Newsletter

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ACLM

AUSTRALASIAN COLLEGE OF LEGAL MEDICINE

President's Report

Post-Graduate Studies

The College has been having ongoing discussions with the University of Queensland Medical School. Through the previous executive, the School had seen the potential for a Master of Legal Medicine course however considered beginning with a Graduate Certificate was a better and less risky option. The College offered to assist with curriculum development and teaching in this regard.

The UQ underwent a significant restructure last year and early this year. It gained a full-time manager responsible for continuing professional education and liaising with organisations externally (to the university) to develop professional medical education programs.

Following a number of discussions last year and this year, a submission was put to the medical school executive to develop courses run through the medical school based on the College's law intensives. In this way, the courses would gain the imprimatur of the university and pave the way for development of a post-graduate qualification in legal medicine.

However, with the restructure of the University medical school came a new executive, which rejected the submission, stating that the law school needed to be involved. Over the past couple of months, the medical school's manager of continuing professional development has begun to facilitate the law school's involvement.

The College has also been liaising with the University of Sydney's law and medical schools regarding post-graduate teaching and it is pleasing that the medical school has accepted the College's offer to provide legal medicine presentations to its undergraduate students next year.

In addition, the College has engendered interest from the Macquarie Law School in relation to the potential for collaborating in running legal medicine programs through the School. In this regard, I have sent the School the College's proposed curriculum outline for a Master of Legal Medicine program. Establishing links such these with the universities will demonstrate the value teaching legal medicine provides in both the undergraduate and postgraduate environments.

Registered Training Organisation

Due to the initially promising response from the University of Queensland medical school, I had not progressed with an application to register the College as a Registered Training Organisation (RTO) with the Australian Skills Quality Authority, essentially due to the considerable bureaucracy and expense involved. To obtain accreditation for the College courses requires 5 stages: preliminary research and consultation, which includes determining if the courses fill a gap in that no similar courses are available; course development; course design and submission; assessment; and decision. This costs $8070 per course.

Accreditation by ASQA is confirmed if the course meets both the Standards for VET Accredited Courses 2012, Standards for Training Packages, and the Australian Qualifications Framework, the latter of which describes the requirements for qualifications from Certificate I through to Doctorate.

If a course is accredited, then, for the College to deliver each course, requires an application for registration as a Registered Training Organisation. This necessitates the College to demonstrate financial viability and complete a formal application. The assessment of the application is done in four stages: completeness check; risk assessment; registration audit; and the ASQA decision. The fee for this application process is $8800.

Hence the total fees amount to a non-refundable $16 870. Nevertheless, I believe it should be pursued if there is not satisfactory progress with the tertiary institutions in the foreseeable future. It will at least allow the College to be 'master of its own destiny' when it comes to legal medicine training and specialty recognition.

Courses

The College is conducting another Expert Witness Training Program in December, this time in Brisbane. The College on this occasion has invited a member of the American College of Legal Medicine to attend the Program as an Observer. Dr Monique Anawis has accepted the invitation, which is great news. Monique is an ophthalmologist with legal qualifications and serves as an Assistant Attorney-General to the Illinois state Attorney-General. As the sole physician, she provides medical expertise to all criminal and civil matters. The majority of the criminal cases she has worked on are abusive head injury cases. Forging closer ties and networking with our American counterparts, as well as with other international jurisdictions, is I believe an emerging role for the College, and one which requires greater focus and involvement in the future.

The College conducted a one-day death certification workshop on Sunday 19 November in Queensland. Cause of death certification requires medical knowledge as to the patient's probable cause of death as well as some legal knowledge as to the requirements of the coronial jurisdiction. This is an area of medical practice that can be improved and I believe a worthwhile undertaking by the College.

In order to obtain continuous professional development points from the RACGP for this course, I attended a one-day workshop run by the RACGP in order to become an Education Activity Representative (EAR). This course provided me with the skills to prepare the Death Certification course, and future courses, with the materials necessary to obtain 40 Category 1 CPD points for the GP and rural and remote medicine attendees. The requirements included an accredited activity application, conducting a needs assessment based on an extensive literature review, and formulating a predisposing activity and a reinforcing activity to assess knowledge and skill levels both before and after the delivery of the course. With this EAR designation, I can apply for much sought after Category 1 points for other College courses using the same format, including the BLI, ALI and the Expert Witness Program.

Unfortunately, despite advertising the cause of death workshop extensively, especially through the RACGP, we managed only six participants. Garnering interest in College courses generally is a struggle, and we will need to look at better ways to market the courses we offer in the future.

College Examinations

Since July last year six members have undertaken the new College written examination. There are two types of written examination, one for the forensic stream and one for the legal stream. There are three parts to each examination: Part A is short answer or multiple choice; Part B is short essay responses; and Part C involves problem based questions. Part C appears to provide the most difficulties. In any event, all candidates were successful.

Journal of Law and Medicine

The Journal of Law and Medicine is the adopted journal of the College. The cost of the Journal is incorporated into the College annual subscription. It is emailed to each member unless the member has opted to pay an extra $60, in which case that member receives a hard copy.

Each member was provided with a user name and password to access the Journal through the email.

There are however ongoing issues in regard to members stating that they do not receive it. The College has done audits and the Journal is being sent to members' email addresses. It may be that the email is not recognised for what it is, as it is sent directly to members by the publishing company, Thomson Reuters.

In any event the College is continuing to examine the issue and has sent a survey to members to provide feedback on this and also whether there is value with continuing the subscription to the Journal. The results of the survey will be provided in due course, with those members who state that they are not receiving the Journal being actioned immediately.

New Executive

At the College Council's final teleconference for the year on 27 November, a new Executive was elected. The result of the election is as follows:

President:
Dr Sandra Johnson

Vice President – Academic:
Dr Adam Griffin

Vice-President – Administrative:
Dr Mike O'Connor

Censor in Chief:
Dr Selva Mudaliar

Secretary/Treasurer:
Dr Don Buchanan

My congratulations to the new Executive and I wish them every success for the year ahead.

Conclusion

As this is my last President's Report, I wish to heartily thank the support that the College Council has provided to me over the past four years. Much has been achieved though much still needs to be done, especially in the post-graduate qualification and related specialty recognition space. The fundamentals are in place; however as has been implied, ongoing perseverance and vigilance are required for these goals to be realised.

I would also take this opportunity to sincerely thank our Administrative Officer, Jayelle Conway, for her exemplary service this year. The College is very fortunate to have Jayelle at the administrative helm as her organisational skills, attention to detail and positive, can-do attitude have been outstanding.

Finally, I wish each and every member a safe and happy festive season and all the very best for 2018.

Dr Don Buchanan

ACLM President

‘First Do No Harm’

Summary of the *Ethics of Therapeutics in Paediatrics* presentation at the 2017 ACLM Annual Scientific Meeting

Ethical practice in Paediatrics, as in all disciplines in Medicine, demands that treatment and intervention be carried out in the best interests of the child. The UN Declaration on the Rights of Children states that every child has a fundamental right to life and dignity and is entitled to optimal medical care. Also, children require special safeguards (including legal) to protect them against abuse or manipulation in view of their physical and mental immaturity.

Paediatricians have the prime responsibility to protect and promote the well-being of children. In this capacity, doctors working with children must be trained and fully aware of the vulnerabilities of children to therapy and treatments.

Although consent for treatment in children under the age of 14 – 16 is obtained from the parent or legal guardian every effort must be made to help the child to understand what is being done and what treatment is being commenced. Children reach an adult capacity for reasoning at around 14 – 16 years, but it could be younger in intellectually advanced children. It is the paediatrician’s responsibility to determine if the child has the capacity to give consent. Children need treatment to be explained to them in terms that they can understand and that must be adapted to the child’s age and developmental level of language comprehension.

Children have the right to refuse treatment if it is not critical to their survival. Allowing the child to discuss concerns with the doctor and parents gives the child time to process information and “think things through.” This pays respect to the child’s autonomy. Medical management is invariably long-term and an optimal doctor-patient relationship is paramount. Where the child’s compliance is needed for effective management of a chronic condition it is prudent to ensure that trust and mutual respect are established early in the relationship.

In therapeutics, many drugs are first developed for use in adults and subsequently studies are done to determine safe use in children. Paediatricians take a cautious approach to new drugs recognizing the vulnerability of systems, for example the hepatic system for the metabolism and the renal system for the excretion of drugs. In addition, the immature blood brain barrier in children might mean that lower doses are needed in children as compared to the doses used in adults. Close monitoring of a child’s response to a drug that is tried for the first time with no hesitation to cease the drug if unacceptable side effects occur is required and ensures that the child’s best interests is kept in mind. A cautious approach is always prudent.

References

Advancing child health research in the UK: RCPCH Infants’ Children’s and Young People’s Research Charter. *Hunter, Sparrow et al. Arch. Dis. Child 2017; 102: 299-300*

Guidelines for the ethical conduct of studies to evaluate drugs in pediatric populations. *Pediatrics 1977; Vol 60: 91- 101.*

Ethical key issues and fundamental rights in paediatric research. *A. Altavilla. Europ J Pharmacology 2011(67); Suppl S117- S123*

Ethical issues in the daily medical care of children. *Kurtz et al. Europ J Paeds 2006; 165: 83-86*

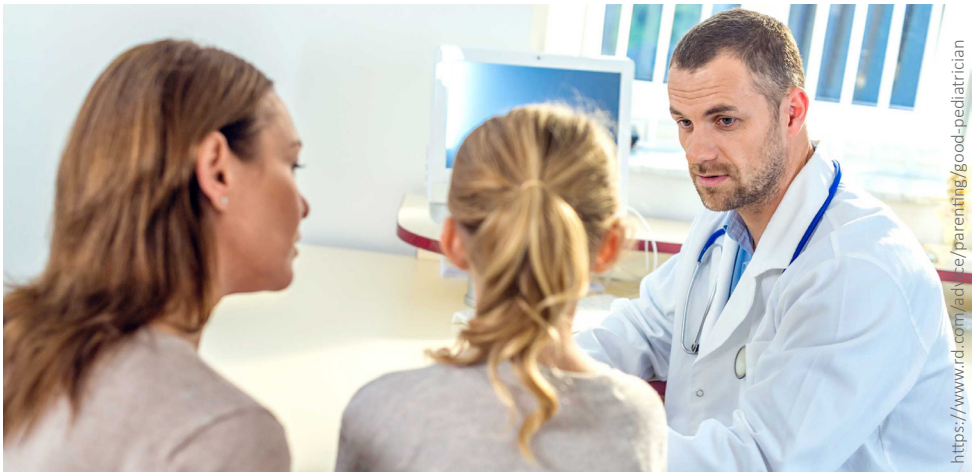
Research allows drugs and therapies to be examined and ethical principles apply when research is done with children. The researchers need to have a close understanding of the developmental needs of children. They must ensure that the research is done in a child-friendly manner, that the process is explained to the child in a manner that the child can understand, that the child has the right to refuse to participate and that no discomfort or suffering occurs on the part of the child. Rigorous principles apply in research and approval is always sought from Ethics Committees of hospitals and universities where the research is carried out. The research must contribute to new knowledge and the methodology must be plausible, valid and show clear objectives. The researchers need to show that there will be clear benefit to children and they must obtain full consent from the parents or the legal guardians.

Ethical considerations when doing research with children are important. The Task Force in Europe for Drug Development for the Young emphasizes respect and autonomy for children with the obligation to maximize benefit and minimize harm. The Royal College of Paediatrics and Child Health (RCPCH) in the UK is currently working on a research charter to encourage a unified approach in Paediatrics.

The emerging technologies of biomedical engineering, genomics and the so called "precision medicine" that allows targeted therapy, for example through nano-technological methods, will bring new challenges for paediatricians. They will need to navigate the benefits of these technological advances in treatment versus safety and the best interests of the children in their care.

Dr Sandra Johnson

Clinical Associate Professor &
Vice President Academic ACLM



https://www.rd.com/advice/parenting/good-pediatrician

Traumatic Pneumothorax and Grievous Bodily Harm

Are all traumatic pneumothoraces treated by routine tube thoracotomy to be considered grievous bodily harm?

Introduction

Queensland has codified its criminal law. Schedule 1 of the Criminal Code Act 1899 (Qld) contains the Criminal Code and section 1 of the Code defines grievous bodily harm (GBH) as –

a. a loss of a distinct part or organ of the body; or

b. serious disfigurement; or

c. any bodily injury of such a nature that, if left untreated, would endanger or be likely to endanger life, or cause or be likely to cause permanent injury to health;

whether or not treatment is or could have been available.

The aim of this paper is to examine whether all traumatic pneumothoraces necessarily satisfy the third limb of this definition.

An important and often misunderstood component to the definition of GBH is the final phrase *"whether or not treatment is or could have been available"*, which applies to all three limbs. In *R v Lobston*[1] it was held by the Queensland Court of Criminal Appeal that the nature of the injury was to be determined at the time the harm was done, and was not to take into account the surrounding circumstances or the availability of medical attention.[2]

For example, if a person severed a major artery in a stabbing and would have bled to death without treatment, then the injury suffered is GBH even though the treatment received was successful and the person is now completely recovered.

Where the circumstances are clear, as with the above example, determining GBH is relatively straightforward. However, depending on the severity of a certain type of injury, it may either resolve itself without consequence, or likely cause death or permanent injury to health if left untreated. Such is the case with traumatic pneumothorax. As will be seen, some centres insert chest tubes (tube thoracotomy) routinely in every case, whereas others employ an "observation only" policy for certain cases, using set criteria or protocols.

The challenge to determine whether a traumatic pneumothorax is GBH arises when a routine tube thoracotomy has been performed in a case that would likely have resolved without such treatment. The routine use of chest tubes in all cases is undertaken to avert the risk of the patient developing a tension pneumothorax (see below), as this condition is invariably fatal if not recognised and treated urgently. While this is appropriate management for the treating physicians, the task of the forensic physician is different. It is to advise if certain cases of traumatic pneumothorax satisfy or otherwise the definition of GBH, if the traumatic pneumothorax had been left untreated.

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[1] [1983] 2 Qd R 720

[2] ibid at 271

[3] Treasure T et al (eds) *The Evidence for Cardiothoracic Surgery* tfm Publishing Ltd Shrewsbury 2005; at 107

[4] ibid

[5] Dunn RJ (ed) *The Emergency Medicine Manual* 3rd ed Vol 2 Venom Publishing South Australia 2003; at 640

Pneumothorax Defined

Pneumothorax is defined as the presence of air in the space (the pleural space) between the surface of the lung and the inner chest wall.[3] There is normally no air in the pleural space and it is kept under negative pressure by the tendency of the elastic lung to collapse and the relatively rigid chest wall to expand.[4] Air can enter the pleural space from either a breach in the lining of the lung, allowing air to escape from within the lung itself, or from a breach in the chest wall allowing air from the outside to directly enter the pleural space.

If there is blood in the pleural space as well as a pneumothorax, this is known as a haemopneumothorax. If there is blood but no air in the pleural space it is known as a haemothorax.

Symptoms of pneumothorax include varying degrees of breathlessness (80% of cases), chest pain (90%), and cough (10%).[5] While the clinical history and physical examination usually suggest the presence of a pneumothorax, clinical manifestations are not considered reliable indicators of its size.[6]

Classification of Pneumothorax

Pneumothorax is usually classified according to its cause. There are therefore two types: spontaneous pneumothorax, which occurs without a preceding event, and traumatic, due to direct or indirect trauma.[7] Spontaneous pneumothorax is further divided into primary, where there is no obvious lung pathology, and secondary, which occurs as a complication of underlying lung disease. Traumatic pneumothorax can be divided into that caused by blunt trauma to the chest causing, for example, rib fractures, and penetrating trauma, such as gunshot or knife wounds.

While the focus of this paper is on traumatic pneumothorax, many of the articles reviewed base the choice of treatment not so much on the cause of the pneumothorax, but on other factors such as the size of the pneumothorax, the co-existence of other pathology, and the presence or absence of symptoms. Hence articles which analyse the treatment options for spontaneous pneumothorax are also examined where relevant.

Tension Pneumothorax

A tension pneumothorax is a true medical emergency that is invariably fatal if unrecognised or if left untreated. It occurs in about 1% to 3% of spontaneous pneumothorax,[8] and in 3% of cases in one prospective study which analysed penetrating injuries to the chest.[9] It occurs when air continues to escape into the pleural space creating such pressure as to cause the lung to fully collapse and the chest contents to be pushed towards the other side. This causes increasing breathlessness, rapid breathing, low blood pressure, sweating, distended neck veins and ultimately death. A large calibre needle inserted through the chest wall (needle thoracentesis) is required to rapidly relieve the pressure, followed by tube thoracostomy.

While the risk of tension pneumothorax developing is low, the consequences of it occurring without access to immediate treatment are dire. In this regard it could

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[6] Henry M et al "BTS Guidelines for the Management of Spontaneous Pneumothorax". *Thorax* 2003; 58 Supplement II May: ii39-ii52; at ii42

[7] Weissberg D & Refaely Y "Pneumothorax: Experience With 1199 Patients". *Chest* 2000; 117: 1279-1285; at 1279

[8] ibid

[9] Hegarty M M "A Conservative Approach to Penetrating Injuries to the Chest". *Injury* 1976; 8: 53-59; at 56

be argued that because of this risk, all traumatic pneumothoraces satisfy the definition of GBH. While there is some force to this argument, life must have been endangered, or likely to have been endangered, and to the criminal standard of proof of beyond reasonable doubt. It is suggested that unless the person actually has suffered a tension pneumothorax (which is clearly GBH), then the risk of it occurring would not be sufficient to satisfy the criminal standard. More is required.

Assessing the Size of a Pneumothorax

The size of a pneumothorax can be assessed using a plain chest x-ray or CT scan, however techniques using plain x-rays are approximations only. Three techniques are mentioned.

1. Average Interpleural Distance Technique

Rhea et al determined that the sum of the distances in centimetres between the pleural surface of the lung and the chest wall at the apex, the middle of the upper half of the lung and the middle of the lower half of the lung, divided by 3, equated to a percent reduction of the lung.[10]
The following approximates the percent reduction:

1 centimetre = 14%

2 centimetres = 22%

3 centimetres = 31%

4 centimetres = 40%

2. Sum of Interpleural Distances technique

Collins et al analysed twenty pneumothoraces from 19 patients.[11] Each had an erect inspiratory posteroanterior chest x-ray performed and the interpleural distances were measured as in the Average Interpleural Distances Technique except that the distances were added together and not averaged. A helical CT was then performed. Regression analysis of the helical CT values on the interpleural distance gave the following formula:

$$Y = 4.2 + [4.7 \times (A+B+C)]$$

where Y is the percent pneumothorax size. A is the distance from the apex to the chest wall superiorly, B is the distance between the pleural surface of the lung and the chest wall at the middle of the upper part of the lung, and C is the distance between the pleural surface of the lung and the chest wall at the middle of the lower part of the lung. Hence the sum of these distances gives the following percentage pneumothorax size:

A + B + C	*Percent Pneumothorax*
2.0 cm	13.6 %
4.0 cm	23.0%
6.0 cm	32.4%
8.0 cm	41.8%
10.0 cm	51.2%

3. Light's Formula

Because the volume of the lung and hemithorax are roughly proportional to the cube of their diameters, the amount of collapse can be estimated by measuring the average diameter of the lung and the thorax, cubing these diameters, and finding the ratios.[12] How the average diameters are calculated is not stated.

While CT scan is a more accurate technique than plain erect chest x-ray for assessing percentage reduction of the lung volume, there will be occasions where it was not ordered in the management of the patient. Hopefully the radiologist's report

[10] Rhea J T et al "Determining the Size of Pneumothorax in the Upright Patient" *Radiology* 1982; 144: 733-736

[11] Collins C D et al. "Quantification of Pneumothorax Size on Chest Radiographs Using Interpleural Distances: Regression Analysis Based on Volume Measurements from Helical CT." *AJR* 1995; 165:1127-1130

or the clinical notes will state the percent reduction of the lung volume. If not, then as the "Sum of Interpleural Distances" technique is based on a comparison with plain chest x-ray and CT scan, it would seem the preferred method when only the chest x-ray is available.

Treatment Options

The management of both spontaneous and traumatic pneumothorax involves four main options[13]:

a. ***Observation only.*** No specific treatment is undertaken and the patient is either observed in the ward or managed as an outpatient.

b. ***Needle Aspiration.*** This involves inserting a needle through the chest wall into the pleural cavity and drawing the air out normally via a syringe.

c. ***Tube Thoracotomy (TT).*** This involves inserting a tube through the chest wall into the pleural cavity and leaving it there until the lung has re-expanded. The outer end of the tube is connected to a drainage unit.

d. ***Surgical Intervention.*** An open thoracotomy is performed under an anaesthetic if the other treatment options fail or the circumstances require it as first line treatment.

The main focus will be on the "observation only" treatment option as it is this group of patients which clearly do not fall within the definition of GBH if they have recovered fully without specific medical intervention. The following discussion reviews a number of articles in order to ascertain the criteria used when determining if a person can be managed safely by observation alone.

"Observation Only" as an Option for Treatment

Hegarty[14] reviewed 131 cases (133 cavities) of penetrating chest injuries prospectively. All patients who had a rim of intrapleural air 1.5cm wide or larger, as assessed by radiography, or had a fluid level up to the level of the 9th rib, had an immediate TT. Those who did not fit these criteria were managed by observation in the ward. Overall, 75 patients (56.4%) required TT as initial management, and 58 (43.6%) were initially observed. Of the 58 cases, 8 subsequently required TT, a failure rate with respect to the criteria, of 13.8%. Four of these cases (3% of the overall)) developed a tension pneumothorax requiring urgent (and successful) treatment.

In the cases where there was only a pneumothorax, Hegarty found that 25 out of 51 (49%) required TT, whereas 26 (51%) did not. Similarly those with haemothorax only, required a TT in 31of 50 cases (62%) with 19 requiring observation only (38%), and those with haemopneumothorax 27 from 32 cases (83.4%) requiring TT and 5 (16.6%) not.

Hence for penetrating injuries causing a pneumothorax only, just over half could be managed with observation alone. However where there had been bleeding, or particularly the combination of bleeding and air, it was more likely immediate medical treatment was required. A major risk of observation alone is the 3% chance of developing a tension pneumothorax however with careful observation in the wards for 2 to 3 days, the patients who developed this otherwise fatal condition were successfully treated.

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[12] Light R W "Management of Spontaneous Pneumothorax" *Am Rev Respir Dis* 1993; 148: 245-248 at 245

[13] Dunn RJ (ed) *The Emergency Medicine Manual* 3rd ed Vol 2 Venom Publishing South Australia 2003; at 641-642

[14] Hegarty M M. "A Conservative Approach to Penetrating Injuries of the Chest: Experience with 131 Cases" *Injury* 1976; 8: 53-59

Knottenbelt and van der Spuy[15] prospectively studied 804 patients with traumatic pneumothorax due to chest injury of any kind. The only criterion for TT drainage of a pneumothorax was that the distance between the surface of the lung and the chest wall be more than 1.5cm when measured at the level of the 3rd rib on x-ray. This was considered to represent a 20% reduction in lung volume. Only pure pneumothoraces were studied. A TT was performed on distances less than 1.5cm in the following circumstances:

- Bilateral (both sides) pneumothorax;
- Undergoing mechanical ventilation to prevent a tension pneumothorax from developing;
- Decreased respiratory reserve, eg chronic obstructive pulmonary disease, high spinal cord injury, other lung pathology.

Otherwise, patients were observed in the wards. The criteria applied whether the type of injury was blunt (114 cases) or penetrating (690 cases). Of the penetrating injuries, 645 were knife wounds, 41 were other instruments such as screwdrivers and broken bottles, and 4 were gunshot wounds.

Of the 333 cases (41.4%) treated initially by observation alone, 33 out of the 333 (10%) subsequently required TT drainage. However the authors noted that 4 of these patients should have initially received TT according to the criterion hence the failure rate in relation to observation was more accurately 8.7% (29 of 333).

Interestingly, the authors noted that they did not give any antibiotics routinely and that they experienced a low infection rate. Their findings in this regard at follow-up clinics revealed wound infection in 2.5% (13 of 530) and no cases of empyema (infection in the thoracic cavity). This will be discussed further below.

The authors conclude that the criterion used is effective though question whether it would be effective in missile injuries given the low incidence of gunshot wounds in their series. However they point out that a pure pneumothorax was a relatively uncommon result of missile injuries in any event.

Johnson[16] conducted a retrospective study of 54 pneumothoraces (53 patients) and found that 29 (54.7%) were initially managed without drainage, with 2 of these patients subsequently requiring TT due to asymptomatic enlargement of the pneumothorax. No patients deteriorated clinically during conservative management. The pneumothorax was an isolated injury in most of these patients. On the other hand, the 24 (45.3%) initially treated with TT contained most of the motor vehicle accident group who frequently had significant other injuries.

Unfortunately, due to the retrospective nature of the study, quantifying the size of each pneumothorax was limited. All conservatively (ie observation only) treated pneumothoraces were described as “small”, “minimal” or “moderate”, whereas all those described as “large”, “complete” or “total” were treated initially with TT.

Johnson concludes that when the pneumothorax is the patient’s only significant injury and there is no respiratory compromise, the injury will

[15] Knottenbelt J D & van der Spuy J W. “Traumatic Pneumothorax: A Scheme for Rapid Patient Turnover”. *Injury* 1990; 21: 77-80

[16] Johnson G. “Traumatic Pneumothorax: Is a Chest Drain Always Necessary?” J *Accid Emerg Med* 1996; 13: 173-174

mostly resolve spontaneously. However, if mechanical ventilation is required or the degree of lung collapse is producing respiratory compromise then TT is mandatory.

Collins et al[17] retrospectively examined 24 patients who had suffered blunt chest trauma causing an occult pneumothorax. This was defined as a pneumothorax that was not apparent on plain chest x-ray but was apparent on CT scan. The size was not recorded and moreover it was not clear what criteria was used to decide which patients received a TT and which were treated expectantly.

The authors defined a positive physical examination as one where findings of sternal tenderness, rib tenderness, crepitus or deformity were noted by the treating doctor. A negative physical examination was when none of these findings was made. The authors considered that physical examination suggestive of blunt chest trauma did not predict treatment with immediate TT as an equal number of patients with positive physical examinations were managed expectantly.

This is not altogether unexpected, as decisions to treat with a TT would likely be based more on the size of the pneumothorax and any respiratory symptoms, though as noted this information was not documented.

The authors concluded that patients with occult pneumothorax from blunt trauma can be reasonably observed under the following conditions:

- The patient is haemodynamically stable
- The patient has relatively normal lung function
- Close clinical observation and radiography are available
- A qualified surgeon is available to insert a drainage tube (ie TT) if needed

Weissberg and Refaely[18] retrospectively reviewed 1199 patients with pneumothorax, comprising 218 primary spontaneous pneumothorax, 505 secondary spontaneous pneumothorax, 47 penetrating traumatic pneumothorax, 356 blunt traumatic pneumothorax and 73 iatrogenic (treatment induced). These patients were treated without regard to cause. With respect to traumatic pneumothoraces the authors noted that the management depended on the presence of other co-existing injuries however in the absence of complications the management followed the same guidelines as for spontaneous pneumothorax.

The criteria for treatment by observation alone were that the size of the pneumothorax was equal to or less than 20%, and that the patient was not short of breath. The criteria for treatment with TT were that the pneumothorax was greater than 20%, the pneumothorax was increasing in size, there was an associated pleural effusion, or that the patient required a general anaesthetic and/or mechanical ventilation.

The observation category had 96 patients (8%). The remaining 1103 (92%) had pneumothoraces greater than 20% and were treated with TT. Tension pneumothorax occurred in 1% of the total. The authors do not however analyse what proportion of these observation only patients were

[17] Collins J C et al. "Occult Traumatic Pneumothorax: Immediate Tube Thoracostomy Versus Expectant Management." *Amer. Surg* 1992; 58:743-746

[18] Weissberg D & Refaely Y. "Pneumothorax" *Chest* 2000; 117:1279-1285

spontaneous pneumothoraces and what proportion were traumatic. Moreover for the size of the pneumothorax they used a percentage reduction instead of a distance measurement, without advising as to the technique used to determine the percentage reduction.

Nevertheless the authors conclude that for a pneumothorax less than 20% of the pleural space, no treatment is necessary unless the patient is short of breath. This is also the recommended treatment outlined in The Emergency Medicine Manual.[19]

O'Rourke and Yee[20] performed a retrospective study on 130 patients with 168 occurrences of spontaneous pneumothorax. Traumatic pneumothorax was not included. Forty of the 168 occurrences (23.8%) were treated with observation alone. Most of these (32 of 40 or 80%) had a pneumothorax of less than 15%, with a range from 5% to 50%. All these patients had "mild symptoms" which did not require immediate re-expansion of the lung.

Initially the authors noted that there were 49 occurrences in the observation only group, however 9 developed increasing symptoms necessitating a TT. Hence the observation only failure rate was 18.4%.

It was not clear what criteria were used in determining treatment options. Size did not seem to be a specific criterion as a wide range of sizes were treated with observation only, and it appeared the main criterion was whether the patient was symptomatic or not.

The authors also analysed the reoccurrence rates and found that the observation only group had a reoccurrence rate of 32.5% (13 of 40), the TT group had a recurrence rate of 23.5% (24 of 102), and both needle aspiration and surgery had a zero recurrence rate. The difference in the recurrence rate of the observation only group and the TT group was statistically significant.

There were 2 cases of tension pneumothorax, both in the observation only group and both resulting in death. This represented an overall rate of 1.2% (2 of 168) which is similar to other studies. However the authors concluded that this represented a rate of 5% of the observation only group, and this combined with the increased recurrence rates made observation only a dangerous option and not to be recommended.

Rhea et al[21] noted that it was a commonly accepted surgical rule that a pneumothorax larger than 25% required chest tube insertion into the chest cavity while one that is smaller may be observed or aspirated as long as symptoms are mild.

Alfageme et al[22] when analysing the long term results of tetracycline pleurodesis on the recurrence rates of spontaneous pneumothorax treated patients who had a pneumothorax of less than 20% with observation only.

Jones[23] considered that a significant closed pneumothorax of greater than 20% or in a symptomatic patient is best provided by

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[19] Dunn R J. (ed) *The Emergency Medicine Manual* Volume 2, 3rd ed. Venom Publishing South Australia 2003; at 640-642

[20] O'Rourke J P & Yee E S. "Civilian Spontaneous Pneumothorax: Treatment Options and Long-term Results." *Chest* 1989; 96:1302-1306

[21] Rhea J T et al "Determining the Size of Pneumothorax in the Upright Patient" *Radiology* 1982; 144: 733-736 at 733

[22] Alfageme I et al "Spontaneous Pneumothorax: Long Term Results With Tetracycline Pleurodesis" *Chest* 1994: 106; 347-350; at 347

[23] Jones K W "Thoracic Trauma" *Surg Clin. North Am.* 1980; 60: 957-981 at 965

[24] Lewis F R "Thoracic Trauma" *Surg Clin. North Am.* 1980; 60: 97-104 at 98

[25] Treasure T et al (eds) *The Evidence for Cardiothoracic Surgery* tfm Publishing Ltd Shrewsbury 2005; at 110

[26] Dunn R J. (ed) *The Emergency Medicine Manual* Volume 2, 3rd ed. Venom Publishing South Australia 2003; at 641

TT, whereas Lewis[24] suggests that treatment of any type of traumatic pneumothorax is by immediate insertion of a large bore chest tube. Tan[25] states that observation as initial management is appropriate in a small (<20%) pneumothorax and in asymptomatic cases. Dunn[26] considers conservative management can occur in a <20% pneumothorax without respiratory compromise.

The British Thoracic Society Guidelines for the Management of Spontaneous Pneumothorax[27] states that a distance in centimetres between the pleural surface and the chest wall of less than 2cm is regarded as a small pneumothorax, and calculate this to be less than a 49% pneumothorax using Light's formula. It recommends that observation should be the treatment of choice for these pneumothoraces but that it is inappropriate treatment if the patient is breathless, regardless of the size of the pneumothorax on x-ray. These guidelines expressly exclude the management of trauma, and based on the studies discussed supra, most trauma centres would actively treat a traumatic pneumothorax greater than 20% even in an asymptomatic patient

On balance therefore, it is reasonable to conclude that a traumatic pneumothorax of less than 20% in size in an asymptomatic patient can be managed by observation alone in most cases.

Empyema Complicating Traumatic Pneumothorax and Haemothorax

Empyema is an infection of the pleural cavity characterised by a persistent purulent fluid collection associated with a fever greater than 38 ºC and a white cell count greater than 12 000 cells /mm³.[28] Long ago Hippocrates laid down the basic principles of treatment of empyema[29] and over the ensuing centuries other treatments were described, including professional wound suckers who were employed by physicians and surgeons to suck out the fluid, blood and pus. During the wars of the 17th and 18th centuries wound suckers were so much in demand that it became a trade, though were considered to be unreliable as they were frequently incapacitated by oral infections![30]

Hix[31] noted that blood in the pleural cavity was an excellent culture for bacteria, resulting in empyema. Hix listed factors contributing to the development of post-traumatic empyema as:

- Delay in TT
- Poor location or malfunction of the chest tube
- Large haemothorax (greater than 500 mls)
- Residual pneumothorax (incomplete expansion of the lung)
- Contusion (bruising) of the lung.

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[27] Henry M et al "BTS Guidelines for the Management of Spontaneous Pneumothorax". *Thorax* 2003; 58 Supplement II May : ii39-ii52; at ii42-ii43

[28] Eddy A C et al. "Empyema Thoracis in Patients Undergoing Emergent Closed Tube Thoracostomy for Thoracic Trauma" *Am J Surg* 1989; 157; 494-497at 494. Mandal A K et al. "Posttraumatic Empyema Thoracis: A 24 Year Experience at a Major Trauma Center". *J Trauma, Injury, Infection and Critical Care* 1997; 43: 764-771; at 764

[29] Molnar T F et al Changing Dogmas: "History of Development in Treatment Modalities of Traumatic Pneumothorax, Hemothorax, and Posttraumatic Empyema Thoracis". *Ann Thorac Surg* 2004; 77: 372-378; at 372

[30] Wagner R B & Slivko B. "Highlights of the History of Nonpenetrating Chest Trauma" *Surg Clin North Am.*1989; 69: 1-19; at 3

[31] Hix W R "Residua of Thoracic Trauma" *Surg Gynecol Obstet* 1984; 158: 295-300; at 296

Nichols et al[32] noted that the most common infectious complications in patients with traumatic pneumothorax are empyema and pneumonia. Bacteria can be introduced into the pleural space through damaged bronchial passages internally or from external contamination by way of a penetrating object. The purpose of any antibiotic therapy is to prevent an infection occurring either at the time of the initial trauma or due to the TT.

Nichols et al performed a double-blind randomised clinical trial examining 119 patients presenting with isolated chest injuries requiring TT. There were 113 penetrating injuries and 6 blunt injuries. Stabbing or single gunshot wounds accounted for 103 of the penetrating injuries with 10 patients receiving multiple gunshot wounds. Patients received either placebo (56 or 47%) or antibiotics (63 or 53%). Six infectious complications developed in the placebo group (10.7%) and one in the antibiotic group (1.6%), the difference being statistically significant.

The authors concluded that routine administration of antibiotics is both beneficial and cost effective in the prevention of infections following TT for isolated chest trauma. While this study demonstrates that TT is not without risk of infection, it does not assist in determining the risk of infection where observation only is the treatment option chosen.

Grover et al[33] noted that the incidence of empyema following chest wounds has varied, with an incidence of 2% observed in the pre-antibiotic era (1922-1935) and 3% in the post-antibiotic era (1948 – 1958). The authors undertook a double blind prospective study to determine whether antibiotics administered shortly after penetrating chest injury would be advantageous or harmful. Seventy-five patients were randomly placed into two groups; group A were given an antibiotic routinely (prophylactic) while group B were given placebo. All patients underwent TT.

Grover et al found that 6 patients in group B (16.2%) suffered empyema, compared to one patient in group A (2.6%). This difference was not, however, statistically significant.

Eddy et al[34] conducted a retrospective study on 117 patients who received TT, with 60% sustaining blunt trauma and 40% penetrating injuries. Forty-four percent had pneumothorax alone, with 56% having haemothorax alone or haemopneumothorax. None of the group who had pneumothorax alone (52 patients) had an incomplete evacuation and none developed an empyema. However of the 12 patients who had incomplete evacuation of the pleural space after TT, all had suffered a haemothorax. Half of those patients (6) developed empyema. In comparison, in the 105 patients (comprising all 52 pneumothorax alone patients plus 53 haemothorax patients) who had complete evacuation, none developed empyema. This difference was statistically significant.

Further, there was no statistically significant difference in the incidence of empyema between patients receiving antibiotic treatment and those that did not.

The authors hence found that the single most important factor in the development

[32] Nichols R L et al. "Preventive Antibiotic Usage in Traumatic Thoracic Injuries Requiring Closed Tube Thoracostomy." *Chest* 1994; 106:1493-1498

[33] Grover F L "Prophylactic Antibiotics in the Treatment of Penetrating Chest Wounds" *J Thorac. Cardiovasc. Surg* 1977.; 74: 528-536

[34] Eddy A C et al "Empyema Thoracis in Patients Undergoing Emergent Closed Tube Thoracostomy for Thoracic Trauma" *Am J Surg* 1989; 157: 494-497

of empyema was whether there was complete evacuation of the pleural space. As such the authors recommended that to minimise the incidence of empyema, there must be complete evacuation of a haemothorax, including clot, and full re-expansion of the lung. Moreover, they considered prophylactic antibiotic use only in cases where there is known, previously established infection, the patient is immunocompromised, or the chest injury was caused by a high-speed projectile because of widespread tissue destruction.

Brunner et al[35] noted that blunt or penetrating chest trauma contributes to the infection risk due to the presence of necrotic tissue and blood with bacterial contamination occurring from the bronchial passages from the injured lung or externally from a penetrating injury. The authors conducted a prospective study of patients with chest trauma resulting in pneumothorax, haemothorax or both, dividing the patients into two groups, one group receiving antibiotics and the other group no antibiotics. All patients received TT.

Brunner et al found that no patients in the antibiotic group developed empyema whereas 6 patients in the no-antibiotic group did so, the difference being statistically significant. However, the no-antibiotic group had 22% more haemothoraces in it compared to the antibiotic group, a condition which Eddy et al above found to be an important predisposing factor to the development of empyema. Moreover, Brunner et al postulated that haemothorax as a pathological process remains a significant risk of empyema. Hence the significance of the difference is debatable.

Villalba et al[36] retrospectively studied approximately 3000 patients with chest trauma over a 5 year period and found that none of the 900 or so blunt trauma cases developed empyema, and 27 of about 2000 penetrating trauma cases did so. All 27 patients had a haemothorax or haemopneumothorax with a minimum of 500ml blood drained (average1265 ml). The fact that there were no post-traumatic empyema cases resulting from blunt trauma led the authors to conclude that early TT with complete evacuation of clot and re-expansion of the lung precludes the development of empyema in most patients.

Antibiotics were commenced in the emergency room in 19 of the 27 patients and neither prevented post-traumatic empyema nor created a sterile thoracic cavity. Indeed at operation there was a higher incidence of positive bacterial cultures in those that were treated with prophylactic antibiotics than those who were not so treated, the authors suggesting that prophylactic antibiotics may be harmful.

Mandal et al[37] conducted a retrospective study 5 474 chest trauma patients and found that 87 developed empyema, an overall incidence of 1.6%. Of the 4 584 patients who sustained penetrating chest trauma, 72 (1.6%) developed empyema. There were 43 gunshot wounds and 29 stab wounds. Similarly, of the 890 patients who had blunt trauma, 15 (1.7%) developed empyema. These consisted of 11 motor vehicle accidents, 2 assaults, and 2 falls.

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[35] Brunner R G et al "The Role of Antibiotic Therapy in the Prevention of Empyema in Patients with an Isolated Chest Injury (ISS-10): A Prospective Study". *J Trauma* 1990; 30:1148-1154

[36] Villalba et al "The Etiology of Post-traumatic Empyema and the Role of Decortication" *J Trauma* 1979; 19: 414-421

[37] Mandal A K et al "Posttraumatic Empyema Thoracis: A 24 Year Experience at a Major Trauma Center". *J Trauma, Injury, Infection and Critical Care* 1997; 43:764-771

Antibiotics were not given routinely to all patients solely because of a TT. The authors' protocol for prophylactic antibiotics included:

- Urgent operative thoracotomy
- Soft tissue destruction of the chest wall by shotgun injuries
- Lung contusion with haemoptysis (coughing up blood)
- Associated abdominal trauma requiring laparotomy
- Associated long bone fractures.

Otherwise, the authors concluded that due to the low incidence of post-traumatic empyema, prophylactic antibiotics are unnecessary.

In summary, a haemothorax or haemopneumothorax requires complete drainage and re-expansion of the lung to minimise the development of a clotted haemothorax and the subsequent risk of empyema. However, on balance, prophylactic antibiotics are not routinely required simply because of the presence of a TT. The risk of empyema developing where there was a pneumothorax only and where complete re-expansion has occurred, is low.

Determining if Traumatic Pneumothorax is not GBH

There are 6 questions that are relevant to determining whether a traumatic pneumothorax is not GBH. As noted in the introduction, this situation will only arise where a chest tube has been routinely inserted in a patient as a precaution who otherwise could have settled by observation only.

1. Was the chest injury a haemothorax or pneumohaemothorax?
2. Was the size of the pneumothorax more than 20%?
3. Were there any significant respiratory symptoms that necessitated treatment?
4. Did the patient suffer any chest complications requiring medical/surgical treatment?
5. Did the patient suffer associated injuries that required mechanical ventilation to facilitate treatment?
6. Were antibiotics given other than on a prophylactic basis?

If the answer is "no" to all these questions then the traumatic pneumothorax is unlikely to be GBH. Explanations of the reasoning behind each question are as follows.

Question 1: Blood in the thoracic cavity requires complete drainage, including clots, to minimise the risk of empyema and subsequent scarring around the lung. This is best achieved by TT at the very least, and may require operative thoracotomy where bleeding continues or drainage is incomplete. Hence haemothorax is likely to cause permanent injury to health if left untreated, so is excluded by this question.

Question 2: Normally the radiologist should provide an estimate of the size of the pneumothorax. If not, and there is access to the erect chest x-ray, then one of the three techniques mentioned supra can be used, although as the "sum of interpleural distances" technique compares the plain chest x-ray with CT, this may be preferred. As such, a sum of interpleural distances of 4 cm or more would indicate a > 20% pneumothorax.

Question 3: None of the articles reviewed is specific on what constitutes "significant" respiratory symptoms although the degree of breathlessness is obviously a crucial factor. Hypoxia would certainly be an indication for active treatment. Interpreting the clinical notes on a case by case basis would be required to answer this question.

Question 4: This question covers other chest injuries or conditions that occurred or were present at the time which would have required medical intervention such as a TT in any event, and include in particular soft tissue destruction of the chest wall by missiles, bilateral pneumothorax, failure of the lung to re-expand from a continuing air leak, and patients with decreased respiratory reserve such as those with chronic obstructive pulmonary disease (COPD) or other lung pathology. While failure of the lung to re-expand is subsequent to the injury, it is important that it is included, as observation only would not have been a successful option in such circumstances.

Question 5: If a patient is to undergo mechanical ventilation, such as for a general anaesthetic or in the intensive care unit, to facilitate the treatment of other injuries, then TT is required to avert the increased risk of tension pneumothorax. Such injuries individually may well satisfy the definition of GBH in any event, avoiding the need to determine if a pneumothorax is GBH.

Question 6: This question excludes the situation where antibiotics were given for a specific condition related to the pneumothorax, for example an empyema, pneumonia or wound infection of the chest. The question therefore attempts to address the situation where antibiotics were given prophylactically solely because of the presence of a TT. Injuries that carry a high risk of infection justifying the use of prophylactic antibiotics, such as tissue destruction of the chest wall by missiles, are covered in questions 4 and 5.

Conclusion

The literature reviewed reveals that while some centres routinely perform TT as initial treatment in all cases, there are others where observation only is the initial treatment of choice for small, uncomplicated traumatic pneumothoraces. While the risk of developing a tension pneumothorax is low, its fatal outcome if unrecognised or left untreated makes routine initial treatment with TT in all patients an attractive and safe option from the medical point of view.

However, in the legal context, the test is to determine the nature of the injury at the time the harm was done, and not to take into account the surrounding circumstances or the availability of medical treatment. Hence the emphasis shifts from what is a reasonable medical standard of treatment collectively, to retrospectively determining on an individual basis whether a person would likely have recovered fully without treatment. The six questions postulated at least provide the impetus for a medical witness to then turn their mind to the possibility that a small, uncomplicated and asymptomatic traumatic pneumothorax, despite treatment by TT, may not satisfy the definition of GBH, at least beyond reasonable doubt.

Don Buchanan

FACLM

2017 Annual Scientific Meeting Review — 'The Law and Ethics of Therapeutics'

The 2017 Annual Scientific Meeting was held in Perth on 21 & 22 October. Attendees enjoyed a diverse and informative program which featured presentations from seven guest speakers from Australia and beyond.

Ethical issues and legal principles surrounding therapeutics were explored in a range of applications relevant to medicine and dentistry.

Dr Wojciech Chrzanowski brought a fresh perspective to therapeutics as he explained current research into treatments using nanoparticles, including the concerning lack of risk assessment methods, as well as exciting developments in targeted drug delivery.

Dr Maria Dudycz explored the complex legal and ethical principles surrounding sterilisation of disabled persons. Maria explained underlying concepts of eugenics which may influence decision making, and highlighted issues in obtaining consent.

Professor Erwin Loh and Dr Jessica Dean co-presented their recent paper which exposed the attitudes of medical professionals towards pharmaceutical sponsorship, the motivations behind such sponsorship, and evidence of the perceived versus actual impact it has on prescribing.

Off-label prescription was discussed by Professor Vera Raposo from the Faculty of Law of Macau University, China. Vera explained the legal issues surrounding off-label prescription, the possible pitfalls, and circumstances which could result in off-label prescription being the best standard of care.

Dr Andy Robertson, Deputy Chief Health Officer and Director of Disaster Management, Department of Health WA, provided an update on the reclassification of cannabis based products and the development of legislation, policy and processes required to manage the expected demand for these products.
Dr Mike O'Connor, Chair of Obstetrics & Gynaecology, School of Medicine, Western Sydney University examined the use of cannabis in pregnancy to control nausea and the effects that this may have on the fetus.

Professor Roy Beran discussed the issues that arise in clinical trials in private practice. Dr Brent Hislop, geriatrician, Southern District Health Board and clinical senior lecturer, Dunedin School of Medicine, University of Otago, NZ, argued that non-consensual clinical drug trials are in some cases permissible, such as in people with advanced dementia, under a best interests standard.

Visit our website to download the abstracts.
If you wish to access a particular powerpoint presentation please contact the College Administrator.

http://www.legalmedicine.com.au/annual-scientific-meetings/2017-asm/

In addition, Associate Professor Sandra Johnson examined the ethical issues of therapeutics in paediatrics, which is included in this Newsletter.

Dr Alexander Holden, dental surgeon and lecturer on Dental Ethics, Law and Professionalism, University of Sydney, discussed the divisive and controversial intervention of teeth whitening/bleaching in relation to the professional remit and scope of practice. Dr Holden contrasted the dental profession's view that the intervention is a professional procedure with that of the non-qualified practitioners' view that it is a legitimate addition to a cosmetic, beautifying armamentarium.

Dr Michael Christmass, Fellow in Addiction Medicine, Next Step East Metropolitan Community Alcohol and Drug Service, Mental Health Commission WA, examined to adverse effects and treatment options on and for methylamphetamine users while Dr Don Buchanan examined the implementation of real time prescription monitoring of opioid medications at the state and federal level in Australia.

This is just a snapshot of some of the ASM presentations but there were many more highlights. We wish to thank each of our presenters for their contribution to an enlightening and successful ASM.

ACLM 2018 Courses

Exact course dates are yet to be confirmed, however the month and location of each course is listed below so that you can plan ahead to attend.

Expert Witness Training Program

Date: March 2018
Location: Melbourne, VIC

Basic Law Intensive

Date: June 2018
Location: Noosa, QLD

Advanced Law Intensive

Date: November 2018
Location: Melbourne, VIC

Annual Scientific Meeting

Date: October 2018
Location: Sydney, NSW

Please email us to express your interest in attending any of the courses.
aclm9@legalmedicine.com.au

Networking Events

Catalan Association of Forensic Physicians

XV Catalan Forensic Medicine Update Congress

Date: 11-13 December 2017

Location: Auditorium of the City of Justice, Barcelona, Spain

American College of Legal Medicine

58th Annual Health Law & Legal Medicine Conference
"The Old. The New. The Now."

In conjunction with the 10th Annual Ethical & Legal Aspects of Dentistry Conference

Date: 23-25 February 2018

Location: Francis Marion Hotel, Charleston, South Carolina, USA

Informa

27th Annual Medico Legal Congress

Date: 1 & 2 March 2018

Location: Swissotel Sydney, NSW

Queensland Law Society

Legal Profession Dinner and Awards

Date: 9 March 2018

Location: Brisane Convention & Exhibition Centre, QLD

The Medico-Legal Society of NSW Inc.

'Complaints against doctors are on the rise!'
Why are patients complaining and what can you do?

Date: 14 March 2018

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