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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

It is our great pleasure to bring you the twenty-fourth edition of the World Journal of Medical Education and Research (WJMER). This edition assembles a variety of intellectually stimulating articles in an attempt to offer the reader an insight into the innovative research that is being conducted throughout the world.

The opening article by Negm et al. considers the effect of grape leaves on rats suffering from acute liver disease. They find that regular intake from 5% grape leaves may help to improve liver functions and may protect against CCL4-induced acute damage of the liver in rats.

Joseph et al. compare the perceptions of competence among senior medical students using problem-based learning and traditional teaching methods. Their analysis of six competence variables reveals that the majority of the medical students who used problem-based learning felt that their curriculum prepared them well for their professional work compared to their counterparts who were trained using traditional teaching methods.

In the following article, Tosetti et al. evaluate the function of undergraduate medical students acting as 'observers' in a role-play in the context of training in general practice. They conclude that role-play can be a useful tool in the context of educating undergraduate students for general practice, especially to highlight topics that require learning reinforcement.

Acknowledging the importance of emergency preparedness, Kahare et al. examine the influence of the capacity of health workers on hospital emergency preparedness in Kangundo Level 4 and Machakos Level 5 Hospitals. They suggest that policy formulation and implementation, commodities, and finances significantly influence emergency preparedness. Moreover, they emphasise the need for staff participation in emergency policy formulation, guidelines, emergency plans, and lobbying for emergency preparedness.

The final article by Ooi and Ooi explores the impact of proposed changes to Step I of the United States Medical Licensing Examination (USMLE). It discusses the benefits and challenges that the new scoring system may have on local medical graduates, international medical graduates, Doctors of Osteopathic Medicine, and students studying in lower-ranked medical schools.

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

Ms Karen Au-Yeung
Editor

Ms Rebecca Williams
Associate Editor

Professor Stuart Enoch
Editor-in-Chief

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Original Research
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World Journal of Medical Education and Research:
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The Biological Effect of Grape Leaves on Liver Disease Rats Induced by Carbon Tetrachloride (CCL_4)

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Abstract
The aim of this study was to investigate the effect of grape leaves (VitisVinifera L.) on rats suffering from acute liver disease. Male albino rats of the Sprague Dawely Strain (24 rats), weighing (195 ±10gm.), were fed on basal diet for one week for adaptation. The rats were then divided into two main groups as follows. The first main group of six rats was fed on basal diet (as a control negative group). The second main group of 18 rats was treated with CCl4, in paraffin oil (50 % v/v 4 ml/kg) subcutaneous injection once a week for one week to induced acute damage in the liver. Then the second main group (18 rats) was divided into three sub-groups; each subgroup consisted of six rats and was fed on diets for (one month) as follows: 1) Rats were fed on a basal diet as control positive group; 2) Rats were fed on a diet containing 2.5% grape leaves; 3) Rats were fed on a diet containing 5% grape leaves. The present findings suggested that regular intake from 5% grape leaves may be useful in improving liver functions and may protect against (CCL4) induced acute damage of the liver disease in rats.

Key Words
(C -CL4); Grape Leaves; Liver Enzymes; Liver Disease

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Introduction

Hepatitis is mostly caused by viral and toxic agents. Deemed chronic when persisting for longer than six months, hepatitis triggers an ongoing inflammation that often leads to fibrosis and eventually cirrhosis, with a concomitant increased risk of hepatocellular carcinoma (Centers for Disease Control and Prevention, 1998).

Grape (*VitisVinifera L.*) is widely distributed in incident times. They help in the treatment of many serious diseases like diabetes mellitus, arthrosclerosis, hyperlipidemia, and hypertension (Srivastava *et al.*, 2003).

Grape leaves (*Vitis ViniferaL.*) have been used in folk medicine for their biological activities since ancient times. The leaves of the plant, which have astringent and haemostatic properties, are used in the treatment of diarrhea, hemorrhage, varicose veins, hemorrhoids, inflammatory disorder, pain, and free radical related diseases (Lardos and Kreuter, 2000).

The leaves of *V. vinifera* are used in the formulation of dietary antioxidant supplements (Monaga *et al.*, 2006). A many number of in vivo and in vitro studies have been conducted on the plant material and have revealed that *V. vinifera* leaves exert various biological activities, including hepatoprotective, spasmolytic, hypoglycemic, and verso-relaxant effects (Orhan *et al.*, 2006)

This study was carried out to study the effect of Grape leaves on rats suffering from acute liver disease.

Materials and Methods

Materials

- Casein, vitamins, minerals, cellulose and carbon tetrachloride (CCL_4) were obtained

from El-Gomhorya Company, Cairo, Egypt.
- Grape leaves (*Vitis Vinifera L.*) were obtained from fields in El- Giza, Egypt.
- Starch and soy oil were obtained from a local market in Cairo, Egypt.
- Normal male albino rats (Sprague - Dawely Strain) (n=42) weighing 195 ± 10g were purchased from Helwan Experimental Animals station.

Methods:

Preparation of Grape Leaves Powder

The leaves from healthy plants were washed. The leaves dried for three days by solar energy and were ground to fine powder in an electric mixer.

Determination of Phenolic Compounds in Leaves

Phenolic compounds of grape leaves were estimated at Food Technology Research Institute, Giza, Egypt, according to Pascale *et al.* (1999).

Preparation of Basal Diet

The basal diet consists of Casein (14%) ≥80% protein, soy oil (4%), Cellulose (5%), vitamin mixture (1%), salt mixture (3.5%), and Choline chloride (0.25%). The remainder is corn starch (72.25%) (Reeves *et al.*, 1993).

Experimental Design

Male albino rats of the Sprague Dawely Strain (24 rats), weighing (195±10gm.), were used. All rats were housed in well aerated cages under hygienic conditions and fed on a basal diet for one week for adaptation in the animal house lab of Faculty of Home Economics, Helwan University.

After a week (for adaptation), the rats were divided into two main groups as follows:

The first main group, six rats, were fed on a basal diet (as a control negative group).

The second main group, 18 rats, were treated with CCl_4 in paraffin oil (50 % v/v 4 ml/kg) subcutaneous injection, one a week for one week to induce acute damage in the liver (Jayasekhar *et al.*, 1997).

Then the second main group (18 rats) was divided into three sub-groups. Each sub-group consisted of six rats and was fed on diets for one month, as follows:

1. Rats were fed on a basal diet as a control positive group.
2. Rats were fed on a diet containing 2.5% grape leaves.
3. Rats were fed on a diet containing 5% grape leaves.

During the experimental period (one month), the diet consumed was recorded every day, and the body weight was recorded every week.

At the end of the experimental period, the rats were fasted overnight before sacrificing. Blood samples were collected from the aorta of each rat in a dry, clean centrifuge tube and left for 15 minutes to clot at room temperature. The samples were then centrifuged for 15 minutes at 3000 rpm to separate the serum.

Serum was carefully separated and transferred into dry, clean Ebendorf tubes and kept frozen at -20°C till analysis.

Liver, kidneys and spleen were removed, cleaned, weighed and kept in formalin solution 10% until histo-pathological examination of the liver.

Chemical Analysis of Serum

The following determinations were carried out for all serum samples:

Determination of total cholesterol:

Total cholesterol in the serum was determined according to the method described by Allain *et al.* (1974).

Determination of the low-density lipoprotein (LDL) cholesterol:

The concentration of LDL was estimated according to the equation of Friedewald *et al.* (1972), as follows:

LDL cholesterol (mg / dL) = Total cholesterol – HDL cholesterol – VLDL cholesterol

Determination of very low-density lipoprotein (VLDL) cholesterol:

The concentration of VLDL was estimated according to the equation of Friedewald *et al.* (1972), as follows:

$$\text{VLDL cholesterol (mg / dL)} = \frac{\text{triglycerides}}{5}$$

Determination of high-density lipoprotein (HDL) cholesterol:
HDL-cholesterol was determined according to the method described by Burstein (1970).

Determination of serum transaminases:
Aspartate amine transaminase (AST) and Alanine amine transaminases (ALT) activities were measured according to the method described by Reitman and Frankel (1957).

Determination of uric acid:
Serum uric acid was determined according to the method described by Fossati *et al.* (1980).

Determination of urea nitrogen:
Serum urea was determined according to the method described by Patton and Crouch (1977).

Determination of serum creatinine:
Serum creatinine was determined according to the method described by Bohmer (1971).

Determination of serum glucose:
Glucose was determined in serum according to the method described by Trinder (1959).

Statistical analysis:
The statistical analysis was carried out using SPSS, PC statistical software (Version 20 SPSS Inc., Chicago, USA).

The results were expressed as mean ± SD. Data were analyzed by one-way analysis variance (ANOVA). The differences between means were tested for significance using least significant difference.

(LSD) test at ($P < 0.05$) (Steel and Torri, 1980).

Results and Discussion

Chemical Analysis (Phenolic compounds) of Grape Leaves

Data in Table 1 showed levels of some Phenolic compounds (mg/100g) for grape leaves. The results of chemical analysis for these leaves revealed that the value of Phenolic compounds from grape leaves were Pyrogallol, followed by Vanillic, represented (17.93 and 0.64, respectively).

Table 1: Phenolic Compounds (mg/100g) of Grape Leaves

Items	Phenolic Compounds (mg/100g)
	Grape Leaves
Gallic	0.70
Protocatechuic	10.71
Pyrogallol	17.93
P -Coumaric	- -
Catechin	1.31
Caffeic	--
Vanillic	0.64
Salicylic	--
Ferulic	1.63
Coumarin	0.51

According to Pascale et al. (1999).

Effect of grape leaves on feed intake and body weight gain % of rats suffering acute liver disease

Feed Intake (FI):

The mean value of feed intake of acute liver disease rats (control positive group) was 10.70g, while the mean value of feed intake of healthy rats (control negative group) was 15.11g/day. Feed intake in the negative control group increased by about 4.41g compared to the positive control group. The mean value of feed intake in all treated groups increased than the positive control group. On the other hand, all treated groups showed a decrease in the mean value of feed intake when compared with the negative control group. The lowest mean value of feed intake was observed in the group treated with grape leaves.

*Values are expressed as mean ± SD.
Significance at $p<0.05$
*Values which do not share the same letter in each column are significantly different.
*GL: Groups of rats fed on a diet containing grape leaves.

Table 2: Effect of grape leaves on feed intake and body weight gain % (BWG%) of rats suffering from acute liver disease

Parameters / Groups	Mean of feed intake (g/day for each rat)	Body weight gain % (BWG%)
Control(-)	15.11	8.1329±1.60788[a]
Control(+)	10.70	1.5271±.03988 [c]
2.5%GL	11.89	2.0657±.68709 [bc]
5% GL	12.31	3.3371±.96757[b]

Body Weight Gain % (BWG %):
Body weight gain % of the positive control group decreased significantly ($p< 0.05$) compared to all groups.
All groups treated with grape leaves achieved a significant increase in body weight gain % compared to the positive control group.

Effect of grape leaves on organs weight / body weight % of rats suffering from acute liver disease
Mean value of organs weight such as liver, kidney and spleen relative to body weight percent of acute liver disease rats fed on grape leaves is summarized in Table 3.

Statistical analysis in our results in one month (experiment period) indicated that all organs weight / body weight % of acute liver disease group (control positive group) showed significant increase $p<0.05$ than that of the negative control group (healthy rats).

On the other side, the mean values of liver, kidneys and spleen weight / body weight % for all treated groups of rats demonstrated significant decrease $p<0.05$ compared to the positive control group, while a clear significant increase $p<0.05$ than that of negative control group (healthy rats).

Effect of grape leaves on serum cholesterol and triglycerides of rats suffering from acute liver disease
Table 4 illustrates the effect of grape leaves on serum cholesterol (mg/dl) and triglycerides (mg/dl) of rats suffering from acute liver disease.

Total serum cholesterol (mg/dl):
In regard to the group of rats in the positive control group, it could be observed that the total serum cholesterol level significantly increased $p< 0.05$ compared to the negative control group fed on a basal diet. Total serum cholesterol in groups treated with diets containing different ratios of grape leaves significantly decreased $p< 0.05$ when compared to the positive control group, while they had non-significant differences compared to the negative control group.

In this respect, Gray and Flatt (1998) showed that dietary fiber might play a corrective role in liver function, either by reducing the blood glucose level or by some either mechanisms which, in turn, reduces the level of triglyceride and total cholesterol in blood plasma of diabetic animals.

Table 3: Effect of grape leaves on organs weight / body weight % of rats suffering from acute liver disease

Parameters / Groups	Kidney weight/ body weight %	Liver weight/ body weight %	Spleen weight/ body weight %
Control(-)	0.6657±0.06604 [c]	2.1086±0.16866 [d]	0.2314±0.02478 [d]
Control(+)	0.9743±0.13011 [a]	2.9443±0.06901[a]	0.3443±0.01134 [a]
2.5%GL	0.7471±0.02059[b]	2.7829±0.21922[ab]	0.3071±0.03729[bc]
5% GL	0.7214±0.03848[bc]	2.6129±0.15261[bc]	0.2914±0.02340[cd]

*Values are expressed as mean ± SD. Significance at $p<0.05$
*Values which do not share the same letter in each column are significantly different.

Table 4: Effect of grape leaves on serum cholesterol and triglycerides of rats suffering from acute liver disease

Parameters / Groups	mg/dl	
	Cholesterol	TG
Control(-)	83.6714±2.27072[c]	45.8429±3.13255[c]
Control(+)	103.9143±1.79028[a]	67.8857±1.84721[a]
2.5%GL	88.3000±0.72121[b]	50.6000±5.03984[b]
5% GL	85.3714±1.87236[c]	46.8714±1.37321[c]

*Values are expressed as mean ± SD. Significance at p<0.05
*Values which do not share the same letter in each column are significantly different.

Effect of grape leaves on serum cholesterol and triglycerides of rats suffering from acute liver disease

Table 4 illustrates the effect of grape leaves on serum cholesterol (mg/dl) and triglycerides (mg/dl) of rats suffering from acute liver disease.

Total serum cholesterol (mg/dl):

In regard to the group of rats in the positive control group, it could be observed that the total serum cholesterol level significantly increased p< 0.05 compared to the negative control group fed on a basal diet. Total serum cholesterol in groups treated with diets containing different ratios of grape leaves significantly decreased p< 0.05 when compared to the positive control group, while they had non-significant differences compared to the negative control group.

In this respect, Gray and Flatt (1998) showed that dietary fiber might play a corrective role in liver function, either by reducing the blood glucose level or by some either mechanisms which, in turn, reduces the level of triglyceride and total cholesterol in blood plasma of diabetic animals.

Serum triglycerides (mg/ dl):

As indicated in Table 4, the positive control group showed that triglyceride level significantly increased p< 0.05 compared to the negative control group (67.8857±1.84701 vs. 45.8429±3.13255, respectively).

Levels of serum triglycerides between all acute liver disease groups after treatments with different ratios of grape leaves showed significantly decreased p< 0.05, especially in groups fed on 5% GL, when compared to the positive control group.

Arvil and Bodi (1995) showed that the substantial decrease in triglyceride and total cholesterol level in the diabetic animals by dietary fiber reinforces its hypoglycemic and hypolipidemic potential. Serum cholesterol and low-density lipoprotein cholesterol (LDL-c) levels were significantly reduced in the dietary fiber treated rat groups.

Daiki *et al.* (2003) and Park *et al.* (2002) reported that resveratrol reduced the serum triglyceride levels by increased excretion of bile acids into feces in hepatoma-bearing rats.

Orhan *et al.* (2007) showed that mainly condensed tannins and flavonoids were suggested to contribute to the anti-diabetic activity and prevention of lipid peroxidation of vitis vinifera leaves.

Effect of grape leaves on serum lipoproteins of rats suffering from acute liver disease

The effects of both different kinds and levels of grape and mulberry leaves on high-density lipoprotein HDL-c, low-density lipoprotein LDL-c, and very low-density lipoprotein cholesterol VLDL-c of acute liver disease rats are discussed in Table 5.

During the experiment, feeding rats on a basal diet (negative control group) showed significant variations: the serum HDL-c increased significantly, while the LDL-c and VLDL-c decreased significantly, compared to the positive control group (injected with ccl4), which recorded a significant decrease in serum HDL-c, while LDL-c and VLDL-c increased significantly.

Table 5: Effect of grape leaves on serum cholesterol and triglycerides of rats suffering from acute liver disease

Parameters / Groups	mg/dl		
	HDL-c	LDL-c	VLDL-c
Control(-)	65.2714±0.90315[a]	9.2314±1.14128[e]	9.1686±0.62251[c]
Control(+)	54.5857±2.34835[c]	35.7514±3.76138[a]	13.5771±0.36940[a]
2.5%GL	63.7857±1.69355[ab]	14.3943±1.24073[bc]	10.1200±1.00797[b]
5% GL	63.2143±0.84742[b]	12.7829±2.64982[c]	9.3743±0.27464[c]

*Values are expressed as mean ± SD. Significance at $p<0.05$
*Values which do not share the same letter in each column are significantly different.

Leelavinothan and Arumugam (2008) suggested that grape leaves extract exerts its protective effect by decreasing the lipid peroxidation and improving antioxidant status, thus proving itself as an effective antioxidant in alcohol-induced oxidative damage in rats.

Orhan *et al.* (2007) showed that mainly condensed tannins and flavonoids were suggested to contribute to the anti-diabetic activity and prevention lipid peroxidation of *V. vinifera* leaves (grape leaves).

The levels of serum VLDL-c for all treated groups showed significant decrease ($p< 0.05$) compared to the positive control group (+), while groups receiving the diet containing 5% GL showed non-significant differences in the mean values of serum VLDL-c compared to the control negative group (-).

The best results for the mean values of lipoproteins were for the groups of rats which received a diet containing 5% GL compared to the positive control group.

Effect of grape leaves on serum kidney functions of rats suffering from acute liver disease.

The data confirmed that, after one month from the experiment period, the rats of serum uric acid, urea nitrogen and creatinine were significant increase ($p< 0.05$) in control positive group compared to the negative control group (healthy rats) fed on a basal diet (4.9286±0.13801, 27.800±2.60768 and 0.8571±0.05345 vs. 2.7286±0.11127, 16.5714±0.52825 and 0.5429± 0.05345, respectively).

The mean values ± SD of serum uric acid, urea nitrogen and creatinine in the negative control group cleared non-significant differences compared to those of the groups that received a diet containing 5% GL in the mean value of serum uric acid and creatinine only. However, in urea nitrogen there was a significant increase in the same groups (received diet containing 5% GL) compared to the control negative group ($p< 0.05$).

There was a significant decrease in the levels of serum uric acid, urea nitrogen and creatinine for all groups which fed on different ratios of grape leaves ($p< 0.05$) compared to the positive control group (injected with ccl4).

Results indicated that the group of rats fed on 5% GL recorded the lowest mean value.

Vikas and Kan (2006) affirmed that resveratrol exerts its protective effect through nitric oxide release, along with the anti-oxidative effect in glycerol induced acute renal failure. Resveratrol (phenol substance occurring in plant leaves) can have a significant effect on the inflammatory process seen in glycerol-induced renal injury.

Joseph *et al.* (2011) showed that resveratrol given at six, 12 and 18 hours significantly improved survival. Hence, resveratrol may have a dual mechanism of action to restore the renal microcirculation and scavenge reactive nitrogen species, thus protecting the tubular epithelium even when administered after the onset of sepsis.

Table 6: Effect of grape leaves on serum kidney functions of rats suffering from acute liver disease

Parameters / Groups	mg/dl		
	Uric acid	Urea nitrogen	Creatinine
Control(-)	2.7286±0.11127^{cd}	16.5714±0.52825^{d}	0.5429± 0.05344^{d}
Control(+)	4.9286±0.13800^{a}	27.8000±2.60768^{a}	0.8571±0.05345^{a}
2.5%GL	3.0143±0.06902^{bc}	20.7286±1.31494^{bc}	0.6714±0.07557^{bc}
5% GL	2.8857±0.08995^{c}	18.5714±0.37289^{c}	0.6429±0.05345^{c}

*Values are expressed as mean ± SD. Significance at $p<0.05$
*Values which do not share the same letter in each column are significantly different.

Effect of grape leaves on serum liver functions and glucose of rats suffering from acute liver disease

Effect of grape leaves on some liver enzymes, aspartate amine transferase (AST), alanine amine transferase (ALT), and glucose of rats suffering from acute liver disease are presented in Table 7.

After one month, in the acute liver disease rats (control positive group), a significant increase in the mean value for both AST and ALT enzymes levels and also glucose level was noticed, compared to healthy rats (control negative group).

The mean value of AST and ALT enzymes in acute liver disease rats fed on a diet containing different ratios of grape leaves showed significant decrease ($p< 0.05$) compared to the positive control group, while the mean value of glucose in acute liver disease rats fed on a diet containing different ratios of grape leaves decreased significantly $p< 0.05$ compared to the control positive group.

Groups fed on 5% GL showed non-significant changes compared to the control negative group in the serum level of ALT.

The mean value ± SD of serum glucose in groups fed on different ratios showed significant increase $p< 0.05$ compared to the control negative group, but revealed a significant decrease compared to the control positive group.

On the other hand, the mean value ± SD of serum glucose levels in all treated groups with different ratios of grape leaves showed significant differences between all groups, but the best mean values were for the groups that received 5% GL.

In this respect, Heibatollah *et al.* (2009) showed that the hydro alcoholic extract of *Vitis vinifera L.* at a dose of 800mg/kg exhibited a significant liver protective effect by lowering the serum levels of AST and ALT, decreasing the sleeping time and resulting in less pronounced destruction of the liver architecture. There was no fibrosis or inflammation.

Livia *et al.* (2011) and Orhan *et al.* (2007) demonstrated that ethanol extracts of *Vitis vinifera L.* were able to induce a hepatoprotective action on carbon tetrachloride induced acute liver damage in rats, which was attributed to the polyphenolic compounds. The ethanolic extract of *Vitis vinifera L.* at 250mg/kg dose was found effective to protect liver and kidney from the oxidative damage and high anti-diabetic.
Orhan *et al.* (2007) emphasize that mainly condensed tannins and flavonoids were suggested to contribute to the anti-diabetic activity and prevention lipid peroxidation of *Vitis vinifera L.*

Orhan *et al.* (2007) also showed that ethanol extracts of *Vitis vinifera L.* were able to induce a hepato-protective action on carbon tetra chloride-induced acute liver damage in rats which was attributed to the polyphenolic compounds.

Table 7: Effect of grape leaves on serum liver enzymes and glucose of rats suffering from acute liver disease

Parameters / Groups	Glucose (mg/dl)	U/l	
		AST	ALT
Control(-)	125.18 ±3.56[d]	122.14±1.51[d]	33.17±2.08[c]
Control(+)	200.72±2.02[a]	195.27±3.785[a]	50.07±1.61[a]
2.5%GL	183.35±2.46[b]	170.42±1.55[b]	39.38±1.39[b]
5% GL	157.11±3.61[c]	132.91±2.60[c]	32.81±3.001[c]

*Values are expressed as mean ± SD. Significance at $p<0.05$
*Values which do not share the same letter in each column are significantly different.

Histopathology Examinations of Liver:
Microscopically, the liver of rats from control negative group revealed the normal histological structure of hepatic parenchyma (Photo 1). On the other hand, the liver of rats from control positive group revealed steatosis of hepatocytes, focal hepatocellular necrosis associated with mononuclear inflammatory cells infiltration, and fibroplasia in the portal triad (Photo 2). The liver of rats from the group fed on 2.5% GL showed hydropic degeneration of focal hepatocytes (Photo 3). The liver of rats from the group fed on 5% GL showed slight activation of Kupffer cells (Photo 4).

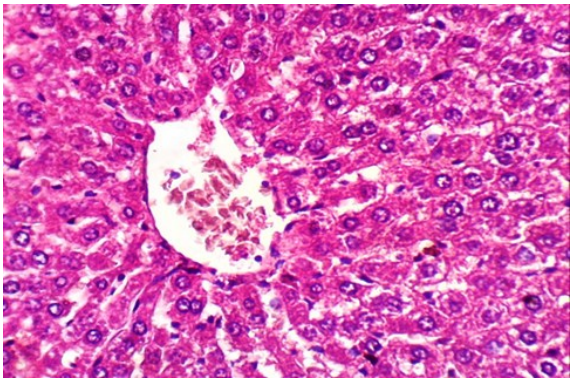

Photo 1: Liver of a rat from the control negative group showing the normal histological structure of hepatic parenchyma (H & E X 400).

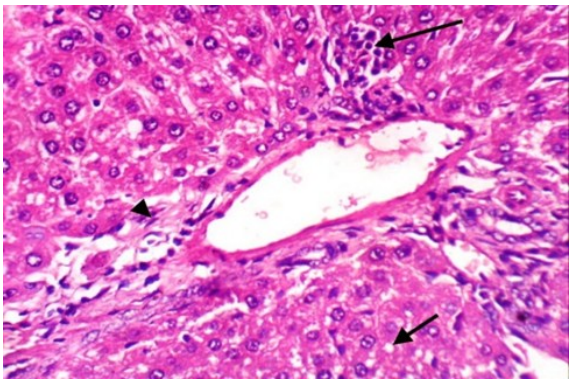

Photo 2: Liver of a rat from the control positive group showing steatosis of hepatocytes (short arrow), focal hepatocellular necrosis associated with mononuclear inflammatory cells infiltration (long arrow), and fibroplasia in the portal triad (arrow head) (H & E X 400).

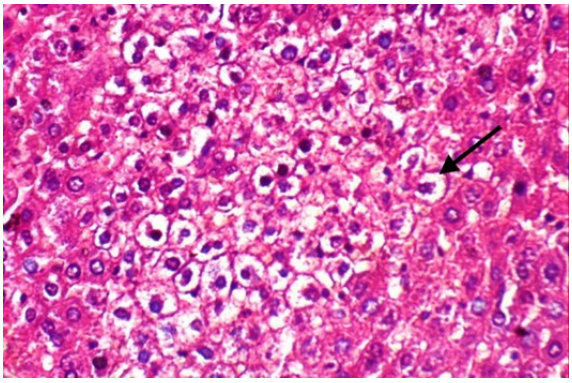

Photo 3: Liver of a rat from the group fed on 2.5% GL showing hydropic degeneration of focal hepatocytes (H & E X 400).

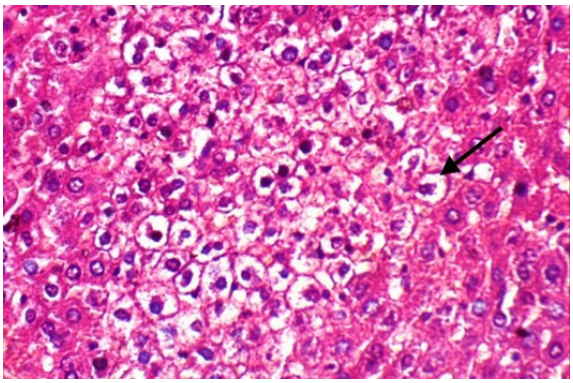

Photo 4: Liver of a rat from the group fed on 5% GL showing slight activation of Kupffer cells (H & E X 400).

Conclusion:

In this article, it appears that Grape Leaves may be useful in improving liver functions and may protect against CCL4-induced acute damage of the liver disease in rats. Ternary resveratrol complex with cyclodextrin and lecithin may be a good alternative medicine for the treatment of liver damage (Gehan F Balata et al., 2017).

In addition, the group of herbs that contain similar flavonoids have a potent effect on different systems in male and female rats (ElSawy, N. A. et al., 2014; ElSawy, N.A. et al., 2014; El-Sayed H Bakr and N. A. ElSawy, 2014; ElSawy, N. A. et al., 2019).

References

1. Allain, C.Z.; poon, L.S. and chan, C.S. (1974):Enfymatic determination on total serum cholesterol. Clin. Chem..20:470-475.
2. Arvill, A. and L. Bodin. (1995): effect of short – term ingestion of Konjacglucomannan on serum cholesterol in healthy men. AMJ. clin, Nutr.61:585-589.
3. Bohmer, H.B.U.M. (1971): Micro-determination of creatinine. Clin.Chem. Acta., 32:81-85.
4. M. Burstein, H.R. Selvenick, R. Morfin (1970): Rapid method for the isolation of lipoproteins from human serum by precipitation with polyanions . J. Lipid Res., 11 , 583-595
5. Centers for Disease Control and Prevention (1998): Recommendations for prevention and control of hepatitis C virus (HCV) infection and HCV-related chronic disease, MMWR Morb Mortal Wkly Rep 47:1–33.
6. Daiki, M. M.; Yutaka. and Y. Kazumi. (2003):hypolipidemic action of dietary resveratrol, a phytoalexin in grapes and wine , in hepatoma – breaking rats – life sci-73:1393-1400.
7. ElSawy, N. A.; Alkushi, A. G.; Alasmary, W. A. M.; Sinna, M. M.; Header, E. A.; Elmadbouly, M. A. & Sakran, A. M. E. A. (2019). Does oregano protect against testicular toxicity produced by ethylene glycol in adult male albino rat? Int. J. Morphol., 37(1):358-362, 2019.
8. El-Sayed H Bakr, Naser ElSawy Therapeutic Role of Aqueous Extract of Milk Thistle (Silybum adans L.) and Burdock (Arctium lappa) in Hyperglycemic Rats (2014).VRI Biological Medicinal Chemistry. Vol 2, Issue2,;eISSN 2330-7250. DOI:http://dx.doi.org/10.14259/bmc.v2i2.135
9. Fossati, P.; Orencipl, L. and Berti, G. (1980): Egyptian colorimetric method of determination of uric acid in serum.Clin.chem., 26:227.
10. Friedewald, W. T.; Leve, R .I .and fredrichson, D.S. (1972): Estimation of concentration of low-density lipoproteins separated by three different. Clin. Clem., 18: 499-502.
11. Gehan F Balata1, , Naser A ElSawy, Mohamad AS Abourehab, Nedaa Ali Karami, Abdualrhmain Bahowirth, Walaa Al Nemari, Mashael Al Daajani and Ferdous Mohammed Turkistani (2017): Resveratrol β-Cyclodextrin/ Lecithin Complexes: A New Approach for Treatment of Hepatic Dysfunction. RRJPPS | Volume 6 | Issue 1 |pp 1-15
12. Gray , A.m. and P.R. Flatt. (1998): Insulin releasing and insulin like activity of agaricuscampestris (mushroom).J. Endocrinol .,157:259-266.
13. Jayasekhar, P.; Mohanan, P. V. and Rahinam, K. (1997).Hepatoprotectlve activity of ethyl acetate extract of acacia catechu. Indian Journal of Pharmacology; 29: 426-428.
14. Joseph, H .; Holthoff.; Zhen.; Wang.; Kathryn, A.; Seely.; Neriman, G. and Philip, R.M. (2011): Resveratrol improves renal microcirculation, protects the tubular epithelium, and prolongs survival in a mouse model of sepsis-induced acute kidney injury..347.
15. Lardos, A. and Kreuter, M.H. (2000): Red vine leaf. In: Kreuter, M.H. (Ed.) Phytopharm. And Phytochem. Products. Flachsmann AG. Zurich; pp. 1-7.
16. Leelavinothan, P. and Arumugam, S. (2008): Effect of grape (Vitisvinifera L.) leaf extract on alcohol induced oxidative stress in rats. Volume 46, Issue 5, May 2008, Pages 1627–1634.
17. Livia, S.; Oliboni; Caroline, D.; Claudia, F.; Joao, A.; Henriques and Salvador. (2011):hepatoprotective, cardioprotective and renal-protective effects of organic and conventional grapevine leaf extracts (vitisLabrusca var. Bordo) on wistar rat tissues. Anais da a cademiaBrasileira de ciencias, 83 (4):1403-1411.
18. Monagas, M.; Hernandez, L.B,.; Gomez, C.; Doves,C. And Bartolome, B. (2006): Commercial dietary ingredients from Vitisvinifera L. leaves and grape skins: antioxidant and chemical characterization. J Agr Food Chem 54: 319–327.
19. Naser A. ElSawy, T. Ben Hadda, E.H. Bakr, E.A.M. Header, A.G. Fakim, Y.N. Mabkhot, M. Aljofan: . (2014). Effects of Crude Aqueous Extract of Origanum vulgaris in Developing Ovary of Rabbits Following in Utero, Adolescent and Postpubertal Exposure. VRI Phytomedicine, (Issue 3): Pages 77-84 eISSN 2330-0280 DOI: http://dx.doi.org/10.14259/pm.v2i3.142VRI
20. Naser A. Elsawy, Eman Mohamed Faruk, Ragia M.Hegazy. Does Ginger Extract Protect against

Ethylene Glycol Induced Hepatic Toxicity in Adult Male Albino Rats? (2014).Basic Sciences of Medicine.3 (2):17-25. DOI: 10.5923/ j.medicine.20140302.01 Copyright © 2014 Scientific & Academic Publishing http:// journal.sapub.org/medicine

21. Orhan, D.D.; Orhan, N. and Ergun, F. (2007):Hepatoprotective effect of Vitisvinifera L. leaves on carbon tetrachlo ride-induced acute liver damage in rats. J Ethnopharmacol 112:145-151.
22. Orhan, N.; Aslan, M.; Orhan, D.D.; Ergun, F. and Yesilada, E. (2006): In-vivo assessment of antidiabetic and antioxidant activities of grapevine leaves (Vitisvinifera) in diabetic rats. J Ethnopharmacol 108: 280–286.
23. Park, S.Y.S.M.; Bok, S, M.; Joem, Y. B.; Park, S.J.;Lee , T.S.; Jeong and M.S. Choi. (2002): effect of rutin and Tannic acid supplements on cholesterol metabolism in rats . Natr.Res-22:283-295.
24. Pascale et al.,(1999) : phenolic compounds. J. Sci. Food Agric.,79: 1625-1634.
25. Patton, C.J. and crouch, S.R. (1977): Enzymatic colorimetric method to determine urea in serum. Anal. Chem.., 49 : 464.
26. Reeves , P . G .; Nielsen , F . H .and Fahmy , G . G . (1993) : Reported of the American institute of Nutrition adhocwriling committee on (The reformulation of the AIN-76 Arodentfiet . J .Nutr ., 123 : 1939-1951 .
27. Retiman, S. and frankel , S. (1957): A colorimetric method for the payruvic determination of serum gultamicoxaloacetic and transaminase.Am.J.clin.Path.,28-56.
28. Scrivastava, S.; Kapoor, R.; Thratola, A. and Scrivastava, R.P. (2003): Mulberry (Morus alba) leaves as human food: a mew dimension in sericulture. Int. J. Food Sci. Nutr; 338: 3-10.
29. Steel, R. G. and torri , J. M.(1980): Principal and procedures of statistical , Biometrical Approach . pbl .MC , Grew H I L L book company . 2ndEd . New York , U . S .A .
30. Trinder, P. (1959): Determination of blood glucose using 4-aminophenazone. J. Clin. Path. 22: 246.
31. Vikas, C. and kan,c. (2006): Protective effect of resveratrol, apply phenol licphytoalexin in ghycero1 induced acute/renal failure in rat kidney,vol. 28,no.2, pages 161-169.
32. medical schools: what is current practice? J Laryngol Otol. 2012 Apr;126(4):340-4.

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Perception of Competence of Senior Medical Students Using Problem Based Learning and Traditional Learning Models

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Abstract
Background: Problem Based Learning (PBL) has grown in popularity and spread to many parts of the world including Kenya. However, there is still continuing confusion about what PBL is and whether it can replace the traditional curriculum.
Objectives: To compare the perceptions of competence among senior medical students using PBL and traditional teaching methods.
Methods: This was a descriptive, cross-sectional study carried out on the final year medical students at Moi University and University of Nairobi in Kenya. A census was carried out for Moi University and a simple random sampling for the University of Nairobi to obtain a sample of 76 and 77, respectively. A questionnaire was administered.
Results: There were six competence variables tested among medical students. The findings showed that there is significant difference in the perceived level of competence among the medical students using the two different learning/teaching models used on them during the period of medical training. The p-value was statistically significant.
Conclusion: The majority of the medical students who used PBL felt that their curriculum prepared them well for their professional work compared to their counterparts who were trained using traditional teaching methods.

Key Words
Problem Based Learning; Medical Students; Competence; Traditional Teaching Methods; Kenya

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Introduction

The Medical School in the University of Nairobi (UoN) started in 1967 and is the oldest in Kenya. The School of Medicine in Moi University (MU) was started in 1989 and is the second oldest medical school in Kenya. Bachelor of Medicine and Bachelor of Surgery (MBChB) is a six-year programme in both these universities. The curricula used in the two Medical Schools is similar in many aspects. Similar examination regulations apply. The first three years primarily focus on basic sciences, and the last three years mainly comprise of clinical management courses. There is a similar pass mark and grading, but there is no classification of the degree in both Medical Schools. The main difference is on the curriculum implementation model. The learning model in Moi University Medical School is Problem Based Learning (PBL) and in the University of Nairobi is the traditional teaching methods. PBL is a student-centered pedagogy, whereas traditional teaching methods are mainly tutor-centered. For the student, PBL emphasizes the application of knowledge and skills to the solution of problems rather than the recall of facts.[1]

Globally, and according to Barral and Buck (2013), PBL is a pedagogical practice employed in many medical schools. While there are numerous variants of the technique, the approach includes the presentation of an applied problem to a small group of students who engage in discussion over several sessions. A facilitator, sometimes called a tutor, provides supportive guidance for the students. Between meetings of the group, learners research their learning issues and share results at the next meeting of the group.[2]

Faculty members often participate as facilitators. Indeed, the role of the facilitator and the nature of the problem are key to successful implementation. Facilitators must be supportive rather than directive. They ask questions to assist students with identifying the limits of their knowledge, monitor the group process (encouraging participation), and provide a framework for constructing models of understanding. Content expertise on the part of the faculty may be helpful but is not considered necessary for effective facilitation. Deeper

understanding of the topic may allow the facilitator to guide student discussions to be more comprehensive. Traditional teaching is concerned with the teacher being the controller of the learning environment. Power and responsibility are held by the teacher, and he/she plays the role of instructor (in the form of lectures) and decision maker (in regard to curriculum content and specific outcomes). The teacher regards students as having 'knowledge holes' that need to be filled with information. In short, the traditional teacher views that it is the teacher that causes learning to occur.[3]

According to Ngatia and colleagues (2009), teaching methods have been classified as traditional or innovative in nature. PBL falls under the innovative methods. Traditionally, in the training of a doctor, traditional teaching methods have and are still being used.[4] Ngatia *et al.* (2009) classify these teaching methods as follows.[4]

The traditional teaching methods are:
Lectures; Large Demonstrations; Role Plays; Practical/Laboratory Work; Field Practice; Clinical Practice; Simulations; Team Teaching; and Apprenticeship
The innovative learning methods are:
Problem Based Learning; Small Tutorial Groups (STGs); Community-Based Education and Service (COBES); Self-Directed Learning; Independent Study; Project; Case Study; Electives; Computer Assisted Instruction; e-Learning; and SPICES (Student-Centered, Problem-Cased, Integrated, Community-Based, Electives and Systematic).

Globally, and according to Nandi and colleagues (2000), the PBL format was first developed at the McMaster University Medical School in Ontario, Canada in the 1960s and has since spread around the world.[3] Maastricht University in the Netherlands offers its whole program in PBL format only, as does St. George's University of London.[5]

According to Vaughan and Baker,[6] effective teaching in medicine requires flexibility, energy and commitment, amidst a busy background of clinical care. Successful medical teaching also requires that teachers are able to address learners' needs and understand the variations in learners' styles and approaches. Teachers can accomplish these requirements while creating an optimal teaching-learning environment by utilizing a variety of teaching methods and teaching styles.[6]

Methods
This study was a cross-sectional study of senior medical students carried out at the schools of medicine of Moi University (MU) and University of Nairobi (UoN) in Kenya. The target population was made up of approximately 400 final year medical students in about a ratio of 1:4 between MU and UoN, respectively.

Due to the small numbers of Moi University Medical School, a census was carried out. However, for the University of Nairobi, a simple random sampling was carried out. A sample of 76 from Moi University and 77 from University of Nairobi was obtained. After obtaining an informed consent, data was collected from the sampled respondents using a similar questionnaire in both medical schools. A 15-question each with a 5-point Likert scale was administered to obtain the perceived competence levels. This questionnaire was filled at almost the same time in both universities at the end of the academic year, before the students sat their final year examinations.

These aspects were six and included: Competence in preparation for internship; Competence in communication skills; Preparedness in teamwork skills; Research; Leadership skills and cultural aspects; and Satisfaction with curriculum. The learning environment is similar. Students in the final clinical year were chosen since they are able to carry out basic patient management, unlike the other clinical and pre-clinical years as far as the two learning/teaching methods were concerned. They were also able to integrate their learning in basic sciences and apply that knowledge in a clinical setting.

Data was analyzed using standard statistical analysis and computing software (STATA) version 10 to obtain descriptive variables such as age and gender. The frequency of the variable ratings of the various competencies in the two learning models was obtained.

We complied with the ethical regulations. We were granted ethical approval by the Institutional Research and Ethics Committee (IREC) of Moi University. We also sought permission from the University of Nairobi so as to collect data from their students.

Results
There was a total of 76 (49.70%) from Moi University and 77 (50.30%) from the University of Nairobi (UoN). Majority (n=97; 63.40%) were female and 56 (36.60%) were male. Most of them (n=115; 75.2%) were in the age range of 21-25 years.

Table 1: Gender and Age Distribution of Medical Students from Both Universities

Variable	Final N=153(%)
Gender	
Female	97 (63.40)
Male	56 (36.60)
Age	
21-25	115 (75.20)
26-30	36 (23.50)
31-35	1 (0.70)
>35	1 (0.70)
University	
MU	76 (49.70)
UON	77 (50.30)

In all the six competencies assessed, the p-value for the variable rating in these two groups was less than 0.001.

The majority of the students rated their learning model in competence preparation to be good (n=91; 59.5%). However, in individual universities, only 31.2% (n=24) of UoN students felt that their learning model prepared them well for competence. Most of the students (68%; n=153) perceived themselves to be good in communication skills.

Teamwork skills preparedness was good in the majority of the students (73.2%; n=153), with the majority from Moi University. In research work, the majority of the students (60.1%) felt that they were poor. Up to 94.8% (n=77) of UoN students felt they were poor in research work.

In leadership skills and cultural aspects, most of UoN students (58.4%) felt they were poor, whereas the majority of their MU counterparts (81.6%) perceived themselves as good. Most students from UoN (75.3%) were not satisfied with their curriculum. However, the majority of MU students (80.3%) were satisfied with their curriculum.

Table 2: A Summary of Descriptive Analysis for Medical Students

Variable Rating	Freq (%) MU	Freq (%) UON	Total	P-value
Competence in preparation				<0.001
Poor	9 (11.8)	53 (68.8)	62 (40.5)	
Good	67 (88.2)	24 (31.2)	91 (59.5)	
Competence in communication skills				<0.001
Poor	13 (17.1)	36 (46.8)	49 (32)	
Good	63 (82.9)	41 (53.2)	104 (68)	
Preparedness in team work skills				<0.001
Poor	9 (11.8)	32 (41.6)	41 (26.8)	
Good	67 (88.2)	45 (58.4)	112 (73.2)	
Research				<0.001
Poor	19 (25)	73 (94.8)	92 (60.1)	
Good	57 (75)	4 (5.2)	61 (39.9)	
Leadership skills and cultural aspects				<0.001
Poor	14 (18.4)	45 (58.4)	59 (38.6)	
Good	62 (81.6)	32 (41.6)	94 (61.4)	
Satisfaction with curriculum				<0.001
Poor	15 (19.7)	58 (75.3)	73 (47.7)	
Good	61 (80.3)	19 (24.7)	80 (52.3)	

Discussion

In the descriptive analysis of all these competence rating variables, the *p-value* was less than 0.001. Statistically significant level of P< 0.05 was used. This was in comparison to the students who used PBL and those who did not.

Learning model in competence preparation

The majority of the students from Moi University (88%; n=76) felt that their learning model (PBL curriculum) prepared them well in making the right decisions while assisting in patient management. Most of them felt competent for having a high degree of accuracy in the interpretation of laboratory results and imaging studies. However, from UoN, only 31% (n=77) felt that their learning model prepared them well to discuss the right aspects while assisting in patient management.

A study done by Dornan *et al.* (2007) on the model linking the processes and outcomes of medical students' workplace learning suggests that the core condition for clinical workplace learning is supported participation. Furthermore, they state that any reduction in medical students' participation in clinical practice that results from the patient safety agenda and expanded numbers of medical students is likely to have an adverse effect on learning. They also found out that the construct of self-directed learning (SDL), which their respondents too often found synonymous with lack of support, should be applied with very great caution to medical students' learning in clinical workplace.[7]

In our study, the majority of UoN students (68.8%; n=77) felt that their teaching model did not prepare them well in competence acquisition in assisting in patient management. This may be due to the large number of students admitted to the medical school of UoN, with an average of about 380 students per academic year. The UoN uses Kenyatta National Hospital (KNH) as their teaching hospital. KNH has a bed capacity of 1,800. Moi University School of Medicine has an average of 70 students per academic year. Their teaching hospital, Moi Teaching and Referral Hospital (MTRH), has a bed capacity of 800. Most of the learning of a final year medical student is bedside. With fewer students per bed, there is better participation in clinical practice compared to a large group of students.

In a study on the perceptions of final year medical students for competence for internship in the University of Cape Town (UCT), Draper and Louw (2012) observed the perceptions of competence for internship. The UCT uses PBL curriculum for their medical students. Their students felt generally positive and competent to enter internship. They also observed that the perceptions of students regarding competence are an important indicator of the attainment of intended curriculum outcomes and provide valuable information for the improvement of curriculum.[8]

Competence in communication skills

In our study, the majority of the students (78%; n=153) from the two universities felt competent in communication skills. This might be due to the introduction of communication skills early in their training. Most of Moi University students (82.9%; n=76) felt they were competent in communication skills compared to 53.2% (n=77) of students at UoN. One of the components of PBL is small tutorial groups (STGs). In these STGs, each of the students has to present to their peer groups. Since this is done regularly in their learning, it most probably improves their communications skills.

Traditional teaching methods do not have many student-centered activities compared to PBL.

In a study done in the Netherlands on the communication competency of medical students, residents and consultants, the author noted that students acquire a satisfactory level of communication competency in a medical curriculum. The curriculum contains several communication courses dispersed throughout this curriculum. However, they noted that this level is already reached early on in the curriculum and does not increase substantially in later years.[9]

Another study in Portugal by Taveira-Gomes *et al.* (2016) on communication skills in medical students emphasized the importance of patient contact, context and clinical role models on the maintenance of learned skills.[10]

Preparedness in teamwork skills

The majority of the respondents (73.2%; n=153) felt that they were well prepared in teamwork. A study done by Jorge *et al.* (2014) observed that transferrable competencies such as communication, teamwork, time management and critical thinking can be acquired by exposure to teamwork.

Most of the medical students prefer teamwork in handling various aspects of patient management. Students in the PBL curriculum appear to develop teamwork skills early, whilst carrying out small tutorial groups (STGs).

The students who use traditional teaching also develop teamwork skills early as most of them engage in teamwork group discussions.[11]
In a study done by Petty *et al.* (2016) on nursing and

medical students, both sets of students were noted to practice team member and leadership roles, while faculty acted as clinical coaches. Faculty and students creatively working together can provide collaborative learning experiences that overcome interprofessional educational barriers.[12]

Research Work

The majority of the students felt they were poor in research (60%; n=153). However, in the individual universities, the majority of the Moi University students (75%; n=76) felt they were good in research. Only 5.2% (n=77) of UoN students felt they were good in research. This may be attributed to Moi University students being introduced early in their training to the Community Based Education and Services (COBES). COBES has a research component. Some of them by the time they are in the fifth year will have published their COBES research projects. Those from the UoN carry out their Community Health Program in the fifth year. Community Health is the main area where UoN students are introduced to research. They also carry out this research in less than one month. This might be the reason most of the UoN students (94.8%; n=77) felt poor in terms of research.

In a study done by Adkison and Glaros (2012), it was noted that the goals of undergraduate medical student research experiences are extremely variable. They noted that the competencies achieved include medical knowledge, interpersonal and communication skills, and professionalism.[13]

In a participation of medical trainees in short-term educational experiences in global health, there was an increasing interest in conducting research. In this case, the competencies identified outline basic knowledge, attitudes and skills necessary.[14]

Leadership Skills and Cultural Aspects

The majority of Moi University students (81.6%) rated themselves good in leadership skills and cultural aspects. From UoN, only 41.6% rated themselves good. In Moi University, students carry out small tutorial groups (STGs) where, in every course, they choose a different leader to steer the group. This probably helps in leadership training. During COBES learning, the Moi University students encounter various cultural aspects in the rural areas. This most likely assists them to learn various cultural aspects.

A study was done by Isayeva (2014) on the modeling cultural competence in teaching humanities to medical students. In this study, the author found that the most important point in modeling culture competence is the teacher's communication, spirituality, attitude and culture. The author recommends the introduction of culture competence programs into the curriculum of medical students as a separate subject.[16]

A study was done on leadership and management in the undergraduate curriculum by Quince *et al.* (2014). From their findings, they concluded that the insights offered into how students view possible developments in leadership and management opportunities can be learned within existing curricular experiences.[17]

Chen (2018) carried out a study on medical leadership. In this study, the author asserts that good medical leadership is the key to building high-quality healthcare. Being a physician requires not only management and leadership but also the need to transfer competencies in communication and critical thinking.[18] Therefore, medical students are expected to develop skills to deal with and resolve conflicts, learn to share leadership, prepare others to help and replace them, take mutual responsibility, and discuss their performances.

Satisfaction with Curriculum

The majority of the Moi University students (80.3%; n=76) were satisfied with the curriculum. However, a minority of UoN students (24.7%; n=77) were satisfied with the curriculum. A study was done by Vahid Ziaee *et al.* (2004) at the Tehran University of Medical Sciences on an evaluation of medical students' satisfaction with clinical education and its effective factors. In this study, overall satisfaction with clinical education was 38.8%, outpatient and bedside teaching 52% each, and theoretical education 70.8%.

In this study, the authors suggested that clinical education should be re-evaluated in their university with specific attention to class size, variety of diseases and course planning considered for each session in clinical education.[19] The Moi University students may have been more satisfied with their curriculum due to their small numbers in the bedside teaching, compared to the UoN students.

Conclusions

The majority of the respondents were female (63.4%; n=153). Most of the medical students (75.2%; n=153) were in the age range of 21-25 years. The majority of the medical students who used the PBL model felt that their curriculum prepared them well for their professional work and their next assignment in doing their internship. They also perceived themselves as good and competent in communication skills, teamwork skills, research, leadership, and cultural aspects. The majority of their counterparts who used the traditional teaching methods felt competent in communication and teamwork skills. Most of the students who were

using traditional teaching methods were not satisfied with their curriculum, but they felt that it prepared them well in competence of their next assignment of internship. The majority of the students who were trained using traditional teaching methods perceived themselves as poor in research, leadership skills, and cultural aspects.

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Conflict of Interest
The authors declare that they have no conflicts of interest.

References

1. Bligh J. Problem-based learning in medicine: an introduction. Postgrad Med J. 1995; 71 (836):323-6.
2. Barral, J. M. and Buck E. What, how and why is problem based learning in Medical education? Education and Training; ASBMB magazine 2013; Vol. 12 No. 8.
3. Novak, J.D. Learning, Creating and Using Knowledge: Concept maps as facilitative tools for schools and corporations. 1998; Mahwah, N.J.,Lawrence Erlbaum & Assoc.
4. Ngatia, P., Mutema, A., Kang'ethe, S., Kimeu, A. and Shoo, R. Training Health Care Professionals. 2009; AMREF, Kenya Litho Printers, Nairobi, Kenya.
5. Nandi,P.L., Chan, J.N.F., Chan, C.P.K ., Chan, P., & Chan, L.P.K. Undergraduate medical education: comparison of problem-based learning and conventional teaching. HKMJ 2000; 6(3):301-306.
6. Vaughn, L. and Baker, R. Teaching in the medical setting: balancing teaching styles, learning styles and teaching methods. Medical Teacher. 2001; 23(6): 610-612
7. Dornan Tim, Henny Boshuizen, Nigel King and Albert Scherpbier Experience-based learning: a model linking the processes and outcomes of medical students' workplace learning. Medical Education. 2007; 41(1): 81-94. Full Text (https://doi.org/10.1111/j.1365-2929.2006.02652.x)
8. Draper, C. E., & Louw, G. J. Competence for Internship: Perceptions of Final-Year Medical Students. Educ Health. 2012; 25:16-23
9. Jan C. Wouda Harry, B.M.van de Wiel The communication competency of medical students, residents and consultants. Patient Education and Counseling. 2012; 86(1) 57-62. Full Text (https://doi.org/10.1016/j.pec.2011.03.011)
10. Isabel Taveira-Gomes, Rui Mota-Cardoso and Margarida Figueiredo-Braga. Communication skills in medical students – An exploratory study before and after clerkships; Porto Biomedical Journal. 2016; 1(5):173-180. Full Text (https://doi.org/10.1016/j.pbj.2016.08.002)
11. Maria Lucia da Silva Germano Jorge, Izabe Cristina Meister Coelho , Mariana Martins Paraizo and Ester Fogel Paciornik Leadership, management and teamwork learning through an extra-curricular project for medical students: descriptive study: Sao Paulo Med. J. 2014; 132(5). Full Text (http://dx.doi.org/10.1590/1516-3180.2014.1325685)
12. Petty GM, Dolansky M. and Luebbers E. Practicing Inter-professional Teamwork Among Nursing and Medical Students. J Nurs Care. 2016; 5: 330.Full Text (doi: 10.4172/2167-1168.10003)
13. Adkison, L.R. and Glaros, A.G. Assessing Research Competency in a Medical School Environment:Kansas City University of Medicine and Biosciences. Med.Sci.Educ. 2012; 22(3): 139. Full Text (https://doi.org/10.1007/BF03341777)
14. Mary T. White, Caley A. Satterfield and Jason T. Blackard. Essential competencies in global health research for medical trainees: A narrative review, Medical Teacher. 2017; 39(9): 945-953. Full Text (DOI: 10.1080/0142159X.2017.1324139)
15. Sunil Kripalani, Jada Bussey-Jones, Marra G Katz and Inginia Genao. A Prescription for Cultural Competence in Medical Education, J Gen Intern Med. 2006; 21(10): 1116–1120. Full Text (doi: 10.1111/j.1525-1497.2006.00557.x)
16. Isayeva, Oksana. Modeling Cultural Competence in Teaching Humanities to Medical Students. American Journal of Educational Research. 2014; 2(12B):51-55. Full Text (DOI: 10.12691/education-2-12B-10)
17. Quince T, Abbas M, Murugesu S, et al. Leadership and management in the undergraduate medical curriculum: a qualitative study of students' attitudes and opinions at one UK medical school BMJ. 2014; Open;4:e005353. Full Text (doi: 10.1136/bmjopen-2014-005353)
18. Chen,TY. Medical leadership: An important and required competency for medical students. Tzu Chi Med J. 2018; 30:66-70
19. VahidZiaee, Zahra Ahmadinejad and Ali Reza Morravedji. An Evaluation on Medical Students' Satisfaction with Clinical Education and its Effective Factors, Medical Education Online.2004;9:1,4365, DOI: 10.3402/meo.v9i.4365. https://doi.org/10.3402/meo.v9i.4365

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Role-Play on Consultation in General Practice for Medical Students

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Abstract
Aim: Role-play is a well-established learning method in medical education. We evaluated the function of undergraduate medical students acting as 'observers' in a role-play in the context of training in general practice.
Methods: The participants were sixth-year medical students, and the role-plays took place during the final meetings of their general practice internship periods. Each session was attended by 10–15 students. The role-play involved a simulation of an outpatient visit in general practice. The students acting as 'observers' were requested to anonymously fill out a short form reporting their perceptions and their proposals in relation to the simulated clinical case.
Results: Most 'observers' identified only the main features of the consultation, but a minority also carried out a psycho-social evaluation. An adequate description of a communicative plan was achieved in most cases for lifestyle changes, care plans, revaluation plans, and instrumental investigation plans.
Conclusion: Role-playing can be a useful tool in the context of educating undergraduate students for general practice, especially to highlight topics that require learning reinforcement.

Key Words
Role-Play; General Practice; Education; Undergraduate Students; Communication

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Introduction

Role-play, a learning method in which participants take on a particular role in a particular situation and interact with others within an emulation of a true-life setting,[1,2] is a well-established training tool in medical education, especially in communication skills.[3,4] When a number of students are involved in the role-play, most of them do not act as the 'character' but as 'observers'. The aim of our research was to evaluate the function of the 'observers' of a role-play for undergraduate students in the setting of general practice training.

Methods

The participants were sixth-year students from the School of Medicine, Bologna, Italy, and the role-plays took place during the final meetings of their general practice internship periods. Each session was attended by 10–15 students and was led by two general practitioners qualified as training tutors (chosen in rotation among the authors of this study). The role-play involved a simulation of an outpatient visit in which two of the students volunteered to act as 'patient' and 'general practitioner'. The two roles were explained separately to the characters by training tutors. The other students acted as 'observers' and were requested to anonymously fill out a short form reporting their perceptions and their proposals in relation to the simulated clinical case. The form was to be completed during the role-play (average duration: 10 minutes) and within the 5 minutes thereafter, just before the group discussion about the role-play. Each form was independently assessed by three of the authors, who judged (yes/no) if each response had achieved an adequate level of description. In cases of disagreement, a majority verdict was accepted. The results were expressed as a percentage of sufficiently reaching an adequate level. All requirements under the Helsinki Declaration, including informed consent, were strictly observed.

Results

The authors collected 119 forms (completely or partially filled) from 10 consecutive meetings. The overall performance was judged at least adequate in 88.2% of the participants and completely accurate in

22.7% of them. Table 1 shows the percentages of adequate level of description for each item obtained in the 119 forms.

A high percentage of participants identified both the main problem involved in the consultation (93.3%) and possible physical diseases presented by the patient (87.4%), but only 9.4% of the students included any element representing a social and environmental assessment.

Referral for immediate assessment by a specialist was suggested by 37.8% of participants, while 26.9% of them would refer the patient for an immediate instrumental examination other than laboratory tests.

A re-assessment of the patient and the patient's care was adequately described by 79.0% of the students, and a fair description of a communicative plan was provided in 79.9% of cases with regard to lifestyle changes, in 73.1% regarding the care plan, in 69.5% regarding the re-evaluation plan, and in 55.5% with regard to a plan for instrumental investigation.

Discussion and Conclusion

This study describes the results of a simple structure role-play carried out by medical students. Most students as 'observers' have achieved a sufficient level of adequacy to understanding the clinical scenario. However, a minority of students used social and environmental assessments over a purely clinical assessment. The difficulty of introducing a social evaluation alongside students' clinical consultations has been well highlighted by dedicated studies.[5]

Approximately one third of students were in favour of an immediate referral of the patients to a specialist, and about a quarter of them would refer the patient for an immediate instrumental examination other than laboratory tests. These behaviours are related to the development of role-play, in particular the accentuation or not by the 'patient' on possible acute symptoms, but the possible large use of instrumental examinations and specialist assessment may also be motivated by the fact that the students are in university environments that provide third-level specialist services.

Clear limits of our study are factors related to the participants (written expressive ability), the internship (duration; quality) and the role-play itself (effectiveness of the script; interpretative ability of the actors; quality of the explanations provided to the participants).

In conclusion, the results of our experience highlight that role-play can be a useful tool in the context of general practice education for undergraduate students. In particular, it can help identify some topics that could require learning reinforcement.

Table 1: Percentage of Adequate Level of Description for Each Item

Items	**%**
What do you identify as the main problem of the consultation?	93.3%
What do you suggest as diagnostic hypothesis?	87.4%
What would you evaluate as clinical objectivity?	88.2%
Would you plan an immediate instrumental examination (excluding laboratory test)?	73.1%
Would you plan an immediate specialist assessment?	66.2%
How would you plan a revaluation of the clinical condition of the patient?	79.0%
How would you explain to the patient the usefulness of possible investigations?	55.5%
How would you explain to the patient the care plan?	73.1%
How would you explain to the patient the plan of revaluation?	69.5%
How would you explain to the patient adequate daily behavior?	79.9%

References

1. Simpson MA. How to use role-play in medical teaching. Med Teach. 1985;7(1):75–82.
2. Joyner B, Young L. Teaching medical students using role play: twelve tips for successful role plays. Med Teach. 2006;28(3):225–229.
3. Nestel D, Tierney T. Role-play for medical students learning about communication: guidelines for maximising benefits. BMC Med Educ. 2007;7:3.
4. Bosse HM, Schultz JH, Nickel M, Lutz T, Moltner A, Junger J, Huwendiek S, Nikendei C. The effect of using standardized patients or peer role play on ratings of undergraduate communication training: a randomized controlled trial. Patient Educ Couns. 2012;87(3):300–306.
5. Benbassat J. Teaching the social sciences to undergraduate medical students. Isr J Med Sci. 1996;32(3-4):217–221.

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Determinants of Hospital Emergency Preparedness in Machakos Level 5 and Kangundo Level 4 Hospitals

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Abstract

Introduction: Emergency preparedness is emerging as a key security priority globally. Plans are needed not only for responding to the impacts of events, but also to maintain business while managing the crisis and to guide recovery and reconstruction effectively. Machakos, which is along Nairobi-Mombasa highway, recorded a 27% increase of emergency cases in 2017, 39% in 2018 in Machakos Level 5. During this period, deaths increased from 191 to 497 from 2016. A 35% increase of referrals to other hospitals was recorded. In the face of these emergencies, the ability of affected facilities like Kangundo Level 4 and Machakos Level 5 Hospitals in Kenya to provide care to the injured can quite literally make the difference between life and death.

Objective: To examine the influence of the capacity of health workers on hospital emergency preparedness in Kangundo Level 4 and Machakos Level 5 Hospitals.

Methodology: The study adopted a cross-sectional design and simple random sampling method. A sample size of 128 respondents was obtained: 49 respondents from Kangundo Level 4 and 79 from Machakos Level 5 Hospitals. Simple random sampling was applied to select respondents. Self-administered questionnaire as a data collection tool was applied.

Results: The findings reveal high understanding of the meaning of emergency preparedness (M = 4.29; SD = 0.67), with 94 (74%) of the respondents considering themselves prepared for an emergency. The mean was 3.67; SD .06. Eighty (64%) considered themselves key leadership figures in emergency preparedness. One hundred and eleven (88%) of the respondents agreed with the statement that training on emergency preparedness should be conducted quarterly, with mean of M = 4.27; SD = 0.95. Respondents agreed that emergency tray is well equipped with various equipment for management of emergency, with a mean of 3.51 1.101, and that the hospital has a drug supply system with drug suppliers, with a mean of 3.51 1.108. The results showed a strong and positive relationship between commodity availability, financial resources, policies and emergency preparedness, with coefficient of correlation of r=0.619, p<0.001, r=0.626, p<0.001, and r=0.702, and p<0.001, respectively. In a combined relationship, Commodities (p<0.05), Finance (p<0.05) and Policies (p<0.05), all had a significant influence on hospital emergency preparedness.

Conclusion: The study found that policy formulation and implementation, commodities and finances significantly influenced emergency preparedness. The variables under this study are important in determining emergency preparedness, and emergency preparedness will work well if the variables in this study are taken into account. Therefore, hospital management needs to build a stable drug supply system with adequate drug suppliers. Resources should be allocated to purchase ultra-modern equipment. Additionally, a clear mechanism of access of emergency commodities should be developed by hospital management, and staff should be made aware of it. There is a need for staff participation in emergency policy formulation, guidelines, emergency plans, and lobbying for emergency preparedness. Additionally, the institutions need to make emergency drills and safety inspections regular.

Key Words
Hospital Emergency Preparedness; Health Systems Management

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Background

The World Health Organization defined the Health Systems Management pillars, which include health workforce, service delivery, leadership and governance, health information systems, access to essential medicines, and financing. The main pillar of focus is service delivery in emergency preparedness that aims to provide quality and effective health care services to all. The service offered does not vary in terms of quality, irrespective of characteristics such

as gender, ethnicity and socioeconomic status. Furthermore, the pillar has other aims, which include safety to patients and caregivers, patient-centered approaches, timeliness and efficiency (Carroll, 2006).

Emergency preparedness is a critical component in healthcare and disaster medicine (Rådestad, 2013). The term 'emergency' refers to any extraordinary event or situation that requires an intense, rapid response and that can be addressed with existing community resources (Qureshi Kristine and Gebbie, 2001). Preparedness, on the other hand, is defined as arrangements to ensure that, should an emergency occur, all those resources and services, which may be needed to cope with the effects, can be rapidly mobilized and deployed (Peter Aitken, 2015).

Emergency preparedness is conceptualized, therefore, as the comprehensive knowledge, skills, abilities and actions needed to prepare for, and respond to, threatened, actual or suspected chemical, biological, radiological, nuclear or explosive incidents, man-made incidents, natural disasters or other related events (Slepski, 2008). Public emergency is defined as an event that happens unexpectedly and has huge negative impacts on human health, the economy, and social stability (Qiu, 2016).

Meanwhile, hospital preparedness encompasses those actions, programs and systems developed and implemented before a major incident to improve the capability and capacity of the hospital to respond to disasters and emergencies (Djalali et al., 2014; Wachira and Martin, 2011; Djalali et al., 2014).

Statement of the Problem

Globally, health facilities are considered to be the pillar of emergency response plans, with the capacity of healthcare workers and policy formulation being identified as the major determinants of emergency response plans (Balicer, et al., 2006). Study results from a survey conducted in New York City to determine the ability and willingness of healthcare workers to report to work during various catastrophic events revealed that about 84.75% were more likely to report and attend to emergencies (Qureshi, 2005). More than half (77.45%) of the respondents reported that capacity building through training improved healthcare workers' knowledge, skills and competencies in emergency response plans (Qureshi, 2005).

According to Kenya Health Strategic Plan (KHSP 2018), level 4 and 5 hospitals can refer or receive emergencies. Kangundo Level 4 and Machakos Level 5 Hospitals are arguably the most advanced in Machakos County. Unfortunately, there is not an assessment of a hospital's vulnerability to identify the state of emergencies preparedness plans of the hospitals to anticipate, prepare for, and manage client flow trends and their effects. For example, Kangundo Level 4 Hospital's records showed a 27% increase in emergency patients in 2017 (18,705 cases) compared to 14, 728 cases in 2016, and a 39% increase in 2018 (25,991 cases) compared to 2017, while Machakos Level 5 Hospital's records showed an increased casualty patient flow by 35% from 43,542 (2017) to 66,987 in 2018. During this period, the deaths in the two hospitals also were reported to have increased compared to previous years. Kangundo Level 4 Hospital reported 375 deaths in 2018 compared to 209 in 2017, while Machakos Level 5 Hospital's mortality records showed 497 deaths in 2018 compared to 362 in 2017, and 191 in 2016 (DHIS, 2019). Referrals from Kangundo Level 4 and Machakos Level 5 were increased by 23% and 35 %, respectively (DHIS, 2018). At the same time, data published by the Ministry of Health Kenya demonstrated an increase in emergency situations in Machakos environments (Government of Kenya; Ministry of Health, 2014).
In the face of these emergencies, the ability of Kangundo Level 4 and Machakos Level 5 Hospitals can quite literally make the difference between life and death (Government of Kenya; Ministry of Health, 2014). Therefore, establishing the determinants of emergency preparedness in Kangundo Level 4 and Machakos Level 5 Hospitals will inform policy formulation, as well as adjustments of resource allocation and commodities for better emergencies preparedness.

Research Objective

The objective of this study was to establish the determinants of hospital emergency preparedness in Machakos Level 5 and Kangundo Level 4 Hospitals.

Research Design

The study adopted cross-sectional study design.
Study Population

The study population was 55 outpatient health workers in Kangundo Level 4 Hospital and 98 in Machokos Level 5 Hospital.

Results

Demographic Characteristics of the Respondents

The majority of the respondents (n=77; 61%) were from Machakos Level 5 Hospital. This was based on proportionate distribution of sample size relative to staff numbers per facility. The majority (n=108; 86%) of the respondents were aged between 20 and 40 years, with a mean age of 32.8 ± 5.4 years; above 51 years was the least since the retirement age is 50 years in Kenya. Seventy percent of the respondents had trained up to college level; this is in line with their age group. While almost two-thirds of the respondents were females (n=81; 64%).

Table 1: Respondents Characteristics

Facility Level	Frequency (n)	Percent (n)
Machakos Level 5 Hospital	77	61
Kangundo Level 4 Hospital	49	39
Total	126	100
Age		
20-30	59	47
31-40	49	39
41-50	13	10
51 and above	5	4
Total	126	100
Education Level		
College	88	70
University	38	30
Total	126	100
Sex		
Male	45	36
Female	81	64
Total	126	100
Years of Work experience Less than 5 years	57	45
5-10	49	39
11-15	6	4
16-20	7	6
21-31	7	6
Total	126	100

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Table 2: Descriptive on Health Workers' Capacity and Hospital Emergency Preparedness

Description	Disagree n (%)		Agree n (%)	Mean	Std. Dev	Chi-Square	P-Value
Understand meaning of emergency preparedness	5(4)		121(96)	4.29	0.67	58.91	0.001
I consider myself prepared for emergency	33(26)		94(74)	3.67	1.07	81.37	0.001
I would be considered a key leadership figure in emergency preparedness	46	(36)	80 (64)	3.39	1.19	60.1	0.001
All hospital staff are well equipped with knowledge on emergency preparedness	77(62)		48 (38)	2.66	1.18	63.27	0.001
The hospital management organizes training in emergency preparedness among its staff	60	(47)	66 (53)	3.02	1.15	80.79	0.001
I am trained to train other staff and stakeholders on emergency preparedness	94	(75)	32(25)	2.23	1.20	43.71	0.001
Training on emergency preparedness should be conducted quarterly	15	(13)	111(88)	4.27	0.95	128.84	0.001
Emergency preparedness training should be included in all medical training curricula	4	(3)	122 (97)	4.66	0.65	94.43	0.001

There was a consensus (n=122; 97%) that emergency preparedness training should be included in all medical training curricula. This is supported by Tang (2015), who wrote that the value of continuous training is well documented (Tang, 2015). The natures of work and emerging conditions such as COVID may explain this high score. Linkage of nature and training of health workers on disaster preparedness and planning is well documented (Perry, 2013). This is in line with Jaye *et al.* (2016) that capacity is a critical element in emergency preparedness (Jaye *et al.*, 2016). The mean was M = 4.66± 0.65. The majority (n=77; 62%) of the respondents disagreed with the statement that all hospital staff are well equipped with knowledge on emergency preparedness. The mean was M = 2.66± 1.18. This is not in agreement with Walsh *et al.* (2012), who argued that the majority of the documented efforts have been limited primarily to individual specialties or targeted professionals, which has resulted in a lack of definitional uniformity across professions with respect to education, training, and best practices within the discipline of public health (Walsh *et al.*, 2012). It is important, therefore, to document and develop a combination of new employee orientation, continuous on-the-job learning, and regular exercises and drills with interwoven quality improvement loops.

Similarly, 60 (47%) disagreed with the proposition that the hospital management organizes training in emergency preparedness among its staff. The mean was M = 2.23±1.20. The lack of continuous training contrasts with the principle of capacity building and of creating an enabling environment with appropriate policy and legal frameworks, personnel continuous development, health workers' development, and strengthening of managerial systems (NIDM, 2013). The Chi-Square results indicate that there was a significance difference ($p<0.001$) in the responses by individuals under each category of Agree and Disagree for influence of health worker capacity for emergency

preparedness.
The Chi-Square results indicate that there was a significance difference ($p<0.001$) in the responses by individuals under each category of Agree and Disagree for influence of commodities availability on emergency preparedness (see Table 4.3). The importance of commodities is well elaborated by Özdamar (2004). Özdamar writes that logistical planning in emergency situations involves putting commodities, such as medical materials, personnel and equipment, in open and strategic places (Özdamar, 2004) a statement backed by Rios (2015) that commodities are central in emergency medical situations and influence the scope of the service offered, as well as the behavior of the provider, facility, and entire countries (Rios, 2015).

Inferential Statistics

Bivariate Analysis
The results show that there is a strong and positive relationship between the independent variables and dependent variable of emergency preparedness.

Multiple Regression

Table 3: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.768[a]	.589	.576	.57185	1.660

a. Predictors: (Constant) Health Workers Capacity
b. Dependent Variable: Emergency Preparedness

Table 4: Analysis of Variance

Model		Sum of Squares	df		Mean Square	F	Sig.
1	Regression	56.773		4	14.193	43.403	.000[b]
	Residual	39.568		121	.327		
	Total	96.342		125			

a. Dependent Variable: Emergency Preparedness
b. Predictors: (Constant) Health Workers, Capacity

The results in Table 4 indicate that the prediction model of hospital emergency preparedness was influenced by the study variables.

Table 5: Regression Weights

Coefficients[a]								
		Unstandardized Coefficients		Standardized Coefficients		Collinearity Statistics		
Model		B	Std. Error	Beta	T	Sig.	Tolerance	VIF
1	(Constant) Health	-.009	.358		-.025	.980		
	Workers Capacity	.008	.011	.044	.717	.475	.909	1.100

a. Dependent Variable: Emergency Preparedness

The VIF index is below 10 for all the variables, indicating that there was no multicollinearity. From Table 5, the constant was not significant with p>0.05. This infers that the study variables under this study are important in determining emergency preparedness and that emergency preparedness will work well if the variables in this study are taken into consideration in addition to other variables not in this study.

From the finding, Y-Intercept (B0=0.000) depicts that, in holding all independent variables constant, the emergency preparedness will not be functional at the health facilities in Machakos County.

Further, the findings on health worker capacity (X1, B1= 0.044, P=0.475) imply that a unit change in health workforce capacity will improve the emergency preparedness by 4.4%. However, the improvement is not statistically significant, at 5% level of significance.

This study also reveals that the health workers in this study never fully felt their role in emergency preparedness of the health facilities.

Conclusion

The study indicates that health workers' capacity did not influence hospital emergency preparedness. While the majority disagreed that all staff are well equipped with knowledge in emergency preparedness, they also agreed with the proposition that emergency preparedness should be conducted quarterly and that training on emergency preparedness needs to be included in all medical training curricula since this will enhance their emergency preparedness skills. In my opinion, health workers should be fully equipped with knowledge, especially including hospital emergency preparedness, as suggested by the respondents.

Recommendation

This study recommends that continuous professional training be conducted regularly, seminars be conducted regularly, and finance for specialized training be provided. This will equip health workers with the necessary skills to handle emergencies, thus reducing deaths and referrals to other facilities and saving life, time, and resources.

References

1. Government of Kenya, (February),57. Retrieved from http://www.sprogrammes.go.ke/images/ndpo.pdf
2.Government of Kenya; Ministry of State for Special Programmes Office of The President. (2009). National policy for\ndisaster management in kenya.
3. Jaubert, R. (2012). From 270 million to 2 billion people affected by desertification: The twilight of an international convention?. Sécheresse, 23(3), 248-252. doi: 10.1684/sec.2012.0347
4. Kim, H. (2014). Learning from UK disaster exercises: Policy implications for effective emergency preparedness. Disasters, 38(4), 846-857. doi:10.1111/disa.12084
5. Lauriault, T. (2020). Tracing COVID-19 Data: Data and Technological Citizenship during the COVID-19 Pandemic. Canadian Journal Of European And Russian Studies, 13(1). doi: 10.22215/currrg/2020.tracingcovid19data management and surge capacity in disasters. Trauma Monthly, 21(2), 1–5. https://doi.org/10.5812/traumamon.30277
6. Najafi, M., Ardalan, A., Akbarisari, A., Noorbala, A. A., & Elmi, H. (2017). The Theory of Planned Behavior and Disaster Preparedness. PLoS Currents, 9. https://doi.org/10.1371/currents.dis.4da18e0f1479bf6c0a94b29e0dbf4a72
7. Noh, J., & Chung, H. (2017). Development and Effect of a Multi-Modality Disaster Training Program for Hospital Nurses. Prehospital And Disaster Medicine, 32(S1), S144-S145. doi: 10.1017/s1049023x1700399
8. Özdamar, L. (2004). 1. Linet Özdamar; Ediz Ekinci; Beste Küçükyazici – Emergency Logistics Planning in Natural Disasters (2), 217–245. https://doi.org/10.1023/B:ANOR.0000030690.27939.39
9. Paci-Green, R., Varchetta, A., McFarlane, K., Iyer, P., & Goyeneche, M. (2020). Comprehensive school safety policy: A global baseline survey. International Journal of Disaster Risk Reduction, 44(November 2019), 101399. https://doi.org/10.1016/j.ijdrr.2019.101399
10. Pathirage, C., Seneviratne, K., Amaratunga, D., & Haigh, R. (2014). Knowledge factors and associated challenges for successful disaster knowledge sharing Prepared for the Global Assessment Report on Disaster Risk Reduction 2015. (January 2014).
11. Peter Aitken, A. (2015). Developing Disaster Health Preparedness in. Retrieved from https://researchonline.jcu.edu.au/43767/1/43767-aitken-2015-thesis.pdf.
12. Rådestad, M. (2013). Evaluation of Medical Response in Disaster Preparedness.

Shabanikiya, H., Gorgi, H. A., Seyedin, H., & Jafari, M. (2016). Assessment of hospital
13. Sadler, D. R. (2013). Making competent judgments of competence. Modeling and Measuring Competencies in Higher Education: Tasks and Challenges, 1, 13–27. https://doi.org/10.1007/978-94-6091-867-4
14. Shapira, S., Friger, M., Bar-Dayan, Y., & Aharonson-Daniel, L. (2019). Healthcare workers' willingness to respond following a disaster: A novel statistical approach toward data analysis. BMC Medical Education, 19(1), 1–12. https://doi.org/10.1186/s12909-019-1561-7
15. Slepski, Cl. A. (2008). Emergency Preparedness and Professional Competency Among Health Care Providers During Hurricanes Katrina and Rita.(2019). Development of damage prediction formula for natural disasters considering economic indicators. Sustainability (Switzerland), 11(3). https://doi.org/10.3390/su11030868
16. Soucat, A. (2019). Financing Common Goods for Health: Fundamental for Health, the Stephenson, J. (2014). Largest-Ever Ebola Outbreak Still Simmering in West Africa.
17. JAMA, 312(5), 476. doi: 10.1001/jama.2014.9757.

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USMLE Step 1: A Change for the Better?

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Abstract
The United States Medical Licensing Examination (USMLE) Step 1 scoring system has historically been used as a crucial indicator in differentiating excellent candidates, particularly when applying for residency training programs in the United States. According to a recent report by the American Medical Association (AMA), a few components of the Step 1 exam will be undergoing changes, one of which being a change from the numerical scoring system to a pass/fail system effective earliest by January 2022. This article explores the benefits and challenges that the USMLE Step 1 pass/fail scoring system may imply on local medical graduates, international medical graduates (IMG), Doctors of Osteopathic Medicine (DO), and students studying in lower-ranked medical schools.

We recommend students recognize the change in the reporting system early to allow ample time to adapt to it accordingly. Local medical students in the United States who are taking Step 1 after January 2022 should plan out strategies to invest more time in preparing for Step 2 Clinical Knowledge (CK). IMGs who are confident that they can perform well in the Step 1 should sit for the exam before the change takes effect. This would still allow them to stand out with a higher numerical score when applying for residency. IMGs who are less confident of their academic potential should consider taking Step 1 after the change has occurred and, in the meantime, develop other areas of their curriculum vitae. However, medical students should not let the absence of a three-digit score alter the course of their dreams and aspirations. Instead, medical students should continue to build their portfolio in all aspects possible to ensure that they can put forth the best application possible by the time they apply for residency.

Key Words
USMLE Step 1; Residency; Training; International Medical Graduates; USMLE Step 2

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Article

The United States Medical Licensing Examination (USMLE) Step 1 scoring system has historically been used as a crucial indicator in differentiating excellent candidates, particularly when applying for residency training programs in the United States. Traditionally, it is used by residency admission committees as an objective measurement of an applicant's academic potential. As a result, most medical schools place a huge emphasis on optimizing a student's performance for Step 1 in the first two years of studying medicine.

A recent statement released by the American Medical Association (AMA) suggested that the change from a numerical scoring system to a pass/fail system was agreed upon to ease the transition between Undergraduate Medical Education (UME) to Graduate Medical Education (GME), to reduce significant distress and anxiety caused by the residency selection system, and to balance student learning and student well-being.[1, 2] Although this change will only be effective from 2022, this article explores the benefits and challenges that the USMLE Step 1 pass/fail scoring system may imply.

The residency selection system has often placed emphasis on the numerical scores of Step 1, especially for competitive specialties such as Plastic Surgery and Dermatology.[3] These specialties often have high Step 1 cut-offs to filter out applicants at the initial screening process. This change has raised concerns among international medical graduates (IMG), Doctors of Osteopathic Medicine (DO), and students studying in lower-ranked medical schools as there is less one objective metric for them to distinguish themselves and to level the playing field.[4, 5]

What does this mean for medical students applying for residency in the future?

Advantages	Disadvantages
1. This change will improve the well-being and mental health of medical students which will, in turn, hopefully reduce burnout, dropout, and suicide rates. This will help to produce students and doctors who are content, fulfilled, and more likely to continue their career in medicine. This will also promote patient safety as they will arguably be less at risk of making careless mistakes.[2] 2. Residency programs can focus on evaluating an applicant's clinical knowledge using their Step 2 score, allowing a better appreciation of how applicants will respond in clinical situations, the primary role of a doctor.[5, 7] 3. Students will have the opportunity to develop themselves more holistically. Students will be able to focus on investing time on more research items (i.e. publications, abstracts, and presentations) and extra-curricular activities to strengthen their letters of recommendation.[4, 5, 7]	1. Unlike Step 1, the Step 2 CK exam will retain its numerical score. Intuitively, admission committees may place a greater emphasis on Step 2 CK as an objective metric. This could counteract the initial purpose of the change and cause more uncertainty and stress.[6] 2. If students do not score highly in the Step 2 CK, they do not have any alternative tests to compensate for their low scores. Hence, this, too, could increase the stress and anxiety levels of students when preparing for Step 2.[4, 7]

Where do we go from here?

1. Local medical students who are taking Step 1 after January 2022 should plan out strategies to invest more time in preparing for Step 2 CK. Conversely, IMGs have a choice, albeit difficult. IMGs who are confident in performing well in Step 1 should sit the exam before the change takes effect.[2] This would still allow them to stand out with a high numerical score when applying for residency. IMGs who are less confident should consider taking Step 1 after the change has occurred and, in the meantime, develop other areas of their curriculum vitae. Overall, students should recognize the change in the reporting system early on to allow ample time to adapt to it accordingly.[7]
2. Standardized evaluation forms are likely to become more common and mandatory across specialties. The established use of the Standardised Letter Of Evaluation (SLOE) in Emergency Medicine has been reported to help define specific competencies and specialty-specific non-cognitive personality traits.[8] This will not only allow admission committees to identify applicants who are a "good fit" for their programs, but it will also help those who will graduate to become successful physicians.
3. The change is a double-edged sword. However, medical students should not let the absence of a three-digit score alter the course of their dreams and aspirations. Instead, medical students should continue to build their portfolio in breadth and depth to put forth the best application possible by the time they apply for residency

References

1. United States Medical Licensing Examination | Invitational Conference on USMLE Scoring [Internet]. Usmle.org. [cited 24 August 2020]. Available from: https://www.usmle.org/incus/#:~:text=The%20USMLE%20program%20will%20change,only%20a%20pass%2Ffail%20outcome.&text=This%20policy%20will%20take%20effect,to%20follow%20later%20this%20year.
2. USMLE Step 1 moves to pass-fail: Answers to 7 key questions [Internet]. American Medical Association. 2020 [cited 25 August 2020]. Available from: https://www.ama-assn.org/residents-students/usmle/usmle-step-1-moves-pass-fail-answers-7-key-questions.
3. Schultz K, Shih L, Davis M, Reece E, Buchanan E, Maricevich R, et al. Integrated Plastic Surgery Applicant Review: Important Factors and Selection Criteria. Plast Reconstr Surg Glob Open. 2020;8(7):e2892.
4. McDade W, Vela M B, Sánchez JP. Anticipating the Impact of the USMLE Step 1 Pass/Fail Scoring Decision on Underrepresented-in-Medicine Students. Academic Medicine. 2020;95(9):1318-1321 doi: 10.1097/

ACM.0000000000003490
5. Desai A, Hegde A, Das D. Change in Reporting of USMLE Step 1 Scores and Potential Implications for International Medical Graduates. JAMA. 2020;323(20):2015–2016. doi:10.1001/jama.2020.2956
6. West CP, Durning SJ, O'Brien BC, Coverdale JH, Roberts LW. The USMLE Step 1 Examination: Can Pass/Fail Make the Grade? Academic Medicine. 2020;95(9):1287-1289 doi: 10.1097/ACM.0000000000003537
7. Neville AL, Smith BR, de Virgilio C. USMLE Step 1 Scoring System Change to Pass/Fail—An Opportunity for Change. JAMA Surg. 2020. doi:10.1001/jamasurg.2020.2836
8. Love J, Ronan-Bentle S, Lane D, Hegarty C. The Standardized Letter of Evaluation for Postgraduate Training. Academic Medicine. 2016;91(11):1480-1482.

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