



# WJMER

**World Journal of Medical Education and Research**

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Anterior Abdominal Wall Leiomyoma Arising De Novo in a Perimenopausal Woman – Diagnostic Enigma

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Metaplastic Carcinoma of Breast – A Rare Tumour with Uncommon Presentation

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## Introduction

The World Journal of Medical Education and Research (WJMER) (ISSN 2052-1715) is an online publication of the Doctors Academy Group of Educational Establishments. Published on a quarterly basis, the aim of the journal is to promote academia and research amongst members of the multi-disciplinary healthcare team including doctors, dentists, scientists, and students of these specialties from around the world. The principal objective of this journal is to encourage the aforementioned, from developing countries in particular, to publish their work. The journal intends to promote the healthy transfer of knowledge, opinions and expertise between those who have the benefit of cutting edge technology and those who need to innovate within their resource constraints. It is our hope that this will help to develop medical knowledge and to provide optimal clinical care in different settings. We envisage an incessant stream of information flowing along the channels that WJMER will create and that a surfeit of ideas will be gleaned from this process. We look forward to sharing these experiences with our readers in our editions. We are honoured to welcome you to WJMER.

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## WELCOME

We are pleased to bring you the thirteenth edition of the World Journal of Medical Education and Research (WJMER). This edition encompasses a variety of thought-provoking articles which intend to provide the reader with an insight into the innovative research currently being conducted around the world.

Our opening article by Vivekananada uses the case of a 46-year-old female patient to discuss leiomyoma of the abdominal wall. The report explores the presentation, occurrence and diagnosis of this benign smooth muscle tumour.

In the following article, Naveen considers Metaplastic Breast Carcinoma (MBC) in the clinical context of a 45-year-old female who presented with this rare form of breast carcinoma. The current literature which exists, as well as the characteristics, presentation, and outcomes of the disease, are investigated in this informative article.

Ibrahim looks at the anticonvulsant and the sedative anxiolytic properties of the medicinal plant *Cymbopogon Proximus*. The study, which was conducted on rats, reveals that leaves extracts of this herbal medicine have potential anxiolytic properties. While further studies should be carried out on human subjects, this article suggests that *Cymbopogon Proximus* can be used to treat insomnia and anxiety.

Keung and colleagues compare simulation-based teaching, lecture-based teaching, and teaching using animal tissue. In order to find the most effective teaching method from a student's perspective, a survey which considers student satisfaction rates, the amount of knowledge gained, and the effectiveness of the learning process is conducted.

The article offered by Ariffin and colleagues suggests that differences between Generation Y and previous generations, such as Generation X, impacts the teaching conducted in medical schools. It may prove challenging for educators to reach those who are immersed in the endeavours pertaining to a different generation. This article aims to understand the way in which Generation Y learns and to propose appropriate teaching approaches to enhance the learning process.

In a descriptive and illustrative piece, Tam discusses Anterior Cruciate Ligament (ACL) injuries. He illustrates the evolution of ACL management, highlights reconstruction methods and the surrounding arguments, and considers alternative therapies for the management of this injury. In addition, the article reflects upon the clinical experiences of patients who have suffered an ACL injury.

Campbell's case study outlines the rare condition entitled Kienbock's disease. While this disease tends to occur in males aged between twenty and forty years, Campbell discusses the case of a thirteen-year-old female who presented with the disease. The study demonstrates that it is important to consider Kienbock's disease in children presenting with persistent wrist pain. It also emphasises that early diagnosis is essential due to the progressive degenerative nature of the disease.

In the first of two articles published in this edition, Muscat and colleagues endeavour to assess if the inclusion of a witty introductory quote at the beginning of a lecture would capture the interest of students. This article thus questions the role of inspirational quotes in medical education and, more specifically, in the teaching of chemical pathology and clinical biochemistry.

The final article, which is also offered by Muscat and colleagues, intends to understand if relating an important learning point to a fictional character enhances knowledge acquisition. The study concludes that the use of a fictional character in the delivery of fundamental medical information may aid the understanding of chemical pathology. As such, the authors suggest that there is a place for this phenomenon in medical education.

We sincerely hope that you find each article in this edition informative, intellectually-stimulating and enjoyable to read.

With very best wishes,

**Ms Karen Au-Yeung**  
Editor

**Ms Rebecca Williams**  
Associate Editor

**Professor Stuart Enoch**  
Editor-in-Chief

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## Anterior Abdominal Wall Leiomyoma Arising De Novo in a Perimenopausal Women – Diagnostic Enigma

Krishna S; Vivekananada M; Hegde KS; Shenoy R

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**WJMER, Vol 13: Issue 1,  
2017**

### Abstract

**Introduction:** Leiomyoma or fibroids are the most common benign tumour of the female reproductive tract. Extruterine or extraintestinal leiomyomas are very rare and they present diagnostic enigma as they are confused for malignant masses or desmoid tumours. Anterior abdominal wall is an uncommon site for primary leiomyoma without any previous history of uterine surgeries or concomitant presence of uterine leiomyomas.

**Case:** A 46-year-old female patient presented with recurrent pain in the right lower abdomen since one year. She is perimenopausal and underwent laparoscopic appendectomy two years back. She has two living children and both were normal vaginal delivery. On evaluation she was having right sided lower abdomen swelling. She underwent diagnostic laparoscopy and excision, final histopathology of which was reported as leiomyoma.

**Discussion:** Abdominal wall leiomyoma are uncommon and can occur following seeding of tumour cells during previous uterine surgeries. Several theories were proposed to explain primary abdominal wall leiomyoma without any success. It has been postulated that primary abdominal wall leiomyoma arises from the smooth muscle of the vessels in the anterior abdominal wall due to certain mutations. Another theory postulates that uterine fibroids become attached to the pre-peritoneum or retroperitoneum, detach from the uterus and develop their own blood supply. These are known as parasitic leiomyomas.

**Conclusion:** To conclude, benign primary leiomyoma of the abdominal wall can occur and this novel entity should be considered in the diagnosis of the anterior abdominal wall mass or pain of long duration in any patient without any concomitant tumours elsewhere in the abdomen or any antecedent history of abdominal or pelvic surgery.

### Key Words

Anterior Abdominal Wall; Perimenopausal Women; Leiomyoma; Diagnostic Laparoscopy; Pelvic Surgery

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### Case Presentation

A 46-year-old multiparous of gravida 2 para 2 (G2P2), perimenopausal female presented with pain in the right lower abdomen since one year which is of dull aching type, on and off, non-progressive and non-radiating. She had a history of laparoscopic appendectomy two years ago. She is amenorrheic for last two months. She was not on steroids or hormone replacement therapy nor had history of gynaecologic interventions. There was no history of diabetes, seizures, mental retardation or behaviour problems and there were no abnormalities of skin pigmentation.

General physical examination was normal.

On per- abdominal examination tenderness in the

right iliac region. Scars of laparoscopic appendectomy were present and healed well. Rest of the abdominal findings were within normal limits. On per-speculum examination cervix was healthy and on per-vaginal examination uterus was normal in size, fornices were free and non-tender.

Her haematological and routine biochemistry investigations were within normal limits. USG abdomen and pelvis showed an enlarged hypoechoic rounded lymph node in the right iliac fossa. Trans-vaginal ultrasound was normal. She was further evaluated with contrast enhanced abdomen and pelvic scan which revealed bulky uterus showing heterogeneous enhancement with endometrial collection of around 2.6cm and a contiguous heterogeneous enhancement of the posterior wall

of uterus which might be an extension of the cervical lesion. It also showed a heterogeneously enhancing well-defined omental lesion measuring ~ 1.8 x 1.6 cms in the right iliac fossa. ? Metastatic nodule.

Patient was evaluated for cervical lesion and underwent D&C and Pap smear which were negative for malignancy. In view of persistent pain in the abdomen and to rule out metastasis in omental lesion she underwent diagnostic laparoscopy. Diagnostic laparoscopy revealed a 2x2 cm firm nodule noted on the anterior abdominal wall in preperitoneal plane in the right iliac region and rest of the abdomen is normal. Laparoscopic excision of the nodular lesion done and sent for HPE.

Microscopic examination revealed a well circumscribed tumour composed of interlacing whorls of smooth muscle bundles with elongated vesicular fusiform nucleus with mitotic figures <1/HPF. Features are suggestive of benign leiomyoma. Patient's post operative period was uneventful. She was doing well at three months follow up.

### Discussion

There is paucity of findings of isolated abdominal wall fibroids in the literature without previous surgeries for myomectomies or presence of uterine fibroids. She has never been managed for infertility. There was no evidence of uterine fibroids in history or imaging and no past history of uterine surgery. This supports the thinking that leiomyomas can be found anywhere there are smooth muscles<sup>1</sup>.

Abdominal wall leiomyoma can be primary or parasitic. Parasitic leiomyomas have been reported in the retro- or pre-peritoneum. It has been proposed that the uterine leiomyoma becomes adherent to these structures, develops its own blood supply from the surrounding structures and gradually over time it loses its attachment with the uterus, thus developing as a parasite in the new location<sup>2</sup>.

Abdominal wall leiomyomas are a rare finding and are thought to follow seeding of tumour cells following surgical resection of uterine fibroid<sup>3,4</sup>. This entity occurs more commonly after laparoscopic

uterine surgery than laparotomy<sup>4</sup>. However, the exact cause of the origin of primary leiomyoma from the anterior abdominal wall is not clear. It has been postulated that the transformation of the cells of the vessel wall in the anterior abdominal layer to leiomyoma occurs probably due to somatic mutations and interplay of hormonal and growth factors<sup>5</sup>. The diagnosis of primary leiomyoma of the anterior abdominal wall can be made only when there is no antecedent history of abdominal surgery, open or laparoscopic ever. The tumour should be carefully removed en bloc minimising spillage of tumour cells to prevent recurrences. Synthetic mesh can be used to cover large defects after tumour extrication<sup>5</sup>.

### Conclusion

To conclude, benign primary leiomyoma of the abdominal wall can occur and this novel entity should be considered in the diagnosis of the anterior abdominal wall mass or pain of long duration in any patient without any concomitant tumours elsewhere in the abdomen or any antecedent history of abdominal or pelvic surgery. Diagnostic laparoscopy is the ideal investigation whenever other investigations are inconclusive.

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## Metaplastic Carcinoma of Breast – A Rare Tumour with Uncommon Presentation

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**WJMER, Vol 13: Issue 1,  
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### Abstract

**Introduction:** Metaplastic breast carcinoma (MBC) is a rare primary breast carcinoma, which is characterised by presence of carcinoma with co-existence of non-epithelial cellular elements. It comprises of 0.05 – 0.1 % of all breast carcinomas. Because of the rarity of the disease, there is paucity of information regarding the outcome of this variant of breast carcinoma.

**Case:** In our case, 45-year-old female presented with a large ulcerated lump in the left breast with foul smelling discharge and maggots. Patient presented in sepsis and hence she was taken for emergency surgery after initial resuscitation. Histopathology report was given as high grade MBC – squamous variant with triple negative receptor status.

**Discussion:** MBC is a rare variety of breast carcinoma which forms only 0.1% of all breast carcinomas. MBC usually has different characteristics compared to IDC with large tumour size, high-grade tumour, less nodal involvement, hormone receptor negativity and poor outcomes. Patients with MBC are to be treated more aggressively than IDC, but specific protocols for management of this type of carcinoma are not framed due to rarity of cases and presently are treated on the guidelines of IDC.

**Conclusion:** Although a rare variety of carcinoma, MBC is of considerable interest because of its pathological heterogeneity and differences in clinical behaviour compared to typical breast carcinomas. The poor disease free survival associated with MBC suggests that further research exploring mechanisms of carcinogenesis and identifying clinically relevant prognostic factors is needed to direct optimum clinical care.

### Key Words

Metaplastic; Non-Epithelial; Squamous Cell; Sepsis; Mastectomy

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### Introduction

Metaplastic Breast Carcinoma (MBC) is a rare heterogeneous group of malignant lesions comprising 0.05 – 0.1 % of breast carcinomas<sup>1</sup>. The unique nature of MBC is that it has an epithelial or mesenchymal cell population mixed with adenocarcinoma. Pathologic classification of MBC is generally divided into two main groups:<sup>1</sup> homogeneous spindle cell/sarcomatoid carcinoma, and<sup>2</sup> heterogeneous carcinosarcoma/ carcinoma with sarcomatous differentiation (osseous, chondroid and rhabdoid). Pure epithelial malignant tumours with metaplasia, such as adenosquamous and pure squamous cell carcinoma, are also considered as MBC subtypes.<sup>1,2</sup>

### Case Presentation

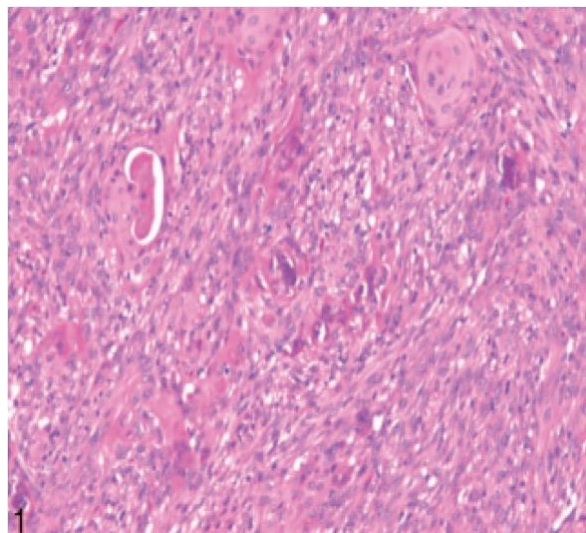
A 45-year-old female with no known comorbidities, presented to the casualty with a large lump in the left breast with ulceration and foul smelling discharge with maggots. Lump was there since 10 years, which was initially small, non-progressive in

size with no other complaints. The swelling increased in size over the past 1 – 2 months along with ulceration over the skin and discharge from the ulcer for past 10 days. She noticed maggots since two days and had low grade fever for one day.

On examination patient had fever (99.40F), tachycardia (pulse rate – 120/min) and blood pressure was 90/60 mm of Hg.

A large mass of size 15 x 10 cm involving almost all quadrants was present in the left breast. There is ulceration of skin over the lump of around 10 x 7 cm with necrotic tissue and foul smelling discharge. Hundreds of maggots were present in the ulcer. A lymph node of size 2 x 1 cm is present in the left axilla, which was firm, non-tender and freely mobile.

In view of the large size of the mass, our clinical diagnosis was malignant phylloids tumour with skin ulceration and sepsis.



Laboratory data showed leukocytosis with neutropilia.

As patient was in sepsis at presentation, she was taken up for emergency simple mastectomy after initial resuscitation and specimen was sent for histopathological examination.

Post-operative recovery was uneventful. Histopathological report showed high grade metaplastic carcinoma of breast, subtype – squamous cell carcinoma. Tumour cells are ER/PR and HER 2 neu negative.

After recovery from the acute situation, patient underwent metastatic workup with contrast enhanced CT of chest and abdomen and bone scan

which showed metastasis to L2 vertebra. Patient was started on palliative chemotherapy in view of stage IV disease.

### Discussion

Metaplastic breast carcinoma is a rare variety of breast carcinoma, which contains admixture of epithelial and non-epithelial components. Non-epithelial elements consist of spindle –shaped cells, bizarre giant cells, bone, cartilage or rarely skeletal muscle cells. Some classification systems also consider adenosquamous type and pure squamous cell variants under MBC based on the metaplastic cell component<sup>1,2</sup>.

Pathological classification is challenging due to its histologic diversity, rarity of the disease and lack of significant consensus regarding appropriate system



of classification of the disease. MBC with prominent spindle cell component consists atypical spindle cells with fascicular arrangements. The amount of atypia varies from pleomorphic tumours resembling high-grade sarcomas to mild cellular atypia resembling benign fibrous lesion<sup>1,2</sup>.

MBCs are usually high grade but low grade MBCs with fibromatosis-like phenotype have been recently described and must be considered in the differential diagnosis of low grade or benign looking fibrous lesions of breast. However, as in case of high-grade tumours, demonstration of epithelial component is necessary to label it as MBC<sup>3</sup>.

Cells of origin for MBC are thought to be epithelial in nature with sarcomatous components representing areas of metaplasia or de-differentiation. Tumours with predominant squamous cell differentiation represent metaplasia of malignant ductal epithelial cells<sup>4</sup>.

Most of the studies show that MBC is typically large at presentation with median size being 3.7 cm. In our case, size at presentation was 15cm, which is far larger than the average. MBC is usually associated with lower incidence of axillary lymph nodal involvement than would be expected from similar sized typical breast carcinoma, which is around 6-26%<sup>2,3</sup>. In our case, palpable lymphnode was present in the axilla, though no tissue diagnosis is available to confirm the metastatic nature of the node.

MBC very less frequently expresses oestrogen and progesterone receptors (0-14%). The ER/PR receptor status in our case was negative. There is only limited data regarding HER 2/neu overexpression. A study showed HER2/neu over expression in 72% of cases with spindle cell and squamous cell variant where as 33% of cases with chondroid variant<sup>3,4</sup>.

Patients with MBC have poorer outcomes compared to classic IDC of breast with high risk of recurrence following primary surgery. In various studies, disease free survival (DFS) after primary surgery after a follow-up of 20-25 months was 50-60%. Adenosquamous cell variant has little better prognosis compared to other variants<sup>1,5</sup>.

Systemic therapy is rarely used for MBC and data regarding the same is limited because of the rarity of the disease. Different studies, where systemic therapy has been used for MBC, show that there is no significant response or increased survival benefit

with use of systemic chemotherapy or hormonal therapy in MBC<sup>1, 2, 5, 6</sup>.

### Conclusion

MBC is a recently classified rare subtype of breast carcinoma, which is aggressive compared to IDC.

It is characterised by advanced stage at presentation, relatively less involvement of axillary nodes, hormonal receptors negative tumour with increased recurrence rates and less median DFS.

Role of chemo-radiotherapy in MBC is limited since there is no significant survival benefit.

More studies including large number of patients with MBC are to be called for to study the disease entity in more detail and to explore novel prognostic and therapeutic targets for better survival in this disease.

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# Anticonvulsant and Anxiolytic Properties of the Leaves Extracts of *Cymbopogon Proximus*

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## Abstract

**Objectives:** This study was conducted to evaluate the anticonvulsant and the sedative anxiolytic activity of the leaves extract of *Cymbopogon proximus* in rats.

**Materials and Methods:** The ethanolic extract of the root of *C. proximus* at 200, 400 and 800 mg/kg, i.p was studied for its anticonvulsant effect on four in vivo rat models (Maximal Electroshock Seizure (MES), Pentylene-tetrazole (PTZ)-, Picrotoxin (PIC)- and Strychnine (STR) - induced seizures). Simple activity meter was used for the evaluation of the anxiolytic properties. Sodium valproate (400 mg/kg) was used as a reference anticonvulsant drug for all models. The protection from tonic convulsions and the number of protected animals from seizures were noted. The number of movements between the squares in the activity meter were counted in the consecutive five minutes and the motor activity was observed.

**Results:** The plant showed marked sedative - anxiolytic effect and significant decrease in the motor activity ( $p < 0.001$ ) since the first dose (200 mg/kg) in a dose-dependent manner. The doses 400 and 800 mg/kg of the extract significantly ( $p < 0.01 - p < 0.05$ ) reduced the duration of seizures induced by MES, MTZ and PIC while only the dose of 800mg/kg of the extract delayed the onset of tonic-clonic seizures produced by strychnine.

**Conclusion:** Results of the present study concluded that the ethanolic extract of *Cymbopogon proximus* leaves possesses strong sedative properties with moderate anticonvulsant and anxiolytic activity. It is therefore recommended for the treatment of insomnia, anxiety in case of epilepsy.

## Key Words

Anxiety; Epilepsy; Extract; *C. Proximus*; Seizures; Traditional Medicine

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## Introduction

*Cymbopogon proximus* is one of the important plants in African and Sudanese folk medicine known as Almahreb. It is used for the treatment of nervous and gastrointestinal disturbances, anxiety and agitation. The petroleum ether extract of *Cymbopogon proximus* proved to have unique antispasmodic characteristics, and could be used for the propulsion of renal and ureteric calculi<sup>1</sup>. *C. proximus* extracts possess a valuable antihypertensive activity and it produces relaxation of the smooth muscle fibers<sup>2,3</sup>. Many biological activities of *C. proximus* have been reported<sup>1,4,5</sup>. Bioactivity-assisted fractionation of the *C. proximus* extracts led to the isolation of an active sesquiterpene, proximadiol (cryptomeridiol) which was found to have antidiabetic activity<sup>1,5</sup>. In addition, *C. proximus* essential oil was found to possess a bronchodilator activity mediated via antagonising both histamine and serotonin receptors<sup>5</sup>.

Furthermore, it has a significant ganglionic blocking action and a mild anti-inflammatory activity<sup>5</sup>. This study was intended to investigate the anticonvulsant, anxiolytic and sedative properties of this medicinal plant in rats.

## 2. Materials and Methods

### 2.1.Plant material

*Cymbopogon proximus* leaves were purchased from a local medical plant market in Khartoum, Sudan and authenticated by Taxonomy Department of Medicinal and Aromatic Plant Research Institute, National Center for Research, Khartoum, Sudan. Leaves were preserved in a dry and cool place for 72 hours, then were grounded into a fine powder using clean dry electric blender. Ethanolic extraction process was followed according to<sup>6</sup>. 100g of the grounded leaves were transferred to a round bottom flask and macerated in 80% ethanol. The flask was stoppered and left for 24 hours at room

temperature. The extract was then filtered using sterile cotton pieces. The filtrate thus obtained was concentrated under reduced pressure and the solvent recalled was used to extract the mark following the same procedure till exhaustion. The concentrated extract was collected and left to dry at room temperature till constant weight was obtained. The extract was then kept in a refrigerator for experimentation.

## **2.2. Chemicals:**

Pentylenetetrazole, sodium valproate, picrotoxin and strychnine were used to induce seizures and all were from Sigma Chemical, USA.

## **2.3. The Experimental Animals:**

Adult males, Wistar Albino Rats (WAR), weighing 110-125 g were housed in standard polypropylene cages in the Laboratory Animal House of the Aromatic Plants Research Institute (MAPRI), National Centre for Research (NCR), Sudan (from February 2013 to May 2014). The animals were acclimatized for seven days under standard environmental conditions (*i.e.*, relative humidity: 40-60%, temperature: 24±2°C, and 12 h light-dark cycle), and fed with mash feed consisting of flour, meat, edible oil, sodium chloride, vitamins, minerals and tap water. Supply of food was withdrawn 12 h prior to the commencement of the experiment. However, the rats were allowed access to water always. All the experiments were carried out by using five animals in each group. The experiments were carried out between 8 am and 12 noon<sup>7</sup>. Twenty five rats were used in each experiment, divided into five groups; each group received three different single doses (200, 400 and 800 mg/kg. *i.p*) of the plant leave extract. One group was given 400 mg/ kg. *i.p* sodium valproate as a reference drug (positive control). The last group was given 10ml/kg. *i.p* normal saline (negative control). This study was approved by the Scientific Research Committee of the College of Pharmacy, Omdurman Islamic University in accordance with good clinical practice and international guidelines for animal use in experimentations.

## **2.4. Experiment 1: Measurement of Anxiolytic Activity in Rats:**

An anxiety model, simple activity meter test, was used to explore the anti-anxiolytic effect of the tested extract<sup>8</sup>. The simple activity meter is a box composed of two glassy and two wooden sides stand on 625 cm<sup>2</sup> wooden plane board divided to 25 squares. Each square was 25 cm<sup>2</sup>. A rat was placed on the center of the board and left to move freely for a period of five minutes. The number of movements between the squares were counted in the consecutive five minutes. Decrease in number of

movements/ five minutes was taken as an indication of anti-anxiety activity. Decrease in motor activity reflected the sedative effect of the extract.

## **2.5. Pharmacological Tests & Assessment of Anticonvulsant Activity:**

### **2.5.1. Experiment 2: Pentylenetetrazole (PTZ) – Induced Seizure Test:**

Myoclonic jerks seizures were induced in male rats by subcutaneous injection of 70 mg/kg pentylenetetrazol (PTZ)<sup>9,10,11,12</sup>. The protective effect of the three tested doses of the extract was recorded. The tested extract was given 45 minutes before PTZ injection. The positive control group received 400mg/kg. *ip* sodium valproate 15 minutes before PTZ injection. One group received 10 ml/ kg.*i.p* normal saline and served as a negative control group.

### **2.5.2. Experiment 3: Picrotoxin (PIC) - Induced Seizure Test:**

This model acts to disrupt the inhibition/excitation balance and creates an epileptogenic focus<sup>13</sup>. Clonic seizures were induced in male rats by subcutaneous injection of 10 mg/kg/*i.p* picrotoxin. The three various doses of the extract were given 45 minutes before picrotoxin administration while the positive control received sodium valproate 15 minutes before picrotoxin injection. Another group was given 10ml/kg.*i.p* normal saline and served as a negative control group. The protective percentage was then recorded.

### **2.5.3. Experiment 4: Maximal Electroshock (MES) Test:**

Tonic convulsions of the hind extremities of mice were induced by passing an alternating electrical current (50 mA, of 100 Hz frequency (pulse/sec.) for 0.5 sec. duration through ear electrodes<sup>11, 12, 13, 14</sup>. The three tested doses of the extract were given 45 minutes before the induction of the MES while the positive control received sodium valproate 15 minutes before the MES. Another group was given 10ml/kg.*i.p* normal saline and served as a negative control group. The number of animals protected from tonic hind limb extension was determined in each dose group.

### **2.5.4. Experiment 5: Strychnine (STR) Test:**

Convulsions followed by death were induced in male mice by the subcutaneous injection of 2.5 mg/ kg strychnine (STR) nitrate. The protective effect of three different intraperitoneal treatments were given 45 minutes prior to STR was recorded. Animals that survived more than 10 minutes were classified as protected. The positive control group received 400 mg/kg. *ip* sodium valproate<sup>9, 11, 15</sup>

## 2.6. Statistical Analysis:

The values are expressed as mean  $\pm$  SEM and the data was analysed using one way ANOVA followed by Tukey-Kramer test. The level of significance was set at  $P < 0.05$ . Median anticonvulsant dose (ED<sub>50</sub>) was calculated according to the method of Litchfield and Wilcoxon<sup>16</sup>. A computer programme was used to calculate 95% confidence limit of ED<sub>50</sub>.

## 3. Results

### 3.1. Effects of *Cymbopogon Proximus* Leaves Extract on the Motor Performance Using the Simple Activity Meter Test:

*Cymbopogon proximus* showed marked sedative - anxiolytic effect and significant decrease in the motor activity ( $P < 0.001$ ) since the first dose (200 mg/kg, ip) in a dose-dependent manner (table 3.1).

Extract dose (mg/kg) i.p		200 (mg/kg)	400 (mg/kg)	800 (mg/kg)
Move-ments counts/5 minutes	Mean $\pm$ SEM Positive control group	20.6 $\pm$ 2.27	20.6 $\pm$ 2.27	20.6 $\pm$ 2.27
	Mean $\pm$ SEM Treated groups	10.0 $\pm$ 0.95**	8.4 $\pm$ 1.03 **	1.0 $\pm$ 0.40 ***

Table 3.1. Effects of *Cymbopogon Proximus* Leaves Extract on the Motor Performance

### Using the Simple Activity Meter Test:

Treatment was compared with control group. Five animals were used in each group. \*\*  $P < 0.01$ , \*\*\*  $P < 0.001$

### 3.2. Pharmacological Tests and Assessment of Anticonvulsant Activity:

#### Effects of *Cymbopogon Proximus* Leaves Extract against Pentylentetrazol (PTZ) - induced seizures:

3.2.1. Pentylentetrazol (70mg/kg, s.c.) produced generalised tonic-clonic seizures in the negative control group.

40% of the animals that received 200mg/kg, i.p of the extract resisted the PTZ convulsive effect, the resistant ratio increased up to 80% in the group that

received 400 mg/kg, i.p of the extract while, 800 mg/kg, i.p of the extract as well as sodium valproate (400 mg/kg, i.p) showed 100% anticonvulsant protection against PTZ. The ED<sub>50</sub> of the extract against PTZ was found to be 248.77 mg/kg. The extract significantly ( $p < 0.05$ ) decreased the recovery period in the affected animals by  $20.02 \pm 2.40$  min. compared to the positive control group ( $44.50 \pm 2.03$  min.). (Table 3.2.1). No incidence of mortality was recorded.

Treatment	Sodium valproate (+ ve control)	<i>c. proximus</i>	Normal saline (-ve control)
ED <sub>50</sub>	162	248.77	-
95% C.L (mg/kg)	(140-185)	(160.42 - 385.75)	-
Time (min.) for duration of recovery (Mean $\pm$ SEM)	0.00 $\pm$ 0.00***	31.20 $\pm$ 1.10*	44.50 $\pm$ 2.03

Table 3.2.1 Effects of *Cymbopogon Proximus* Leaves Extract Against Picrotoxin (PIC)- Induced Seizures:

3 to 5 doses were used to calculate ED<sub>50</sub> (in mg/kg). \*  $p < 0.05$ , \*\*\*  $p < 0.001$  significant (compared with the respective control).

#### 3.2.2 Effects of *Cymbopogon Proximus* Leaves Extract Against Picrotoxin (PIC) - Induced Seizures:

Picrotoxin (10 mg/kg, s.c.) produced generalised tonic-clonic seizures in the negative control group.

The plant extract appeared slight to moderate activity against PIC-induced seizures.

The dose of 200 mg/kg, i.p showed 20% protection in the tested animals group while 400 mg/kg, ip produced 40% protection. The protection ratio increased up to 60% when the third group was injected with 800 mg/kg, ip of the extract. The ED<sub>50</sub> of the extract against PIC was found to be 483.02 mg/kg. The extract significantly ( $p < 0.05$ ) decreased the recovery period in the affected animals by  $34.50 \pm 2.23$  min. compared to the positive control group  $48.20 \pm 3.12$  min. (Table 3.2.2). 20 % incidence of mortality was recorded in the affected animals.



Treatment	Sodium valproate (+ ve control)	<i>C. proximus</i>	Normal saline (-ve control)
ED <sub>50</sub>	192.6	483.02	-
95% C.L (mg/kg)	(159-207)	(253.46 – 920.47)	-
Time (min.) for duration of recovery (Mean ± SEM)	0.00 ± 0.00***	34.50 ± 2.23*	48.20 ± 3.12

Table 3.2.2. The Effect of *Cymbopogon***Proximus Leaves Extract Against Picrotoxin (PIC)- Induced Convulsions:**

3 to 5 doses were used to calculate ED<sub>50</sub> (in mg/kg).  
\**p* < 0.05, \*\*\**p* < 0.001 significant (compared with the respective control).

**3.2.3. Effects of *Cymbopogon Proximus* Leaves Extract on Maximal Electroshock (MES)- Induced Seizures:**

The anticonvulsant agent, sodium valproate, completely protected the rats against MES-induced seizures (*P* < 0.001). The dose of 800 mg/kg, i.p of the plant extract showed 20% protection against the MES test and significantly (*p* < 0.01) decreased the recovery period in the affected animals by 32.40 ± 16.68 sec compared to the control 174.20 ± 23.01 sec. The dose 400 mg/kg, i.p significantly (*p* < 0.05) shorted the duration of recovery period in the affected animals by 85.40 ± 14.37 sec compared to the control, while 200 mg/kg of the plant extract did not appear any significant protective activity against MES test. All the affected animals were recovered and no deaths were recorded. (Table 3.2.3).

Type of treatment	Dose rate (mg/kg)	Protection rate against MES %	Time (sec) for duration of Recovery/ death recovery (Mean ± SEM)	Recovery/ death
Normal saline	(10 ml/kg)	174.20 ± 23.01	0 %	Recovery
Sodium valproate (+ ve control)	400	0.00 ± 0.00***	100%	Recovery
<i>C. proximus</i>	200	0%	146.00 ± 19.45	Recovery
	400	0%	85.40 ± 14.37*	Recovery
	800	20%	32.40 ± 16.68**	Recovery

Table 3.2.3. Effects of *Cymbopogon Proximus* Leaves Extract on Maximal Electroshock (MES)- Induced Seizures:

\**p* < 0.05 significant, \*\**p* < 0.01 most significant, \*\*\**p* < 0.001 highly significant (compared with the respective control).

Type of treatment	Dose rate (mg/kg)	Protection rate against STR (%)	Time (min.) of the latency of seizures (Mean ± SEM)	Survive / death
Normal saline (-ve control)	(10 ml/kg)	0 %	3.20 ± 0.86	Death
Standard valproate (+ ve control)	400	100%	0.00 ± 0.00***	Survive
<i>C. proximus</i>	200	0%	4.20 ± 1.01	Death
	400	0%	6.01 ± 1.00	Death
	800	0%	16.60 ± 2.37*	Death

Table 3.2.4. Effects of *Cymbopogon Proximus* Leaves Extract on Strychnine (STR)-Induced Seizures:

Sodium valproate completely protected the rats against STR-induced seizures (*P* < 0.001). Only the dose of 800mg/kg, i.p of the plant extract protected 20% of the tested animals group and showed significant (*p* < 0.05) increase in the latency of seizures by 16.60 ± 2.37 min compared to the negative control 3.20 ± 0.86 min while both doses of 400 and 200 mg/kg, i.p did not show any significant protective activity against STR test. Deaths were recorded in all the affected animals (Table 3.2.4).

\**p* < 0.05 significant, \*\*\**p* < 0.001 highly significant (compared to the respective control).

**Discussion**

The results of the current study indicate that *Cymbopogon proximus* leaves extract has potential anxiolytic properties. This potentiation of anti-anxiety suggests the presence of anxiolytic-sedative properties in the extract of *C. proximus*<sup>17</sup>. The sedative-anxiolytic effect of *C. proximus* is probably due to the essential oil which was found to have antagonising effects for both histamine and serotonin receptors<sup>18</sup>. The result is in correspondence with Seth et, al<sup>19</sup> who reported that *Cymbopogon* citratus essential oil induced hypnosis in mice.

*Cymbopogon proximus* also showed significant anticonvulsant properties by inhibiting convulsions induced chemically or electrically in various percentages. The extract protected rats against PTZ, PIC and STR-induced seizures in a dose-depend manner. As PTZ has been shown to interact with the gamma amino butyric acid (GABA) neurotransmitter<sup>20</sup>, the antagonism of PTZ induced seizures suggests that *C. proximus* interacts with

GABA ergic neurotransmission since the PTZ is a selective blocker of the chloride ionophore complex to the GABA-A receptor. Picrotoxin (PIC) - induced seizures is known to be a non-competitive GABA antagonist, exerting its effect by blocking the chloride channel in the GABAA receptor complex<sup>21, 22, 23</sup>. It is used to induce acute simple partial seizures and generalised tonic-clonic seizures<sup>24</sup>. The antagonism of PIC-induced seizures suggests the interaction of the plant extract with the GABA-ergic neurotransmission.

These results agree with some studies that show that menthol, a synthetic product from the extract, acts as GABAA receptor positive allosteric modulator and increases GABAergic transmission in periaqueductal grey neurons<sup>25</sup>. Also, *C. proximus* essential oil was found to be a significant ganglionic blocking agent<sup>18</sup>. The mild inhibition of STR-induced seizures by *C. proximus* extract suggests that it possesses anticonvulsant properties<sup>26, 27</sup> and that glycine neurotransmission is involved in a weak way<sup>28</sup>. *C. proximus* antagonised MES-induced seizures probably by prolonging the activation of sodium channels<sup>12</sup>. The anticonvulsant anxiolytic activity of the plant extract is in association with some findings proved that the genus *Cymbopogon* has marked depressant effect on the central nervous system<sup>19</sup>.

### 5. Conclusion and Recommendations

*Cymbopogon proximus* leaves possess strong sedative properties with moderate anticonvulsant and anxiolytic activity. It is therefore for the treatment of insomnia, anxiety in case of epilepsy.

These results were obtained from experimental animals' models, so this herbal plant should be used in appropriate formulations for further clinical trials in human.

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# Comparing Clinical Learning Effectiveness Among Lecture-Based Training, Simulation-Based Training and Training Using Animal Tissue Models

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## Abstract

**Objectives:** To compare simulation-based teaching (SIM), lecture-based teaching (LEC) and teaching using animal tissue (ANT) in terms of students' satisfaction, knowledge gain and learning efficiency.

**Method:** All the students who attended the courses organised by the CSTC from 1<sup>st</sup> Jan 2013 to 31<sup>st</sup> Dec 2015 were enrolled in the study. Data was collected through a questionnaire delivered at the end of the course. The questionnaire contained 15 questions and used a ten-point Likert scale to rate the students' satisfaction to the course and also the competence before and after the course. (Appendix A)

**Result:** 5024 questionnaires were collected with a response rate of 67%. Students demonstrate a higher post-course score in SIM, LEC and ANT ( $p < 0.001$ ). However, neither one course performed better than the others. Student satisfaction was similar among the three courses. When specifically asked to compare the teaching effectiveness of SIM or ANT with LEC, our study showed that the answer is positive with median score of eight for both.

**Conclusion:** Simulation-based courses, lecture-based courses and courses using animal tissue are effective teaching modalities. They are equally acceptable to students with similar satisfaction rates. When compared to lecture-based courses, students perceived that simulation-based courses or courses using animal tissue were more effective in learning.

## Key Words

Learning Effectiveness; Lecture; Simulation

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## 1.1 Background

With advances in science, technology and knowledge, skill of health-related disciplines is expanding. Commenced in 2009, the NTWC Clinical Skills Training Centre (CSTC) provides on-job-training to health care professionals including doctors, nurses and allied health care workers.

Since its establishment, the centre has organised around 100 courses per year, including life support courses, pain management, suturing courses and ventilator care workshops, amongst others. Total participants reach more than two thousand per year. Most of them are medical and nursing staff, accounting for approximately 75% of all participants in 2016.

In general, the courses organised by CSTC are divided into three categories. They are Lecture-based training (LEC), Simulation-based training (SIM) and Training using animal tissue (ANT). (Table 1)

Type of course	Example
Simulation-based	Basic Life Support resuscitation provider update Emergency Delivery workshop Procedural Sedation course Resuscitation course Nurse initiate Defibrillation course Emergency Medicine workshop on developing country Lumbar puncture workshop
Lecture-based	Interactive Neurosurgical Management Workshop Emergency PCI in AMI Clinical simulation education seminar Acute Grief Support Workshop PEG Workshop Trauma Course
Course using animal tissue	Surgical Interns practical workshop Wound management and suture workshop Chest drain workshop

Table 1: Course organised by CSTC



The aim of this study is to compare lecture-based training, simulation-based teaching and training using animal tissue in terms of participants' satisfaction, knowledge gain and learning efficiency.

## **2. Methods**

### **2.1 Study Design**

This study was designed to measure participants' satisfaction and knowledge gains and compare the learning efficiency among Lecture-based training, Simulation-based training and Training using animal tissue. The subjects of this study were the participants who attended the courses organised by the CSTC during the period of 1<sup>st</sup> Jan 2013 to 31<sup>st</sup> Dec 2015.

### **2.2 Study Protocol**

Each participant attending the courses organised by the CSTC received a questionnaire (Figure 1) at the end of the course. The questionnaire contained 15 questions using a ten-point Likert scale to rate participants' satisfaction about the course and their competence before and after the course.

To ensure confidentiality, entry of all personal data was optional. The study protocol was approved by the New Territories West Cluster Clinical and Research Ethics Committee (NTWC CREC) in January 2016.

The courses were categorised into three types:

1. Simulation-based training (SIM): It is an imitation of real-life situations without utilising animal tissues. The instructors begin with lectures and participants are then required to utilise the knowledge learnt in the designed scenarios.
2. Lecture-based training (LEC): The instructors present lectures and discuss related issues with participants in a conference room.
3. Training using animal tissue (ANT): The instructors use animal tissue to demonstrate a series of procedures. Participants then perform the procedures under observation.

### **2.3 Measurement**

The primary outcome is the knowledge gained after the courses. It is based on comparing the self-rated competency before and after three types of courses. Other outcomes including participants' satisfaction and participant-rated teaching effectiveness among SIM and LEC, and ANT and LEC are measured as well.

Question 1 in part B (B1) and question 2 in part B (B2) reflect the self-rated competency before and after the course respectively. A higher numerical value indicates a higher self-rated competency. The difference between B1 and B2 ( $\Delta B$ ) is defined to be knowledge gained after the course. Question 6 in part A (A6) measures the overall satisfaction of the courses.

For participants attending simulation-based training or training using animal tissue, they are asked to compare the courses with lecture-based training and rate the effectiveness in question 6 in part C (C6). It measures the participant-rated learning efficiency. A higher numerical value indicates a higher self-rated learning efficiency compared with traditional lecture-based teaching.

### **2.5 Data Analysis**

Data was analysed using the Statistical Package for Social Science (SPSS) 20 for Windows using descriptive statistics, Kruskal-Wallis test and Mann-Whitney U test. Ordinal variables were summarised by median, interquartile range and compared among different groups by chi-square test.

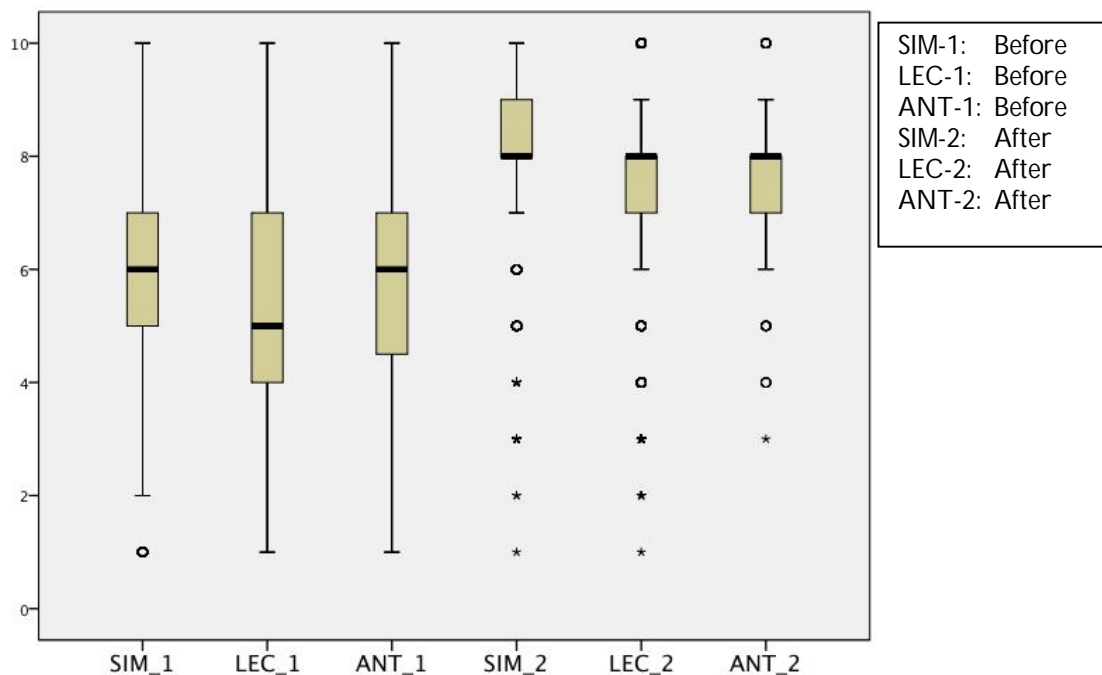
## **3. Result**

### **3.1 General**

There were 5024 questionnaires completed during the period of 1<sup>st</sup> Jan 2013 to 31<sup>st</sup> Dec 2015. The response rate was 67% (5024 / 7547). Among those completed questionnaires, 2532 (50.4%), 2297 (45.7%) and 195 (3.9%) came from lecture-based training (LEC), simulation-based training (SIM) and training using animal tissue (ANT) respectively.

Wilcoxon signed rank test was used to compare the self-rated competency among the same group of participants before and after the course. It shows that participants demonstrated a higher post-course score in SIM, LEC and ANT ( $p < 0.001$ ). The median difference between the pre-course and post-course score ( $\Delta B$ ) was 2 (IQR: 1-3) for SIM, 2 (IQR: 1-3) for LEC and 2 (IQR: 1-3) for ANT. Kruskal-Wallis test showed that there was no significant difference in the knowledge gain ( $\Delta B$ ) between each group ( $p = 0.9$ ).

The self-rated learning competency before and after the course represented by question B1 and B2 were shown (Figure 1).



**Figure 1:** Box and whisker plot showing the self-rated learning competency before and after the course represented by question B1 and B2

### 3.2 Participants' Satisfaction

The answer of question 6 in part A (A6) reflects the satisfaction of participants. The median scores for A6 are 8 (IQR: 8-9), 8 (IQR: 8-9) and 8 (IQR: 8-9) for SIM, LEC and ANT respectively.

Although the Kruskal-Wallis test showed there is significant difference in the score among the three groups ( $p < 0.005$ ), clinically their differences are small with similar median score and interquartile range.

### 3.3 Comparison with Lecture-Based Course

Question 6 in part C (C6) specifically asked the participants to compare the teaching effectiveness of SIM or ANT with that of LEC. The median score of C6 was 8 (IQR: 8-9) for SIM and 8 (IQR: 8-9) for ANT.

## 4. Discussion

Simulation-based medical education is gaining popularity and the use of simulators in medical education has increased in recent years<sup>3,4</sup>. Studies have shown that simulation-based training was associated with a higher performance in intensive care<sup>5</sup>, medical emergencies<sup>6</sup>, perioperative ultrasound<sup>7</sup>, obstetrical emergencies<sup>8</sup> and anaesthesia induction<sup>9</sup>. On the contrary, studies demonstrated no improvement in written test score among groups of radiology trainees receiving lecture versus simulation-based training in management of contrast reaction.

On one hand, simulation-based training in medicine has several merits including provision of a safe environment for risky procedures, exposure to rare but important clinical events, ability to provide immediate feedback and opportunity for team training.

On the other hand, simulation-based teaching is more resource intensive. First, it involves the cost of simulator as well as the on-going maintenance cost. Since our centre delivers a wide range of courses including adult, paediatric and neonatal resuscitation, different models of simulator are needed and hence the costs are tremendous.

Secondly, simulation-based teaching generally requires more preparation time for the participants and instructors. Instructors need extra time to become familiar with the simulators as well as the designed scenarios. Extra time is needed to assign different roles to participants and explain the designed scenarios.

Thirdly, simulation-based teaching requires higher instructor-to-participant ratio. At least one assistant is needed to operate the simulator and to provide interactive response to participants during simulation.

Training using animal tissue is in fact a type of simulation-based teaching. However, instead of using simulators, animal tissue is used. Animal tissue

is used in training of surgical procedures including chest drain insertion, suturing or surgical airway. There was no live animal used in our training centre. Therefore, it does not involve issues of animal rights.

This study demonstrates that SIM, LEC and ANT courses enhance the knowledge of participants. However, this study failed to show the superiority of SIM among the LEC and ANT courses in terms of immediate knowledge gain.

For participants' satisfaction, this study indicates that the difference among all three courses is small though significant. The lack of difference between the three types of courses was unexpected in contrast to many previous studies showing more enjoyable and valuable learning in simulation-based teaching<sup>10</sup>. We speculate that participants remained somewhat comfortable in all three groups because participants chose the nature of courses based on their interest and they were not randomly assigned to different types of courses. The median score for participants' satisfaction in all three types of courses was 8 (out of 10). It indicates that participants were satisfied with the courses.

Regarding the teaching effectiveness of SIM or ANT compared to LEC, our study showed participants moderately agree that SIM or ANT is more effective for learning than LEC. However, it was not reflected in the difference of knowledge gain for SIM or ANT compared with LEC. This can be explained by the lack of parameter measuring knowledge gain. Besides, knowledge gain is only one aspect of teaching effectiveness and other aspects include participant enjoyment, learning atmosphere and

participants' effort in learning. The other explanation is the leading-nature of the question.

### **5. Limitations**

We acknowledge the limitations of a post-course questionnaire as the assessment tools on a voluntary basis can lead to a relatively low response rate. There were pre-test and post-test sessions for some of the courses. However, due to the time constraints, such arrangement was not feasible for all courses.

Other limitations of this study include the diversity of participants and courses. The participants share different knowledge as well as epidemiological background contributing possible confounders. Following the privacy policy, epidemiological data was collected on a voluntary basis. The courses are grouped simply based on the teaching modality only, irrespective of contents and themes. The inconsistency among each group is not properly measured in our study. Further study is required to draw a precise conclusion.

### **6. Conclusion**

While acknowledging the limitations, this study demonstrated that simulation-based courses, lecture-based courses and courses using animal tissue are effective teaching modalities. They are equally acceptable to participants and attain similar satisfaction rates. When compared with lecture-based courses, participants perceived that simulation-based training or training using animal tissue were more effective.

Further studies with better design and method are warranted to measure the long-term effectiveness of simulation-based education.

## Appendix A

(V5)(Sept 2014)CSTC-Evaluation Form

### Clinical Skills Training Centre Evaluation Questionnaire CSTC – NTWC

Course Title: \_\_\_\_\_ Date: \_\_\_\_\_

Please provide feedback about the course by circling the number that best represents your response:-

Part A	General	Strongly Dissatisfied	1	2	3	4	5	6	7	8	9	10	Strongly Satisfied
	<i>Sample</i>		1	2	3	4	5	6	7	8	9	10	
	1. Program Organization		1	2	3	4	5	6	7	8	9	10	
	2. Theme/topics clearly stated		1	2	3	4	5	6	7	8	9	10	
	3. Appropriate venue setup		1	2	3	4	5	6	7	8	9	10	
	4. Appropriate question time		1	2	3	4	5	6	7	8	9	10	
	5. Enhance your learning/interest		1	2	3	4	5	6	7	8	9	10	
	6. Overall satisfaction		1	2	3	4	5	6	7	8	9	10	
Part B	Competence	Very incompetent											Very competent
	1. <u>Before</u> the course		1	2	3	4	5	6	7	8	9	10	
	2. <u>After</u> the course		1	2	3	4	5	6	7	8	9	10	
Part C	Course content ( for simulation course only )	Strongly Disagree											Strongly Agree
	1. Fostering teamwork.		1	2	3	4	5	6	7	8	9	10	
	2. Assessing existing services and system.		1	2	3	4	5	6	7	8	9	10	
	3. Identifying process gaps and initiating improvement		1	2	3	4	5	6	7	8	9	10	
	4. Evaluating clinical performance/knowledge		1	2	3	4	5	6	7	8	9	10	
	5. The debriefing session was informative and useful.		1	2	3	4	5	6	7	8	9	10	
	6. Compared with the conventional non-simulation training, this simulation workshop was more effective for my learning		1	2	3	4	5	6	7	8	9	10	
	7. Enhancing the Personal technical Skills		1	2	3	4	5	6	7	8	9	10	
Part D	Comments & Personal Details												
Comments:													
Specialty													
Profession (Please ✓ one)	Doctor	Nurse	Allied Health	Others (Please specify)									
Contact Details (Optional)	Name: _____ Phone no: _____												

Please return the completed questionnaire to the Reception Counter or to the Staff of CSTC.

Thanks for your participation in the Course!



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## Generation Y (Gen Y) Issues in Medical Education at Private University in Shah Alam, Malaysia: Bridging the Gap

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### Abstract

**Background & Aims:** As generation Y behaves differently from the previous generation which are the generation X and the Baby boomer's generation, expressions of concern arises especially among health educators (Schmidt, et al., 2012). Since generation Y have different requirements, health educators are having a hard time in figuring out the effective teaching styles that are suitable (White & Kiegaldie, 2011). Thus, this research is done to understand and suggest the appropriate approach in enhancing learning methodology for generation Y.

**Methods:** The sampling method used is focus group method, (n=28) which consist of students from BMS and MBBS Year 1 to 5.

**Results:** Majority of the students prefer an interactive classroom approaches. Most of them says that it is important to incorporate the use of technology during teaching and learning activities. They find that lecturers who keep the teaching and learning activities interesting and always taught them to analyse and think critically enhances their interest and concentration which helps them to understand a subject better. A two-way teaching where they ask questions among each other are preferred as well. Colourful diagrams, short text, and videos are the most preferable learning tools, and not to forget music especially instrumental genre.

**Conclusion:** As the issues that exists within generation Y is understood, the use of the stated methods is able to bridge the gap in terms of teaching and learning activities to suit their needs.

### Key Words

Generation Y; Medical Education; Teaching Learning Approaches

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### Introduction

In this era, we can see that generation Y population is slowly over-taking the older generations in many aspects. Some say that massive changes can be seen in the way the generation Y handle the current and global issues. Generation Y/Millennial or "Civic" generation are born from 1982 to 2002<sup>1</sup>. Medical schools nowadays face challenges in preparing students to meet evolving health-care needs in society. However, the way that education is delivered to aspiring health professionals has not changed a bit<sup>2</sup>.

Thus, this research is done in order to understand and suggest the appropriate approach in enhancing learning methodology for the Y generation. The educators which are teachers and lecturers from the older generation such as baby boomers and generation x are facing issues that they themselves do not understand when it comes to educating the Y generation.

The rationale of this study is to find a method or technique which helps the educators of Y generation increases their quality of teaching and to match with the learning approach of Gen Y. It is like finding the right key that fits the lock perfectly. By understanding the issues existed within the Y generation in medical education, educators can easily mold or create a new and improved curriculum which helps them delivering their knowledge efficiently and effectively.

The gap must be bridged or connected for knowledge to pass through. When in attempts to answer the age-old question of what motivates Generation Y students, educators often turn to motivational theory<sup>3</sup>. The Y generation must be understood generally as human behaves differently as an individual.

### Methods

For this research, the study design that was used is a cross-sectional method. The targeted population

will be the students of private medical school, Shah Alam. Inclusion criteria: Students which are taking the MBBS and BMS courses as they are the medical students and also medical lecturers of the school. Exclusion criteria: Staffs and non-medical lecturers and students.

The sampling method is by using focus group method. The data is collected through a semi-structured group interview process. Focus groups are generally used to collect data on a specific topic. The data is collected and gathered from the focus group interview. The data was categorized to identify themes. Using the themes and connections between the themes, the data was interpreted within the context of the literature review. A list was created consisting of key points and important findings discovered as a result of categorizing and sorting the data.

## Results

The data are coded and characterized into themes.

### The themes among students (Generation Y):

The first theme that emerged is students (Gen Y) prefer to study by themselves by using the 21<sup>st</sup> century learning tools. It is a combination of self-directed learning and technology. The students (Gen Y) are visual, audio and kinesthetic learners. Next, when it comes to understanding a topic, the students prefer a mixture of both conventional and modern learning methods. This is because some of the subjects still need a conventional approach by the lecturers. Students (Gen Y) very much prefers guided learning.

Most students say that it is important to incorporate the use of technology during teaching & learning activities as this will enhance their interest and concentration. Students demand more exposure on clinical practices as an early exposure (Experiential learning). Lecturers that are flexible, who knows their students personally are more interesting and motivating. Students prefer lecturers who challenge the student's knowledge with their own area of expertise. Lastly students (Gen Y) does not favor lecturers who are not prepared, lack of skills in engaging and barely interacting with the students.

### The themes among lecturers (Gen X & Baby Boomers):

Lectures implements interactive & two-way teaching to the students combine with the use of social media platforms, PowerPoint presentation and videos. Generation Y are described to have high levels of curiosity but somehow lack skills in identifying information which are important, reliable,

and necessary. Lecturers say that students prefer a friendly and comfortable environment for them to study. Lecturers feel that the effectiveness of their teaching methods are somewhat moderate and still needs improvements.

## Discussion

In this research, it has been found that students demand change in the teaching styles of the lecturers so they can learn better as they think and behaves differently. Students demand more interaction between them and the lectures and certainly two-way learning method is preferred by the majority of generation Y. As been said by Gillispie (2016)<sup>4</sup> a successful flipped classroom can be seen when the students are allowed to become critical thinkers, students and instructors are fully engage with one another, and a deep understanding of the material is fully developed.

Two- way teaching, interactive learning combined with the use of technology are the teaching & learning approaches that Gen Y prefer. The use of technology has been stated many times as important by the generation Y as this helps them to engage with lecturers during class without getting left behind. As been supported by (Lloyd et al. 2013)<sup>5</sup> Generation Y are the first to grow up in an environment where health-related information is widely available by internet, TV and other electronic media. This is why their mind works differently from the older generations as they get fast exposures from different cultures and beliefs from all around the world.

Generation Y are visual, audio and kinesthetic learners. They learn differently when compared to previous generation. Generation Y are visual learners as mentioned by the majority of the students interviewed in this research. They will search for videos, colorful diagrams and visual materials as their learning tools. Sometimes music especially instrumental genre is used by the students. Students states that music are helpful and makes it easier for them to memorize a subject. This finding is also consistent with Frand (2006)<sup>6</sup>, which states that Generation Y do not remember and cannot imagine a world without digital technology. Digital natives multitask and prefer visuals to graphics and text. They are complicatedly connected or networked via cell phone, blog, Facebook, and YouTube, thriving on instant gratification and preferring games to work. Generation Y also prefers an environment where they can ask questions freely and comfortably especially during class. This classifies them as kinesthetic learners.

When it comes to understanding a topic, the

students prefer a mixture of both conventional and modern learning methods such as two-way learning. The students mention that sometimes, conventional learning method or known as one-way teaching is required in order for them to understand complex subjects. Lecturers will first teach and explain to them during class on a particular subject. After the class has ended, students will ask questions regarding the subject in areas that they do not understand.

Students also mentions that the main learning tool provided by the lecturers is a PowerPoint presentations. Although it is considered helpful which serves as a guideline and record for future use, sometimes PowerPoint presentation becomes uninteresting with certain lecturers. The students say that, short, brief text in point forms, accompanied by diagrams, pictures and videos which are added into the PowerPoint presentation makes its more attention-grabbing and stimulating. This finding is also the same with Azriel's et al. (2005)<sup>7</sup> theory which states that a greater number of students may be reached and effectively taught when educators combines the use of instructional devices that supports various learning styles. For instance, students who learns with auditory means and as those who learn through visual means can be reached with a PowerPoint presentation.

The research participants (Gen Y) very much prefers guided learning. Students mention that they really enjoy the idea of a guided approach as lecturers will focus on small group of students. Tutorial sessions helps the lecturers to identify the students who are weak thus guides those students to progress better. Those personal advices given from the lecturers to each student boosts the students' motivation to improve.

Experiential learning is also one of the methods that generation Y desires. The students demand more hands-on approaches and activities in their modules as this helps to prepare themselves earlier before they advance into the clinical years.

Lecturers that are flexible, who knows their students personally are more interesting and motivating. When being asked to describe about defining the best lecturer, the students mentions that the attitude of the lecturer influence their interaction in class. In other words, the attitude of the students in class reflects the lecturers themselves. Lecturers who challenge the student's knowledge with their own area of expertise are intriguing. Students also made a point by demanding the lecturers to keep on testing their level of knowledge by simply ask question which makes them think outside of the box.

Students (Gen Y) does not favor lecturers who are not prepared, lack of skills in engaging and barely interacting with the students. Some lecturers who lack skills in teaching are also considered as an issue. Monotone, unstructured flow of knowledge brings confusion to the students which will then leads to boredom. Black's (2010)<sup>8</sup> and Prensky's (2007)<sup>9</sup> states that their participants mentioned experiencing boredom during lecture-only classes are consistent with the findings in this research. The intention of the lecturers themselves plays an important role in setting the atmosphere of the classrooms.

As lecturers are already progressing and adapting to the "new style" of teaching, it can be said that currently the teaching style of lecturer suits with learning style of students. Although some lecturers are still struggling with the changes, effort and improvements are what the Y generation seek within their lecturer.

Lecturers describes generation Y to have high levels of curiosity but somehow lack skills in identifying information which are important, reliable, and necessary. Lecturers do acknowledge the fact that students prefer a friendly and comfortable environment for them to study. This however contradicts with their style of learning during their student days. Thus, lecturers need time to change and adapt to the new demands of Generation Y.

Lecturers are now engaging with the use of technology to enhance interest in student when teaching. Adapting and implementing two-way teaching, interactive learning in class are the approaches that they use currently. This thus improves the process of transferring knowledge up to its highest potential and to be passed on effectively. Lecturers admit the fact that the effectiveness of their teaching methods are somewhat moderate and still needs improvements.

Bridging the gap between those differences requires time and improvement from both Gen Y and the medical educators. As they both needs to adjust themselves with the new changes. Like for instance, generation Y students acknowledge the fact that they need to have PowerPoint presentation. However, they emphasize that they do not need those lecture notes as a form of spoon-feeding but instead as guidelines to help them minimize the scope of study. Lack of skills from the lecturers in interacting, delivering knowledge in ways which are stimulating and intriguing are not well accepted and tolerated.

Above all that, personal engagement by the lecturers is valued and treasured by the students.

They want to get to know their lecturers personally and that will enhance the students' motivation to learn and excel better. With that being said, the only way to overcome this issue is for the lecturers to constantly improve, be proficient and allow themselves to become creative with their current teaching & learning approaches such as the use of social media platforms, PowerPoint presentation and videos. Lecturers should understand how Gen Y behaves, the way they think and what are the components that captures their interest when learning.

### **Conclusion**

Even though there is a gap between the way generation Y learns and the teaching methodology used by the lecturers, there is a way to bridge between it through; change the teaching, learning approaches & activities so it will be more student centered and supported by technology.

### **Conflicts of interest**

The authors declare no conflicts of interest

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## Anterior Cruciate Ligament: Single Vs Double Bundle

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### Abstract

In the UK, approximately 35 cases of ACL injury per 100,000 people occur annually<sup>1</sup>. 40% of all sports related knee injury involves ligament damage, 59% of which involves the ACL<sup>2</sup>. ACL originates from the anterior tibial plateau and runs superiorly, posteriorly to the lateral femoral condyle. It consists of an anteromedial and posterolateral bundle. ACL resists anterior translation, medial and lateral rotation of the tibia. ACL injuries arise from sudden rotation, putting the knee in an unnatural position. It can cause injuries to surrounding tissues such as menisci, increasing the chance of future OA development<sup>3</sup>. Decisions on graft selection and whether it should be a single or a double graft remain unsolved. Methods of improving and reducing rehabilitation time are debated constantly. The evolution of ACL management is outlined below, followed by discussions about reconstruction methods, alternative therapies and reflections on clinical experience from patients recovering from ACL injuries.

### Key Words

ACL Injury; Management; Reconstruction; Single Bundle; Double Bundle

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### Background

ACL injury management has revolutionised since the first reported treatment in 1837 by Robert Adams<sup>4</sup>. Throughout the late 19<sup>th</sup> century, clinicians had gained knowledge about symptoms associated with ACL injury. Up until 1900, clinicians managed the injury conservatively and were reluctant to perform an open surgery.

In 1900, the first repair was performed by Mayo Robson who sutured both cruciate ligaments in a 41-year-old miner. His knee was reported as 'perfectly strong' after cast immobilisation postoperatively<sup>5</sup>. Suturing was widely criticised, especially by Ernest Groves who believed suturing failed to restore function and the only reliable management was to use natural cicatricial tissue<sup>6</sup>. In 1916, he performed the first ACL reconstruction by securing the fascia lata onto the tibia via a bone tunnel. Galeazzi then discovered using a semitendinosus tendon as an autograft for a new ACL<sup>7</sup> in 1924 which initiated numerous experiments over the next few decades to find alternative autologous tissue graft such as patella and quadriceps tendon. Synthetic graft was wrongly believed to be more durable and equipped to withstand stress during the 1980s, and was soon disregarded. Arthroscopic technique was discovered by Jackson and Dandy which reduced invasiveness and

infection. The current gold standard recruits either a patella or hamstring tendon graft.

### Methods

MEDLINE, PubMed and Google Scholar were used to locate resources. Single Bundle vs Double Bundle literatures were searched using terms: ACL reconstruction.exp (1683 results), bundle.m\_title (7433). Both terms were combined to form 215 results, and filtered to 11 relevant articles. Hydrotherapy and cryotherapy studies were derived from descriptive search terms: alternative ACL management, knee kinetics, motion, muscle performance. Literatures were selected based on hierarchy of evidence reliability, samples size, bias, sufficient blinding, relevance to ACL rehabilitation, validity, presentation of results and creditability.

Literature gave efficacy of ACL management based on knee kinetics, but rarely accounted for patients' emotions towards different management plans, therefore limiting the holism required to understand rehabilitation from a patient's stance. To build upon literatures reviewed, an innovative approach was taken and ACL hydrotherapy clinical experience was arranged to provide extra dimensions in understanding rehabilitation regime as feedback on efficacy in pain and symptoms management, personal satisfaction and limitations in daily activities



were given.

### Single or Double Bundle?

Conventional ACL reconstruction restores the anteromedial bundle, whilst limiting the restoration of the posterolateral bundle. The double bundle (DB) tension pattern of ACL was discovered as early as 1832 by the Weber brothers, but was not acknowledged until 1982, when Mott<sup>8</sup> created two tunnels in the femur and tibia to pull through the semitendinosus tendon for a DB reconstruction, but without any follow-up nor outcome measures to compare DB to a single bundle (SB). Mott had recognised that, if he replicated both bundles, it would restore the knee closer to its original anatomical state.

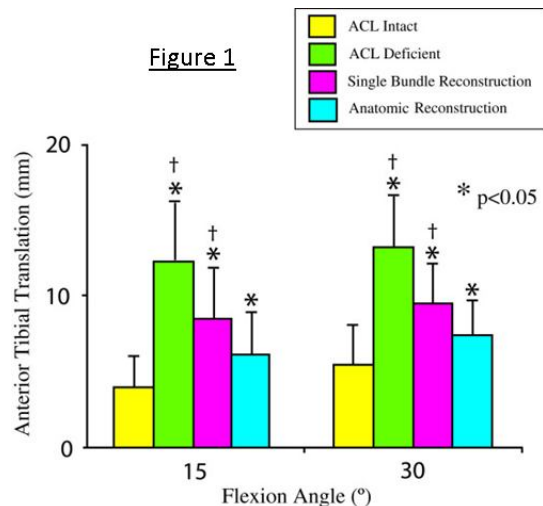
### Results

In a retrospective non-randomised case-control study<sup>9</sup> from 1992-1996, 56 patients treated with SB and 79 with DB ACL reconstruction were compared following a minimum of 24 months. 34% of SB group were still Lachman test positive, compared to 13% in DB group. KT-1000, a device to assess the amount of anterior knee translation between 20 to 30 degrees of knee flexion, was used as a measure of ACL function and showed an anterior laxity of  $2.7 \pm 2.3$  mm (95% CI) in SB compared with  $1.9 \pm 1.9$  mm (95% CI) in DB. A normal ACL should show anterior laxity of less than 3mm.

A more recent prospective randomised 5-year study by Suomalainen<sup>10</sup> allocated 90 patients equally into three groups for SB reconstruction with either bio-absorbable screw or metallic screw or DB with bio-absorbable screw. Clinical examination, KT-1000, Lysholm knee score and radiographic imaging were used to analysis the outcome. Postoperatively, seven patients with SBB (bio-absorbable), three with SBM (metallic) and one with DB had graft failures ( $P < .043$ ). In a 5-year follow-up, 30% of DB developed osteoarthritis and 51% in SB group. Figure 1<sup>11</sup> is derived from examining knee kinematics in 10 cadaveric knees by external loading conditions and demonstrates DB reduces anterior translation more than SB.

### Discussion

Muneta et al. defined two intervention groups with a clear purpose to measure the efficacy of both techniques. Patients were drawn exclusively from the hospital due to their condition (ACL rupture) with no intention of recruiting a randomised group from the population which induced selection bias. Controlling selection criteria such as damage to their ACL, same surgeon and rehabilitation protocol would be difficult unless it was a RCT. Suomalainen et al. found DB lowers the chance of graft failure



and radiographers concluded less osteoarthritis would develop from DB graft. However, it showed no significant statistical difference between SB and DB in Lysholm and laxity score (derived from KT-1000), contrasting to Muneta et al.. Bias was minimised by triple blinding, confounders were eliminated as one surgeon performed all surgeries with the same rehabilitation protocol. 14 patients were unable to be followed up five years postoperative.

Similar outcome measures were used in both literatures, but did not result in parallel findings on knee mechanics post ACL reconstruction. There are many factors for the differences in outcomes and further research with bigger sample size and longer follow-up can show if differences between both literatures were significant. Both studies indicated DB resembles a more natural ACL than SB as DB allows a wider contact area between graft and bone. Evidence for DB superiority over SB is insufficient, therefore, rotatory stability, long term outlooks and comparisons with other reconstruction techniques such as bone-patella tendon-bone graft should be implemented to establish the clinical utility of DB reconstruction.

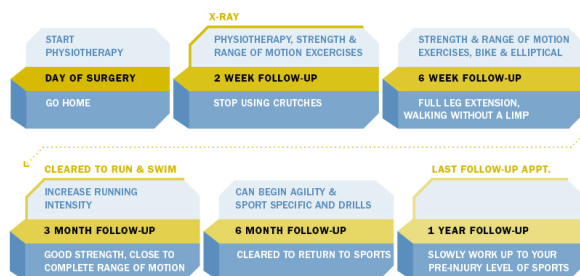
### Rehabilitation Programme

Objectives of rehabilitation include swelling control, recovery of range of motion and improving stability. Nowadays, post-operative rehabilitation begins as soon as the patient wakes up from anaesthesia to reduce stiffness by passive motion. Neuromuscular electrical stimulation is used to reduce muscle atrophy and to begin the process of quadriceps strengthening. Rehabilitation is just as important as the surgery itself. If a patient does not follow the protocol then reconstruction should be rejected because the quality of outcome is dependent on physiotherapy.

A typical timeline of rehabilitation is shown<sup>12</sup>.

## Can alternative therapies improve rehabilitation?

In addition to the normal rehabilitation protocol, alternative methods such as cryotherapy, hydrotherapy and shockwave therapy are popular.



## Results

Cryotherapy is a low cost method to alleviate pain and swelling in early rehabilitation due to the physiological effects of low temperature on tissues damage. In a RCT<sup>13</sup> with 25 post-surgery patients, 10 patients were selected for the intervention group and a control group of nine patients, with six patients failing to meet the selection criteria. Normal rehabilitation protocol set by the hospital was followed by both groups. Intervention group received an ice pack to place on the affected knee for 20 minutes after each physiotherapy session (2x daily). Pain intensity was measured by Visual Analog Scale, knee flexion and extension by goniometry. There were significant differences in outcomes when comparing intervention against control. Pain satisfaction improved by 47%, flexion increased by 9.1° and extension by 4.3° when using cryotherapy compared to the control.

## Discussion

Characteristics of participants were similar: all male, same type of graft. ROM was examined by one clinician and sufficient blinding took place to ensure reliability. Pain is an unpleasant sensory state and tolerance will vary between individuals. VAS is a subjective scale, but provides vital information on the effects of cryotherapy. It can only represent an individual's perception of pain at a certain time, therefore diminishing reliability. Nevertheless, VAS provides good indication of patient satisfaction in treatment. Patients experienced a bigger range of movement, less inflammation and pain following cryotherapy treatment, highlighting the benefits of a simple ice pack in restoring function and accelerating recovery.

## Results

Hydrotherapy involves doing exercises such as squats, lunges and step-ups in a warm water pool. In a RCT<sup>14</sup>, 10 patients were treated with pool rehabilitation and 10 patients with land

rehabilitation for eight weeks post-surgery. Different outcome parameters were measured at the end of rehabilitation. Both groups showed a significant decrease in mid-patella girth with an increase in quadriceps muscle girth in land rehabilitation patients. Pool rehabilitation gave a mean Lysholm score of 92.2 (SD=4.31) and land rehabilitation with 82.4 (SD=12.36) (P=0.03).

## Discussion

The increase in muscle girth may not represent a true muscle girth as joint effusion will affect the size of muscle at the point of measurement. It is more likely that land rehabilitation elicited more stress on the knee, thus leading to more joint effusion and a false increase in muscle girth. A big difference in Lysholm score indicated patients were more comfortable with doing daily living activities, pain management and had an increased physical tolerance by reducing joint effusion and avoiding overstress of the graft through warm water exercises. A relatively high SD in Lysholm score reported by land exercise patients may represent high variability and signifies confounding variables other than rehabilitation method choices are contributing to their knee function.

## Conclusion

At the moment, there is not a distinctive answer for the best intervention because not all injuries are identical. Studies show DB ACL has certain advantages over SB reconstruction by returning the knee to a more natural anatomy and kinematics. Future research should focus on comparing knee performance such as daily functional activities between both interventions to provide a holistic answer. Evidence from rehabilitation studies show alternative methods can improve recovery in terms of reducing time and regaining function. Consequently, it will be beneficial to patients if alternative therapies can be combined with conventional physiotherapy in the future.

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## A Case Report of Kienbock's Disease in a Thirteen-Year-Old Girl

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### Abstract

**Introduction:** Kienbock's disease is characterised by progressive collapse of the lunate caused by avascular necrosis. It is rare and most commonly affects the dominant wrist of males between twenty and forty. It is extremely rare in children and there is little evidence discussing optimal management. Management in adults is based on classification, with less advanced disease (stage 1) treated conservatively with a period of immobilisation and more advanced disease (stages 2-4) treated surgically.

**Case Report:** A thirteen-year-old girl presented with a three-week history of left wrist pain following a hyperflexion injury. She complained of pain with activity, reduced range of movement and reduced power. Although xray was normal, MRI showed advanced avascular necrosis of the lunate confirming Kienbock's disease. She was managed with a Futura Splint. After two months her pain had improved and on examination she had an improved range of movement. Repeat xray showed no further lunate collapse.

**Comments:** Our case study has demonstrated that it is important to consider Kienbock's disease in children presenting with persistent wrist pain. An early diagnosis is essential due to its progressive degenerative nature. Our case study has confirmed that children with stage 1 disease can be successfully managed conservatively through immobilisation.

### Key Words

Kienbock's; Teenager; Treatment; Case Report

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### Introduction

Kienbock's disease is characterised by progressive collapse of the lunate caused by avascular necrosis. It was first described by Austrian radiographer Dr Robert Kienbock in 1910<sup>1</sup>. It is a rare disease which most commonly affects the dominant wrist of male manual workers between the ages of twenty and forty<sup>2</sup>. Although its aetiology is unknown, it has a higher incidence in those who have sustained trauma to the wrist. An increased incidence of

Kienbock's disease in people with a negative ulnar variance has also been described in the literature<sup>3</sup>. It is characterised by wrist pain which commonly worsens with activity, a reduced range of movement and decreased grip strength<sup>2</sup>.

The disease is classified into four stages based on plain radiography according to Lichtman et al (Figure 1)<sup>4</sup>. The first stage of the disease can be diagnosed using magnetic resonance imaging (MRI).



Stage 1. No visible  
xray changes.



Stage 2. Sclerosis  
of the lunate.



Stage 3. Lunate collapse  
with fixed scaphoid  
rotation.



Stage 4. Degenerative  
disease at adjacent  
intercarpal joints.

**Figure 1:** Radiographs demonstrating the Lichtman's four stages of Kienbock's disease

However, there are no changes on plain film. Progressive radiological findings include sclerosis of the lunate, lunate collapse, fixed scaphoid rotation and degeneration of the adjacent intercarpal joints<sup>4</sup>. Management is based on its classification, with less advanced disease (stage 1) usually treated conservatively with a period of immobilisation and more advanced disease (stages 2-4) occasionally treated surgically. Surgical options include temporary scaphotrapeziotrapezoidal pinning, joint levelling procedures and radial wedge procedures for those with stage 2-3 of the disease, and proximal row carpectomy, arthrodesis and arthroplasty for those with stage 4 of the disease<sup>5</sup>.

Kienbock's disease is extremely rare in children, although some cases are reported in the literature<sup>6,7,8</sup>. There is little evidence discussing the optimal management of Kienbock's disease in children. It has been suggested that younger patients have a greater potential for remodelling and revascularisation, suggesting increased success rates with conservative immobilisation in this age group<sup>2,8,9</sup>. We present a case of Kienbock's disease in a thirteen-year-old girl managed conservatively.

### Case Report

A thirteen-year-old girl presented with a three week history of left wrist pain following a hyperflexion injury when landing awkwardly whilst dancing. She complained of persistent pain in the wrist particularly with activity, reduced range of movement and reduced power. On examination she was tender on palpation around the distal radius, distal ulna, scaphoid and lunate. She had limited flexion to 20 degrees and extension to 45 degrees due to pain.

A radiograph was suspicious of a fracture through the radial styloid with minimal displacement (Figure 2). She was treated for a fracture of her radial



**Figure 2:** A radiograph of the left wrist three weeks after initial injury (lunate highlighted).

styloid and managed conservatively with a Futura Splint. However, an MRI scan was arranged to rule out any scaphoid injury.

The MRI showed advanced avascular necrosis of the lunate confirming the diagnosis of Kienbock's disease (Figure 3). She was managed conservatively with a Futura Splint and analgesia for a further two months.



**Figure 3:** An MRI two months after the initial injury demonstrating advanced avascular necrosis of the lunate. (T1 image left and T2 image right).

On follow up after two months her pain had improved and on examination she had an improved range of movement. A repeat xray showed no further collapse of the lunate (Figure 4).

### Discussion

The cause of Kienbock's disease is poorly understood. Although trauma tends to be a preceding factor, there are a number of risk factors that are thought to be contributory<sup>2</sup>. Negative ulnar variance of the wrist has shown to be a significant risk factor for the development of the disease<sup>3</sup> as have anatomical differences in the blood supply to the lunate leading to reduction in venous outflow<sup>10</sup>.

There are a number of imaging modalities that are useful in diagnosing Kienbock's disease. Initial





**Figure 4:** A radiograph of the left wrist four months after initial injury.

diagnosis is usually made based on plain radiographs. Radiographs are also used for staging of the disease, guiding appropriate treatment and evaluating the success of treatment. However, radiographs are only useful in diagnosing Lichtman's stages two to four of the disease, as there are no visible changes in stage one. Progressive radiograph findings include sclerosis of the lunate, lunate collapse, fixed scaphoid rotation and degeneration of the adjacent intercarpal joints. Computed tomography (CT) scanning may also be useful in demonstrating fracture or fragmentation of the lunate that may be difficult to see on plain radiograph<sup>2</sup>.



**Figure 5:** A T2-weighted MRI showing bone marrow oedema in the lunate in the acute stage of Kienbock's disease<sup>17</sup>.

MRI is widely thought to be the most sensitive and reliable imaging modality in the diagnosis of Kienbock's disease. Unlike plain radiographs, it is useful in diagnosing the acute stages of the disease with bone oedema, particularly on the radial side of the lunate, clearly visible within a T2-weighted image. Decreased signal intensity can also be seen in

a T1-weighted image. However, this can also be seen in ulnar compaction syndrome or following wrist trauma<sup>11</sup>.

Isotope bone scans also have a place in investigating Kienbock's disease. Bone scans expose the patient to significant lower doses of radiation than a CT and cost roughly half as much as an MRI<sup>12</sup>. Negative bone scans will reliably rule out the condition. However, positive scans are not specific to Kienbock's disease and are therefore not diagnostic.

In adults, treatment of the disease is based on Lichtman's radiographic staging. It is recommended that adults with stage 1 Kienbock's disease are managed with a period of immobilisation<sup>5</sup>. Studies have however shown that adults in the later stages of the disease can have better outcomes when managed operatively<sup>13</sup>. These procedures include joint levelling procedures and radial wedge procedures for those with stage 2-3, and wrist fusion and proximal row carpectomy for those with stage 4. Several studies have suggested improved outcomes in adults treated with radial shortening compared to immobilisation<sup>13,14</sup>. In some long-term studies, conservative management resulted in progressive deterioration of the lunate radiologically, but this did not necessarily correlate with a deterioration in symptoms<sup>4,15</sup>. One particular study suggested that surgery should only be performed on symptomatic patients after an attempt of immobilisation and analgesia<sup>16</sup>.

Kienbock's disease is rare in children and there are few studies that attempt to compare outcomes in children treated conservatively or surgically. One literature review suggests that outcomes are better in children less than 14 following conservative management with a period of immobilisation as they have greater potential for revascularisation and remodelling<sup>8</sup>. Further studies also recommend conservative management in children with a period of prolonged immobilisation<sup>9</sup>.

Our case study has demonstrated that it is important to consider Kienbock's disease as a differential in children presenting with persistent wrist pain. An early diagnosis is essential due to the progressive degenerative nature of the disease. The majority of patients with stage 1 disease will go on to worsen even with prompt diagnosis and immobilisation of the wrist<sup>4,15</sup>. Our case study has confirmed that children with stage 1 disease can be successfully managed conservatively through immobilisation of the affected wrist. This supports previous studies that suggest that children with Kienbock's disease have a better outcome with conservative management when compared to adults possibly due to their greater potential for



revascularisation and remodelling. To increase the chances of successful conservative management in children, it is important to consider a differential of Kienbock's disease and investigate appropriately to ensure an early diagnosis.

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## Can Witty Introductory Quotes Help Rivet Attention in Chemical Pathology?

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### Abstract

**Objectives:** The objective was to assess the impact of witty introductory quotes at the beginning of a lecture or tutorial with respect to riveting an audience's attention in chemical pathology.

**Methods:** The statement 'I am inspired to listen and know more by a witty introductory quote or statement' was included in a validated medical student questionnaire, as well as in a shorter questionnaire distributed to another smaller group of medical students after a weekend seminar. This statement was also tested in pilot in a school-aged students questionnaire but was later removed from the final questionnaire due to poor post-test reliability in this age group.

**Results:** A heterogeneous response was noted with respect to agreement or neutrality on the matter with, however, a general trend shifted towards and favouring agreement with the statement, with a fewer proportion in disagreement. Mathematical modeling also revealed this factor to be a significant predictor of interest in chemical pathology with it, however, somehow counterintuitively, being more predictive when 'Disagree' or 'Neutral' were selected.

**Conclusions:** Interest with respect to inclusion of introductory quotation may vary inter-individually. However, it may hold its own distinctive sub-niche in medical education.

### Key Words

Chemical Pathology; Clinical Biochemistry; Education; Witty Introductory Quotes; Communication

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### Introduction

Many people, both from the general population and some medical professionals, enjoy reading or posting on social media so called 'inspirational quotes'. The hypothesis tested is, if inclusion of a relevant witty introductory quote, prior to commencement of a lecture or tutorial, would be of interest to students.

### Methods

The statement 'I am inspired to listen and know more by a witty introductory quote or statement' was included in a validated medical student questionnaire. This statement was also tested in pilot in a school-aged students' questionnaire but was later removed from the final questionnaire due to poor post-test reliability in this age group. The statement querying preference towards witty quote inclusion was later repeated in another shortened questionnaire distributed after a weekend seminar in chemical pathology to medical students. Quantitative analysis of the responses was first undertaken followed by more detailed analysis of

the predictive nature of variables with respect to interest in chemical pathology.

### Results

From the first medical student cohort, 35.7% agreed that a witty introductory quotation would be helpful to stimulate their attention with respect to the medical topic at hand, whereas 33.3% expressed neutrality on the matter (n=88). There were fewer responses at both extreme ends of the spectrum, with 15.5% strongly agreeing and 3.6% in strong disagreement. The remaining 11.9% selected 'disagree'. When factor analysis was undertaken here, the factor loading for this variable was 0.233. During mathematical model fitting to the medical student data, witty quote inclusion was found to be a significant predictor of interest in chemical pathology. However, non-intuitively, it was noted during model analysis and calculation that 'Quote Inclusion' was more predictive of greater interest in the subject of chemical pathology when 'Disagree' or 'Neutral' were selected when compared to the individuals who were in agreement.

A possible confounder contemplated was that the Likert-like scale options for the statement on the introductory quote did not mirror the previous questions on the questionnaire and was partially reversed. In spite of this, given a significant proportion of responders selected 'Neutral/neither agree nor disagree', bias due to automatic random repeat ticking was less likely, and the overall response trends were consistent.

For the school student questionnaire the statement "I am inspired to listen and know more by a witty introductory quote or statement" was removed from the post-pilot school age student questionnaire, given it was not well understood by some school students in the pilot phase study.

In the shortened questionnaire distributed after a weekend chemical pathology seminar, the order of the Likert-like scale responses with respect to witty quote inclusion was changed somewhat to mirror the order of the preceding questions.

The introductory quotes were subsequently included at the beginning of each individual chapter in a chemical pathology book which was drawn up for this purpose<sup>1</sup>. The three witty quotes included at the beginning of each chapter were of thematic relevance to the medical content of the respective chapter itself, however being presented in a more literary and artistic context than the actual advancement of the medical knowledge per se, which was the role of the subsequent chapter content.

### **Discussion**

It is commonplace for many individuals to demonstrate an interest in inspirational or witty quotes, usually taken from books or previously stated by prominent figures. It is also common to see people share inspirational quotes both within a household setting, school or work environments, as well as a definite emerging trend of sharing posts on social media which incorporate motivating quotations. A cohort of individuals feel that use of such inspirational quotations may have the power to help better focus and reshape one's thought processes, enhancing one's personal output and potentially improving outcomes. Different individuals tend to relate differently to the diverse inspirational quotes in circulation, and most people tend to have either a personal favourite or a few personal favourite quotations to which they relate on a deeper level.

Some more creative individuals may at times come up with their own personal motivational quotes, moulding one's emotions and usually being somewhat target directed. These inspirational

quotes may hold some potential towards subconscious conditioning, are usually brief and hence quicker to recite when compared to short stories, and hence less time consuming when compared to digesting stories and other concepts or ideas. This research looked into the hypothesis as to if such targeted inspirational quotations may hold a valuable role in medical education, more specifically, in this instance the education of a particular sub-speciality, namely chemical pathology or clinical biochemistry.

As with the general population trend, where uptake of use of inspirational quotes in daily lives varies from individuals to individuals, a similar trend was also observed with respect to the medical student cohort of respondents, where different individuals favoured it to various extents. Some showed neutrality and a smaller proportion even disagreed that it would play a role in gaining their attention with respect to a medical topic at hand. A heterogeneous response was hence observed, with, however the greatest proportion being in favour. The significant number of respondents who were indeed in favour of implementation of witty introductory quotes to rivet their attention with respect to the topic at hand might indeed benefit from similar inclusions. Bearing in mind the fact that a lecture or tutorial session is a time-constrained entity of usually one hour or 45 minutes in general, some may opt to include brief quotations at the beginning or at the end of these sessions. However, given the actual medical content is more important, and opinions on use of inspirational quotes in this setting vary, another option is to include brief witty relevant quotes at the beginning of a chapter in a relevant textbook. In the latter case, those who are interested and have some more time can read through them first, whereas others who prefer may quickly skip that designated page and move on to the medical and scientific content proper.

Insightful and thematically relevant quotations have been employed in various disciplines<sup>2-9</sup>. Quotations have been praised by many<sup>10</sup>. Some people think that thought patterns may be more purpose driven and modulated via inspirational quotes, whereas others may believe that these are none other than uselessly impressive and 'made to be' attractive assertions of little empirical value. In an era of ever improving technology and knowledge base, will medical quotations on the board find a cognitive role such as inspirational quotations on the fridge door did once? <sup>11, 12</sup> Quotations, after all, may be construed by some as 'borrowed ideas'<sup>13</sup>. The different opinions on the matter, with some claiming inspirational quotes to be nothing more than pseudo-profound, to the others who view them as having philosophical roots and being truly attractive

and profound, were reflected in the heterogeneous responses elicited. However, irrespective of this, and in view of the greatest response category being indeed in favour, a witty introductory quote may indeed have a role to play in medical education<sup>14</sup>. From quotations on the cover page of a journal, to introductory quotations in a chapter of a book, this culture has been seeping in gradually over the years, to various degrees<sup>15-17</sup>. The acoustic nature of brain stimulation when responding to inspirational quotes has also been looked into and compared amongst others to monotonous direct speech<sup>18, 19</sup>. Relevant introductory inspiration quotes, may also be a vehicle to bridge the gap between medicine and literature, and move into the realm of the medical humanities<sup>20</sup>. It is also of note that, in spite of the greatest proportion of participants being in favour of quote inclusion, the model of prediction of interest in chemical pathology was more positively predictive when these variables were selected in the 'disagree' and 'neutral' categories. It is worthy of note that this statement/question was just one of many stems presented in a questionnaire, where ultimate interest in the subject of chemical pathology was computed against a given number of the multiplicity of variables.

### Conclusion

Interest with respect to inclusion of introductory quotation may vary inter-individually, however may hold its own distinctive sub-niche in medical education.

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## Does Linking a Medical Learning Point to a Relevant Fictional Character Enhance Knowledge Acquisition?

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### Abstract

**Objectives:** The objective of this study was the elucidation of the hypothesis as to if linking a chemical pathology learning point to a relevant fictional character enhances knowledge acquisition.

**Methods:** Two validated questionnaires were distributed, one to a medical student cohort (n=88), and the other to a school age student cohort (n= 678). Both these questionnaires included the question as to if participants would enjoy relevant movie clip incorporation within a teaching session, as well as another question as to their personal preference with respect to inclusion of stories. A separate questionnaire was distributed at a comic convention (n=542).

**Results:** In both the medical student cohort as well as the school-age children cohort, the positive response towards reported clarity of use of film clips and inclusion of stories in a chemical pathology related session was statistically significant. However, in the medical student group, movie enjoyment was not a predictive variable in the proportional odds model for interest in chemical pathology, whereas story inclusion was. The comic convention questionnaire responses with respect to motivation and helpfulness of linking a learning point to a character in remembering a topic were significant.

**Conclusions:** Linkage of learning points to fictional characters may have a definite niche in the education of chemical pathology, albeit may be favoured to varied extents by different individuals.

### Key Words

Medical Learning; Science Education; Fictional Characters

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### Introduction

The objective of this study was the elucidation of the hypothesis as to if linking a chemical pathology or clinical biochemistry learning point to a relevant fictional character enhances knowledge acquisition. Fictional characters may take the form of characters in movies, novels, stories, cartoons, as well as anime and manga. Fictional stories are ubiquitous entertainment media subscribed to by a vast majority of the population, to various extents and in different shapes and forms. Movies of different genres permeate the entertainment world. Stories, both fiction and non-fiction, be it fantasy, history or science fiction, are presented in various formats in most people's everyday lives. From series and live dramas, to cartoons, Japanese animation, western comics and manga/Japanese comics, storytelling has come to pervade everyday life and has the capacity to provide entertainment to those interested. This study looks further into the bridging of the education-entertainment divide by linkage of learning points in chemical pathology to a fictional figure, hence also bridging the arts and the sciences.

### Methods

Two validated questionnaires were distributed, one to a medical student cohort (n=88), and the other to a school age student cohort (n= 678). Both these questionnaires included the question as to if participants would enjoy relevant movie clip incorporation within a chemical pathology teaching session, as well as another question as to their personal preference with respect to inclusion of stories. In the school age cohort, this was done right after an information session with simplified chemical pathology concepts was delivered over the period of a double lesson. A separate questionnaire was distributed at a comic convention to a sizeable number of more heterogeneous participants (n=542). This was composed of only six simplified questions, along the lines of some of the similar questions in the longer previously validated medical student and school student questionnaires. This comic convention questionnaire specifically elicited not just general preferences to story inclusion, as did the previous questionnaires, but also specific questions as to linking learning points to a fictional



character. It specifically included the following questions: "Would linking a learning point to an anime character be helpful for you to remember a topic?" and "Overall, do you feel more motivated to know more if learning points are associated with an anime character?". Proportional odds modelling and factor analysis was undertaken on the data.

### Results

In the medical student cohort, reported clarity of use of film clips had a majority response of either 'extremely clearly' or 'very clearly' at 56.4%, with the rest selecting various gradations of perceived clarity, with only 4.7% opting for the 'not at all clearly' response. With respect to inclusion of stories, 61.2% selected 'extremely well' or 'very well'. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy identified latent traits in the data sample, rendering factor analysis necessary. A scree plot identified an indentation at the second component, given there was hence a single prevailing high Eigen value latent trait. The question, "How well does incorporation of relevant stories in the lesson/tutorial/lecture meet your learning needs?" gave a factor loading of 0.708, whereas the other question, "How clear would chemical pathology information be if partly presented through a selection of film excerpts and documentaries?" yielded a factor loading of 0.718. Film clips usage was a non-predictive variable for interest in chemical pathology in medical students, whereas story inclusion was.

From the school-age cohort 75.5% of respondents selected either 'extremely well' or 'very well' with respect to stories in a lesson helping their understanding, with only 3.2% selecting not at all. Relevant film excerpts or documentaries inclusion result in either 'extremely clear' or 'very clear' information transfer according to 73.4% of respondents. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy again identified latent traits in the data sample with a scree plot similarly identifying an indentation at the second component, given a single prevailing high Eigen value. Component matrix extraction by principal component analysis yielded a component of 0.760 for "How well did the stories in the lesson help your understanding?" and 0.646 for "How clear to you is the information in the film excerpts or documentary?" In this case, movie enjoyment was also a predictive variable in the proportional odds model for interest in chemical pathology as well as story inclusion.

The 542 completed comic convention questionnaires allowed for a significant power of the sub-study at the 95% confidence interval. The age range of the comic convention attendees was

varied, with 42.6% of respondents belonging to the 10-19 age group, followed by 32.8% being 20-29 years of age, and 19.7% being 30 or older. With respect to the question about helpfulness of linking a learning point to an animated character in remembering a topic, a total of 50.6 % selected either 'extremely helpful' or 'very helpful'. 'Moderately helpful' was selected by 30.8%, with 12.4% and 6.3% going for 'slightly helpful' and 'not at all helpful' respectively. A similar trend was also noted with respect to the question on increased motivation if a learning point is associated with a fictional animated character, with a total 57.6% selecting either 'extremely motivating' or 'very motivating'. 'Extremely motivating' was selected by 19.2% with only 11.1% and 5.7% selecting 'slightly motivating' and 'not at all motivating'. With respect to stories in a lesson helping understanding, the response was even more overwhelmingly positive with 79.4% selecting either 'extremely well' or 'very well'. Subsequent mathematical modelling revealed both motivation and helpfulness associated with linking a topic to a fictional character were in turn predictive variables with respect to respondent selection of stories helping their understanding of a lesson. A mediated model could also be observed in the given data set, with general enjoyment of animated features and Japanese comics or 'manga' in turn being predictive of perceived motivation and helpfulness, which also in turn predicted preference to use of stories in a lesson. Hence these variables were statistically related.

### Discussion

A personal favourite character in a motion picture or other fictional story can be especially helpful in boosting the memory. Use of fiction may indeed have a role to play in medical education<sup>1-4</sup>. Medical communication to wider audiences may be facilitated through identification with fictional figures used as a vehicle to transmit a message. Narrative persuasion models have also been advocated in health education to bridge the education-entertainment boundary<sup>5</sup>. Narrative persuasion may be an effective, viable strategy to better convey an educational theme<sup>6</sup>. Such interventions have been investigated in the health related disciplines, both in undergraduate learning as well as in aiding patient understanding<sup>7-12</sup>. Such techniques may in turn strongly impinge on recollection of the topic at hand<sup>13</sup>. Cognitive as well as emotional engagement may be well suited to the purpose via integrated narratives and individual character identification. The experiential involvement associated with these activities is the underlying mechanism<sup>13, 14</sup>. Such methods may also breach different knowledge-level barriers in more diverse audiences where different levels of literacy or language barriers may exist<sup>15-20</sup>. These inclusions may range from specific

documentary series and medical dramas, to overall unrelated fictional stories with enmeshed relevant learning points<sup>21-23</sup>. Integrating a more theoretical framework with entertaining ideas has definite potential via emotional involvement with respect to a given issue<sup>24</sup>.

These interventions that focus on the fusion of education-entertainment are not merely limited to linkage of a learning point to a fictional character in a story. Some others even tried to employ simulation gaming in health education<sup>25</sup>. It is of interest that in this study, although numerous medical student respondents favoured inclusion of film clips in a chemical pathology session to a great extent, the mathematical proportion odds model revealed that this was not an overall discriminating predictive variable with respect to their subsequent overall interest in the subject of chemical pathology. Motivation and helpfulness of linking a learning point to an animated character was explored in a heterogeneous group of attendees, who had a common passion for the comic culture. The mediated model observed indicated that higher baseline interest in these recreational activities allowed for even greater positive uptake of including these in teaching sessions that bridge the education-entertainment divide. A fictional figure may enhance learning and probe the inner workings of the subconscious mind. At the heart of the effect of a narrative is the recreation of experiential learning. Then again, medical education research goes beyond just telling a story<sup>26</sup>. Illnesses themselves, like the learning processes, do not exist in a vacuum, but constitute a facet of the patient's overall story<sup>27</sup>. A backdrop of fiction, together with actual facts, may thus provide greater momentum to medical education in a select number of individuals<sup>2-4</sup>.

### Conclusion

Linkage of learning points to fictional characters may have a definite niche in the education of chemical pathology, albeit may be favoured to varied extents by different individuals.

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