparent recovery.

Possible issue of medical negligence charges as a result of poor awareness of such complications among medical profession is also discussed.

In this type of uncommon autopsies, the forensic practitioner's role in analyzing the history and autopsy findings as well as review of the literature is very important in understanding the sequence of events and excluding alternative possibilities.

(Key words – Trans-diaphragmatic hernia, Penetrating injury, Delayed complications, Culpability, Medical negligence)

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