



# Health Sciences Journal

ISSN 2244-4378

From the desk. To the bench. To the bedside.



# The HEALTH SCIENCES JOURNAL

is published by the  
University of the East Ramon Magsaysay Memorial Medical Center, Inc.  
Research Institute for Health Sciences

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# A questionnaire-based cross-sectional study of obstetricians' knowledge, attitudes and practices of vaginal birth after cesarean (VBAC) in the Philippines

Catherine V. Magante, MD

## Abstract

**Introduction** There has been a steady increase in the number of cesarean deliveries, exposing more women and their infants to its long-term complications. Vaginal birth after cesarean is one way to decrease cesarean section rates. This study was done to describe the knowledge, attitudes and practices of obstetricians regarding vaginal birth after cesarean section.

**Methods** A self-administered questionnaire was distributed to consultants and residents who attended the 2014 Annual Convention of the Philippine Obstetrical and Gynecological Society (POGS). The questionnaire contained items on patient selection, safety, practices, reasons for doing or not doing, and requirements in doing vaginal birth after cesarean.

**Results** More than 75% of respondents practiced vaginal birth after cesarean section. Practitioners of vaginal birth after cesarean section scored higher in the items on the requirements, qualifications of a low-risk candidate and complications of vaginal birth after cesarean section, and more practitioners had a positive attitude. Practitioners were more likely to do a trial of labor in a candidate for vaginal birth after cesarean section in active labor and were less likely to do a repeat cesarean section in a candidate not in active labor. The main reason of non-practitioners for not doing vaginal birth after cesarean section was fear of complications; practitioners did it for its lower cost for the patient, shorter recovery time and fewer long-term complications. Obstetricians practicing in a university hospital were more likely to practice vaginal birth after cesarean section than those from private and government hospitals.

**Conclusion** Practitioners had a higher knowledge and more positive attitude towards vaginal birth after cesarean section. They were more likely to do a trial of labor in candidates for vaginal birth after cesarean section that were in active labor. The factor associated with the practice of vaginal birth after cesarean section was primary practice in a university hospital.

**Key words:** Vaginal birth after cesarean, VBAC

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Presented in the 17th Annual Research Forum, February 17, 2015, University of the East Ramon Magsaysay Memorial Medical Center, Quezon City

Cesarean delivery is defined as the birth of a fetus via laparotomy and then hysterotomy. Cesarean delivery may be primary, referring to a first time hysterotomy, or secondary, denoting a uterus with one or more prior hysterotomy incisions.<sup>1</sup> An obstetric care consensus of the American College of Obstetricians and Gynecologists (ACOG) and Society for Maternal Fetal Medicine (SMFM) in 2014 noted that the most common indications for primary cesarean delivery included: labor dystocia (34%), abnormal or indeterminate fetal heart rate tracing (23%), fetal malpresentation (17%), multiple gestation (7%) and suspected fetal macrosomia (4%).<sup>2</sup> More than 50% of these indications are non-recurrent so that a patient may be offered trial of labor after a primary cesarean. This study also noted a rapid increase in cesarean birth rates in the United States from 1996 to 2011 without clear evidence in concomitant decrease in maternal and neonatal morbidity or mortality, raising a significant concern that cesarean delivery may be overused. Hamilton and Martin found that the overall cesarean delivery rate had doubled over the last two decades from 15% to 30%.<sup>3</sup> The WHO Global Survey on Maternal and Perinatal Health in 2007-2008 reported a 27.3% cesarean delivery rate in Asia.<sup>4</sup> Data from the Philippine Obstetrical and Gynecological Society (POGS) showed a cesarean section rate of 27.8% in 2012. In our institution, the Department of Obstetrics and Gynecology reported a primary cesarean section rate of 29% in 2013 and 2014.

The steady increase in the number of cesarean deliveries has been driven by a variety of factors including the relative safety of the procedure, a decrease in trial of labor after prior cesarean delivery, decrease in vaginal breech delivery and medico-legal concerns.<sup>5</sup> Although most studies of morbidity associated with cesarean delivery focus on short-term, rather than long-term complications, women undergoing cesarean delivery are at increased risk for a variety of chronic problems, including pain, surgical adhesions and infertility or subfertility. The risk of perinatal complications and of serious long-term morbidities also increases with the number of cesarean procedures and thus is greatest in women who have undergone multiple cesareans. These morbidities range from bladder injury to obstetrical hemorrhage and other serious morbidities associated with the spectrum of placenta accreta disorders.<sup>6</sup>

Placenta accreta is a severe obstetrical complication characterized by abnormally deep attachment of the placenta, with adherence to the myometrium rather than the endometrium. The three variants of placenta accreta - accrete, increta and percreta - are distinguished from each other by the depth of placental attachment to the uterine wall. The tight adherence of the placenta to the uterine wall interferes with normal separation of the placenta from the uterus after delivery, with resultant maternal hemorrhage. Placenta accrete is probably the most clinically significant long-term maternal morbidity following cesarean delivery and is associated with life-threatening hemorrhage resulting in peripartum hysterectomy. A survey showed that blood transfusion was required in over 80% of cases and transfusion of at least 4 units blood was required in more than 40% of cases;<sup>7</sup> 82% had a prior cesarean section.<sup>8</sup> Placenta accreta is also the leading cause of peripartum hysterectomy and is also associated with increased risk for hypotensive shock, coagulopathy, ureteral damage, infections and need for second operation to control bleeding or treat infection.<sup>9</sup> Maternal death has been reported in up to 7% of cases of undiagnosed placenta accreta;<sup>10</sup> perinatal morbidity is also increased. The occurrence of other morbidities including placenta previa, severe adhesions, hysterectomy, bladder injury, post-operative anemia and blood transfusion increased as the number of cesarean deliveries increased.<sup>11</sup>

Several measures have been undertaken in order to reduce cesarean delivery rates to decrease morbidities associated with multiple cesarean deliveries. Efforts include peer reviews, audits and educational efforts to promote vaginal birth after cesarean (VBAC) in non-dystocia cases. VBAC may be a key measure in lowering the overall cesarean section rate.<sup>12</sup> In spite of the guidelines of American College of Obstetrics and Gynecology (ACOG), British Royal College of Gynecology (RCOG) and Society of Obstetricians and Gynecologists of Canada (SOGC) on the practice of VBAC, there is still low VBAC rate because of (1) provider concerns for maternal and fetal consequences of uterine rupture, (2) medico-legal concerns, (3) patient's request and (4) absence of physician that is "immediately available" during trial of labor after cesarean.<sup>13</sup>

Most research on VBAC has focused on the clinical outcomes of mothers and their infants associated with trial of labor, however, it is apparent that other factors such as “physician factor” appear to play an increasingly important role in both the choice of cesarean section and VBAC.<sup>14</sup> There have been few researches on the various factors that influence the practice of obstetricians to either offer VBAC or elective repeat cesarean section.

In an effort to determine the factors that influence the decision of obstetricians whether or not to perform VBAC, we conducted a survey in order to investigate the knowledge and attitude of obstetricians regarding VBAC and specifically, to determine:

1. The percentage of the respondents doing VBAC;
2. Their levels of knowledge of the requirements for VBAC and its complications;
3. Their attitudes towards VBAC;
4. Their reasons in performing or not performing VBAC;
5. The conditions they require in practicing VBAC; and
6. The association between the status, length of practice, residency training institution attended, area/hospital of practice with the practice of VBAC.

## Methods

This was a quantitative cross-sectional study involving a self-administered questionnaire among obstetrical consultants and residents from all over the country who attended the 2014 Annual Convention of the Philippine Obstetrical and Gynecological Society (POGS) on November 11 to 14, 2014 at the Philippine International Convention Center. The study was approved by the Ethics Review Committee.

A survey questionnaire used to assess attitude and practices among obstetricians in Australia and New Zealand<sup>15</sup> was modified to the Philippines setting. The items were developed after a focus group discussion among residents and consultants of the University of the East Ramon Magsaysay Memorial Medical Center Department of Obstetrics and Gynecology. The initial modified questionnaire with 38 items was pilot tested among 30 obstetrical residents and consultants from different institutions. The final version of the survey contained 24 items and included questions on demographic details, patient selection

for VBAC, safety of VBAC, practices regarding VBAC, reasons for doing or not doing VBAC, concerns that encourage practitioners to do VBAC and requirements in conducting VBAC. Three questions were multiple choice with multiple answers, 18 questions were multiple choice questions with single best response and three questions had the option of “others” with an instruction to specify what “others” meant. The survey was validated for content and assessed for reliability. To assess the content validity, the content validity rate (CVR) and content validity index (CVI) were computed. The internal consistency was examined using Cronbach’s alpha and its test-retest reliability was determined using SPSS.

The self-administered questionnaire was fielded among obstetrics and gynecology residents and consultants from different institutions during the POGS Annual Convention in 2014. Respondents were chosen by convenience sampling. The questionnaires were collected during the convention. Informed consent was obtained from the all the participants. A sample size of 97 respondents was computed with an estimated response rate of 33% at 95% confidence level and 10% standard error.

Data was encoded using Excel 2007 and exported to SPSS version 20. The interval reliability of the instrument was analyzed using Cronbach’s alpha. Descriptive statistics were generated using cross tabulation and chi-square was used to determine association between the variables.

## Results

Four hundred fifty delegates were given questionnaires, of which 328 answered and were enrolled in the study for a 73% response rate. These included 187 consultants and 141 residents. More than 75% of the respondents practiced VBAC (250 vs 76). Majority (44.9%) finished residency in a government institution, while 33.5% came from private hospitals and a minority (21.6%), from university hospitals. More than half of the respondents (57.9%), including all the residents, had been practicing less than five years. Majority of the respondents practiced in the National Capital Region (66.5%); 34.5% had their primary practice in a government hospital, 42.1% in a private hospital and 16.5% in a university hospital. Eighteen practiced in both government and private hospitals while five had

their primary practice in both university and private hospitals. The characteristics of the respondents are shown in Table 1.

The second objective of the study was to describe the level of knowledge of the respondents regarding the requirements for VBAC in women with one previous low-transverse cesarean section and its possible complications. Table 2 summarizes their knowledge on the requirements for VBAC; Table 3 summarizes their knowledge of the qualifications of a low-risk VBAC candidate and Table 4 summarizes their knowledge on the complications of VBAC. Items that showed a significant association are marked with an asterisk.

Table 2 shows that more obstetricians practicing VBAC correctly identified four out of five requirements for VBAC than the non-practitioners. The proportion of VBAC practitioners who answered correctly ranged from 79.6% to 95.2%, while the non-practitioners had less than 80% in three items. The difference was significant in two items where the VBAC group scored higher – malpresentation (OR =

4.20,  $p < 0.01$ ) and fetal distress (OR = 4.34,  $p < 0.01$ ). The difference was significant in the item on cephalopelvic disproportion where the non-practicing group scored higher. Table 3 shows that more VBAC practitioners correctly identified the qualifications for a low risk VBAC candidate than the non-practitioners. The difference was significant in two items – previous transverse uterine incision (OR = 1.8,  $p = 0.04$ ) and prior vaginal delivery (OR 3.09,  $p < 0.01$ ). Table 4 shows that the more VBAC practitioners identified two (uterine rupture/dehiscence and failed trial of labor) out of four complications of VBAC while more non-practitioners identified the other two (peripartum hysterectomy and hemorrhage). The difference was significant for failed trial of labor (OR = 3.01,  $p < 0.01$ )

The third objective was to determine the attitude of the respondents towards VBAC. The responses were categorized into positive or negative attitudes. With regards to the question on safety and encouraging VBAC in their practice, an answer of “strongly agree” or “agree” to positively-worded statements was considered a positive response. However, in terms of time-allotted to VBAC, compensation, monitoring and convenience, a positive response was when the respondent answered “strongly disagree” or “disagree”. Items that showed a significant association are marked with an asterisk.

Table 4 shows that more VBAC practitioners had a positive response in all items except for “time-consuming” and “not well-compensated”. The difference was significant in five out of seven items. Table 5 shows that attitudes and practice of the respondents to VBAC candidates in active labor and not in active labor. VBAC practitioners were more likely to do a trial of labor after cesarean (TOLAC) over a repeat cesarean section than the non-practitioners (OR = 8.77,  $p < 0.01$ ) in a VBAC candidate in active labor. Majority of both VBAC practitioners and non-practitioners would perform a repeat cesarean section in a VBAC candidate not in active labor, however, the VBAC practitioners were less likely to do so (OR 0.28,  $p < 0.01$ ).

The fourth objective was to identify the reasons of the respondents for doing or not doing VBAC. The main reason non-practitioners do not practice VBAC is fear of the complications (84.2%) as seen in Table 7. Low cost (81.6%), shorter recovery time (80.8%) and fewer long-term complications (64.4%)

**Table 1.** Demographic characteristics of respondents.

Characteristic	Frequency (%)
<b>Status</b>	
Consultant	187 (57)
Resident	141 (43)
<b>Residency training</b>	
Government	147 (44.9)
Private	110 (33.5)
University	71 (21.6)
<b>Length of practice (years)</b>	
< 5	190 (57.9)
5-10	53 (16.2)
11-15	38 (11.6)
16-20	17 (5.2)
> 20	30 (9.1)
<b>Place of practice</b>	
NCR	218 (66.5)
Non-NCR	110 (33.5)
<b>Primary practice</b>	
Government	113 (34.4)
Private	138 (42.1)
University	54 (16.5)
Government & private	18 (5.5)
University & private	5 (1.5)

were the most cited reasons by practitioners of VBAC. More than half of the practitioners also cited two other reasons as seen in Table 8.

The fifth objective of this study was to explore the conditions required by practitioners to do VBAC. As shown in Table 9 at least 85% cited availability of blood for transfusion (86.4%), fetal monitoring (93.2%), anesthesiologist (98%) and pediatrician

(98%), in a level II or III hospital (98.8%) with operating room (99.6%).

The last objective was to try to determine the factors that influenced the practice of VBAC. Table 10 shows that primary practice in a university hospital was the only significant factor in the practice of VBAC (OR = 2.59, p = 0.02).

**Table 2.** Percentage of respondents who answered the correct requirements of VBAC.

Requirement	Practicing VBAC (%)	Not practicing VBAC (%)	Odds ratio	p-value
VBAC is offered to a woman with a history of vaginal delivery	238 (95.2)	68 (89.5)	2.33	0.10
VBAC is not offered to women with CS secondary to cephalopelvic disproportion	225 (90.0)	74 (97.4)	0.24	0.04*
VBAC is offered to a woman with CS secondary to malpresentation	221 (88.4)	49 (64.5)	4.2	<0.01*
VBAC is offered to a woman with CS secondary to fetal distress	231 (92.4)	56 (73.7)	4.34	<0.01*
VBAC is offered to women with a 2-year interval between pregnancies	199 (79.6)	56 (73.7)	1.4	0.27

**Table 3.** Percentage of respondents who answered the correct qualifications for a low risk VBAC candidate.

Qualification	Practicing VBAC (%)	Not practicing VBAC (%)	Odds ratio	p-value
Patient with previous transverse uterine incision	194 (77.6)	50 (65.8)	1.80	0.04*
Patient who had prior vaginal delivery	237 (94.8)	65 (85.5)	3.09	<0.01*
Patient with appropriate counselling	204 (81.6)	57 (75.0)	1.48	0.21
Patient who went into spontaneous labor	207 (82.8)	59 (77.6)	1.39	0.31
Fetus with an EBW less than 4000g	153 (61.2)	40 (52.6)	1.42	0.18

**Table 4.** Percentage of respondents who answered the correct complications associated with VBAC.

Complication	Practicing VBAC (%)	Not practicing VBAC (%)	Odds ratio	p-value
Uterine rupture/dehiscence	241 (96.4)	73 (96.1)	1.10	1.00
Peripartum hysterectomy	164 (65.6)	52 (68.4)	0.89	0.65
Hemorrhage and transfusion	200 (80)	64 (84.2)	0.75	0.41
Failed trial of labor	215 (86)	51 (67.1)	3.01	<0.01*

**Table 5.** Percentage of respondents with a positive response towards VBAC.

	Practicing VBAC (%)	Not practicing VBAC (%)	Odds ratio	p-value
VBAC should be actively encouraged in a low risk candidate	218 (87.2%)	59 (77.6%)	1.96	0.04*
VBAC is a safe option for the mother	198 (79.2%)	39 (51.3%)	3.61	<0.01*
VBAC is a safe option for the infant	191 (76.4%)	40 (52.6%)	2.91	<0.01*
VBAC is time consuming	84 (33.6%)	30 (39.5%)	0.78	0.35
VBAC is not well-compensated	158 (63.2%)	60 (78.9%)	0.46	0.01*
VBAC requires close monitoring	54 (21.6%)	12 (15.8%)	1.47	0.27
VBAC is inconvenient	145 (58%)	20 (26.3%)	3.87	<0.01*

**Table 6.** Attitude and practice of respondents when presented with a VBAC candidate.

	Practicing VBAC (%)	Not practicing VBAC (%)	Odds ratio	p-value
When a VBAC candidate goes into active labor:				
A. Do TOLAC*	198 (79.2%)	23 (30.3%)	8.77	<0.01*
B. Repeat CS	52 (20.8%)	53 (69.7%)		
When a VBAC candidate is not in active labor:				
A. Repeat CS	192 (76.8%)	70 (92.1%)	0.28	<0.01*
B. Induce and do TOLAC*	58 (23.2%)	6 (7.9%)		

\* TOLAC - trial of labor after cesarean

**Table 7.** Reasons of non-practitioners for not doing VBAC.

Reasons	Frequency (%)
Resources for VBAC not available at my primary delivery hospital	20 (26.3)
I fear the complications of VBAC	64 (84.2)
I practice in a hospital without an obstetrician on 24-hour duty	11 (14.5)
I feel I do not have the expertise required to perform VBAC	12 (15.8)

**Table 8.** Reasons of practitioners for doing VBAC.

Reasons	Frequency (%)
Patient's request	165 (66.0)
Low cost for the patient	204 (81.6)
Fewer long term complications	161 (64.4)
Shorter recovery time for the patient	202 (80.8)
Self-fulfillment	142 (56.8)

**Table 9.** Requirements of practitioners for doing VBAC.

Requirement	Frequency (%)
Level II or Level III hospital	247 (98.8)
Anesthesiologist present	245 (98.0)
Pediatrician present	245 (98.0)
Operating room available for use	249 (99.6)
Electronic fetal heart rate monitoring	233 (93.2)
Routine preparation of blood	216 (78.5)
Use of epidural anesthesia	184 (73.6)
Oxytocin to augment labor	94 (37.6)

**Table 10.** Factors that influence the practice of VBAC.

Factor	Practicing VBAC (%)	Not practicing VBAC (%)	Odds ratio	p-value
Status				
Consultant	137 (54.8%)	48 (63.2%)	0.71	0.20
Resident	113 (45.2%)	28 (36.8%)		
Primary practice				
University hospital	52 (20.8%)	7 (9.2%)	2.59	0.02*
Private/government hospital	198 (79.2%)	69 (90.8%)		
Length of practice				
10 years or less	185 (74%)	58 (76.3%)	0.88	0.67
11 years or more	65 (26%)	18 (23.7%)		
Place of practice				
NCR	163 (65.2%)	54 (71.1%)	0.76	0.34
Non-NCR	87 (34.8%)	22 (28.9%)		

## Discussion

The study documented that respondents have a high level of awareness regarding the requirements for VBAC, qualifications for a low-risk VBAC candidate and the possible adverse outcomes of VBAC. With regards to attitude, there is generally a positive view of VBAC and this view may be predicted by the respondents who practice VBAC. However, both VBAC and non-VBAC practitioners think they are not well-compensated for the procedure. One important finding is that more VBAC practitioners perceive the procedure as inconvenient as compared to the non-VBAC group. With regards to managing low-risk patients with one previous CS in spontaneous labor VBAC practitioners prefer doing trial of labor as compared to non-VBAC practitioners who would opt to do repeat cesarean section. In managing

patients not in active labor both groups opt to do repeat cesarean section.

It is however interesting to note that in some items non-VBAC practitioners had higher scores. Specifically, this is demonstrated in items that seem to point against the practice of VBAC. One item about the requirements - VBAC is not offered to women with prior CS secondary to cephalopelvic disproportion; the other two are related to the complications of VBAC (peripartum hysterectomy and hemorrhage), albeit these latter two did not produce a significant association. On reflection, these may point to reasons why certain obstetricians avoid VBAC: the possibly exaggerated view of the negative aspects of VBAC.

The results show a generally positive view of VBAC, and this may be consistent with the

respondent's inclination to practice VBAC. VBAC is believed to be safe for both the mother and the neonate, and should a VBAC low-risk candidate present herself to the respondents, they would actively encourage the VBAC option. For all these attitudes, VBAC practitioners are more likely to agree. That VBAC is not a well-compensated procedure is prevalent in both groups, but significantly more so in non-practitioners. Practitioners of VBAC are more likely to describe VBAC as inconvenient even though they practice it. This may indicate that the motivation to practice VBAC is something outside personal preference; this may be related to an awareness and/or adherence to a set of guidelines. The reason for this situation is outside the purview of the questionnaire and may be worth investigating at the institutional level.

The responses of the non-practitioners on the reasons they do not practice VBAC seem to show some dissonance. After all, if one has the expertise, this should not increase one's fear of possible complications because part of that expertise should include the management of those complications. Perhaps this is the crux of the problem. One possibility is the mindset that expertise may not be enough once complications set in and even if the risk of complications is low once the complications happen they are usually severe. Another possibility is that perhaps the respondents do not feel "safe" or they may fear litigation consequences brought about by the possible complications of VBAC, thus a strong fear of these complications. Wells found that non-VBAC providers do not offer VBAC because they are unwilling to accept the risk of adverse outcomes and they fear the medico-legal concerns associated with VBAC.<sup>13</sup> On the other hand, the practitioners' main reasons for doing VBAC are patient-centered: lower cost, shorter recovery time and fewer long-term complications. While patient benefits were prioritized, the result that more than half of those who perform VBAC find self-fulfillment in the practice of VBAC is encouraging.

Those who practice VBAC require that they so in a Level II or III hospital with an operating room ready for use should the need arise. Majority also deemed it necessary to have an anesthesiologist and a pediatrician present. The availability of electronic fetal monitoring is also favored possibly for early detection of abnormal fetal heart rate. Only 78% of

the respondents routinely prepare blood and 67% use epidural anesthesia. Rowbottom found that obstetricians avoid giving epidural anesthesia due to concerns that epidural anesthesia might mask the signs and symptoms associated with uterine rupture.<sup>16</sup> Only 33% of the respondents use oxytocin (Syntocinon®, Novartis Healthcare) to augment labor. This may be due to findings that the use of oxytocin to augment labor increases the risk of uterine rupture two to three-fold and increases the risk of cesarean section by one and a half times.<sup>17</sup> These findings are similar to the survey results of Dodd and Crowther in Australia and New Zealand.<sup>15</sup>

The results of the study may be applicable only to the population from which the respondents were recruited – attendees of the 2014 POGS Annual Convention. The study was also limited by the self-administered nature of the survey because respondents may have had different interpretations of the questions which could not be clarified with the investigator. The short time allotted for data collection and the convention setting may have influenced the quality of the responses.

Majority of the respondents were VBAC practitioners and believed that it had a shorter recovery for the patients and lower cost as compared to a cesarean section. Those who practice require that they do it in a Level II or III institution with an anesthesiologist and pediatrician present. They also require the use of electronic fetal monitoring and a readily available operating room. Around 75% do routine preparation of blood for transfusion and 66% percent use epidural anesthesia. Less than half of the respondents used oxytocin to augment labor. Most of the non-practitioners answered that the fear of the possible complications of VBAC discouraged them from practicing VBAC. Lastly, it was noted that the only factor that might significantly predict the practice of VBAC is the location of the respondent's primary practice, specifically the type of hospital they practice in. Respondents practicing in a university hospital, compared to a private or government hospital were more likely to choose VBAC over a repeat elective cesarean section.

### **Acknowledgement**

The author is sincerely grateful to her adviser, Dr. Teresa Diana B. Bongala, FPOGS, for her valuable inputs and support.

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# Efficacy of apple cider vinegar as an adjunct to 2% ketoconazole shampoo in the treatment of tinea versicolor: A randomized controlled trial

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## Abstract

**Introduction** Tinea versicolor is prevalent in the Philippines and chronically recurrent. Given the limitations of topical treatments like ketoconazole, the anti-fungal property of apple cider vinegar was explored. The purpose of this study was to determine the efficacy and safety of apple cider vinegar as an adjunct to 2% ketoconazole shampoo compared to 2% ketoconazole shampoo alone in treating tinea versicolor.

**Methods** Twenty patients with tinea versicolor were randomly assigned to receive 2% ketoconazole shampoo and apple cider vinegar or 2% ketoconazole shampoo alone over a 5-day intervention. Efficacy was assessed in terms of clinical signs and symptoms (pruritus/itchiness, scaling and erythema), and laboratory parameters (Wood's lamp examination and 10% KOH Test). Evaluation was done at baseline and on Days 6, 13, 20, and 27.

**Results** A comparison of the measures of effectiveness between the two groups did not yield significant differences. However, the percentage of treatment success favored the apple cider vinegar-ketoconazole group where the clinical signs and symptoms and laboratory parameters were negative in all the subjects compared to the control group. The symptoms also resolved faster in the apple cider vinegar-ketoconazole group. Mild side effects like burning sensation, extensive dryness, and increased itchiness were observed in both groups.

**Conclusion** Apple cider vinegar may be considered as a safe and potential adjunct to 2% ketoconazole shampoo in the treatment of tinea versicolor.

**Key words:** ketoconazole, apple cider vinegar, tinea versicolor

In the global scale of disease, skin problems are given the least priority compared to diseases that

cause significant mortality. However, skin diseases are generally common in primary care settings especially in tropical countries such as the Philippines. Fungal infections have been the second leading cause of dermatological clinical consultation in the Philippines since 2000, with a prevalence of 12.98%; tinea versicolor accounted for 25.43% of such cases.<sup>1</sup> Tinea versicolor is a benign fungal infection characterized by hypo- or hyperpigmentation which may be associated with itching and is usually caused by *Malassezia furfur*.

Topical azole antifungals, such as ketoconazole, have been proven to be effective in the treatment of

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Presented in the 17th Annual Research Forum, February 17, 2015, University of the East Ramon Magsaysay Memorial Medical Center, Quezon City

tinea versicolor. They are synthetic derivatives of imidazole, which interfere with the synthesis of triglycerides and phospholipids by blocking fungal cytochrome P450, altering the cell membrane permeability in susceptible fungi. Ketoconazole shampoo 2% was selected as primary treatment due to its cost-effectiveness in the treatment of tinea versicolor compared to selenium sulfide shampoo and sulfur-salicylic acid soap.<sup>2</sup> However, ketoconazole is deficient in restoring normal pigmentation. Nonetheless, the persistence of hypo- or hyperpigmentation does not necessarily indicate treatment failure. It is important to note that recurrence of the disease is also expected since the organism causing the disease is considered as a normal skin flora.

Due to the limitations of currently available interventions in the treatment of tinea versicolor, there is a need to explore other potential remedies. Apple cider vinegar has been suggested as a home remedy for fungal infections but it lacks supporting studies. Our literature search revealed only one in-vitro experimental study that explored its anti-fungal properties; this was on *Candida albicans*.<sup>3</sup> The anti-fungal properties of apple cider vinegar are derived from its components malic acid and acetic acid. Malic acid has an inhibitory effect on fungi and bacteria through pH manipulation,<sup>3</sup> whereas acetic acid inhibits carbohydrate metabolism resulting in subsequent death of the microorganism.<sup>4</sup> Apple cider vinegar has been utilized against *C. albicans*<sup>3</sup> which belongs to the same kingdom as *M. furfur* and both are part of the human indigenous microflora. In addition, *M. furfur* and *C. albicans* are the most commonly encountered fungi causing superficial mycoses.<sup>5</sup> Moreover, *C. albicans* has a gene called LIP1, which encodes a lipase similar to *M. furfur*'s MfLIP1. Lipases and phospholipases have been shown to contribute to *M. furfur*'s and *C. albicans*' morphological transition, colonization, cytotoxicity and penetration of the host.<sup>4</sup> With the connections made between these two microorganisms and the promising properties of apple cider vinegar, further exploration of its effects as a potential remedy against *M. Furfur* is essential. This study aimed to evaluate the efficacy and safety of apple cider vinegar as an adjunct to 2% ketoconazole shampoo compared to 2% ketoconazole shampoo alone in the treatment of tinea versicolor.

## Methods

The study was a randomized controlled trial comparing the efficacy and safety of apple cider vinegar as an adjunct to ketoconazole compared to ketoconazole alone for the treatment of patients with tinea versicolor from seven barangays in San Juan and Quezon City. The interventions were given for 5 days and the subjects were monitored for one month.

The subjects included in this study were Filipino residents of the identified barangays, either male or female, aged 10 to 60 years, who had at least one tinea versicolor lesion in any part of the body, diagnosed by the trained researchers through (1) clinical assessment, as having pruritus/itching, scaling, and erythema; (2) Wood's Lamp examination, with findings of yellowish green or golden yellow fluorescence; and (3) 10% KOH test, with a characteristic microscopic finding of hyphae and spores (spaghetti and meatball appearance) of *Malassezia furfur*. The researchers excluded patients with tinea versicolor who had other skin diseases, especially other fungal infections; those with a history of hypersensitivity to any of the study substances; those currently receiving or had any systemic or topical antimycotic therapy within a month prior to the start of the study; those with any serious concomitant illness like diabetes mellitus, renal failure, or immunosuppressive diseases; pregnant or lactating women; and patients currently on immunosuppressive therapy.

Diagnosis through culture of skin scrapings was not done due to time constraints, variability of its results and difficulty in discriminating the different *Malassezia spp.*<sup>6,7</sup> Although hyper- or hypo-pigmentation is common among patients with tinea versicolor, this was not used to measure the outcome of treatment because its resolution may take months to years after the organism has been cleared.<sup>8</sup>

The computed sample size was 13 subjects for each group for a total of 26 subjects. The subjects were recruited through house-to-house interview with the assistance of the barangay health workers in seven different communities.

Initial clinical assessment was performed. Each lesion was grossly examined to detect presence and severity of pruritus, scaling, and erythema. These signs and symptoms were rated using a 4-point scale which was based on a severity rating scale utilized in a related study.<sup>10</sup> Erythema and scaling were rated as follows: 0 = absent, 1 = minimal involvement, 2 =

distinctive presence, 3 = marked/intense. On the other hand, pruritus was rated and defined as: 0 = absent, 1 = at least occasionally present but seldom bothersome, 2 = present and bothersome some of the time, 3 = present and so bothersome that the patient thinks about it often. With the consent of the subjects, lesions were photographed using a camera with 8-megapixel lens for further assessment and documentation. For better documentation, a body mapping diagram was used to plot the exact locations of the lesion/s.

Aside from evaluation for the presence of the clinical manifestations stated above, Wood's light was also used as an aid in the diagnosis of tinea versicolor.<sup>11</sup> It was shone onto the subjects' skin to determine whether the lesion/s fluoresced a yellowish green or golden yellow hue which signified the presence of *Malassezia furfur*. A negative result for Wood's light examination was graded 0 and positive result was graded 1. Lastly, the researchers collected scales from the subjects, particularly from the active border of the lesion/s, using sterile surgical blades and subjected these to 10% KOH test to confirm the diagnosis. A negative result was graded 0 and positive result was graded 1.

Subjects who fulfilled the inclusion-exclusion criteria and consented to join the study were randomly assigned to receive either ketoconazole and apple cider vinegar, or ketoconazole alone. Block randomization was performed after 20 subjects had been recruited. Allocation concealment was done to avoid selection bias.

A commercially available brand of 2% ketoconazole (Nizoral<sup>®</sup>, Johnson & Johnson, Philippines) and apple cider vinegar (Heinz<sup>®</sup>, H.J. Heinz Company, USA) were used in this research. The stock concentration of the apple cider vinegar was 5%; this was diluted it to come up with a 0.5% concentration, the effective dose against *Candida albicans* in a previous study.<sup>3</sup> The desired dilution of the apple cider vinegar was attained by mixing 100 ml of apple cider vinegar with 900 ml of distilled water. The one liter solution was sufficient for the 5-day requirements of all the subjects in the treatment group. The solution was stored in a cool, dry place. For subjects in the treatment group, body parts with tinea versicolor lesions were damped with water; 2 ml of 2% ketoconazole shampoo was lathered per body part affected and left in place for ten minutes then rinsed with water. The area was pat dried and a

small amount (5ml) of apple cider vinegar solution was poured on a cotton ball. The wet cotton ball was spread onto the lesion and the apple cider vinegar solution was left in place for ten minutes then rinsed with water. For the control group the same procedure was done, but it only included the application of 2% ketoconazole shampoo. Application of the drug and adjunct substance was done once a day by the investigators themselves on days 1 to 5 of the study. The test substance/s was/were applied during the time of the day that was most convenient for each patient. Treatment duration was based on the suggested administration of topical ketoconazole. The short treatment of 5 days was preferred against the classical treatment duration of 14 days because of its cost-effectiveness in treating tinea versicolor.<sup>12</sup> After intervention, all subjects were instructed to not rinse the treated areas nor take a bath until at least one hour had elapsed.

Progress of treatment was monitored on days 6, 13, 20, and 27, by rating the clinical signs and symptoms using the same 4-point scale utilized during the recruitment process. Both Wood's lamp examination and 10% KOH test were rated 0 if they yielded negative results and 1 if positive. Occurrence of adverse events was noted during the entire intervention and monitoring phase.

Treatment success was defined as a negative KOH test (absence of hyphae and spores), negative yellowish green or golden yellow fluorescence on Wood's lamp, and a severity score of 0 for erythema, pruritus/itching, and scaling, and absence of adverse events. Treatment failure was defined as the presence of any of the following: positive KOH test, positive yellowish green or golden yellow fluorescence on Wood's lamp, severity score on the clinical signs and symptoms of  $\geq 1$  for erythema, pruritus/itching, and scaling, and presence of adverse events leading to the subject's discontinuation of participation.

The statistical analysis was done using SPSS version 22.0. Descriptive analysis and percentages were reported for the variables. Fisher's exact test was used to compare the gender and efficacy of treatment. Independent t-test was likewise employed to compare the numerical data, age and duration of the disease. All subjects were fully informed about the objectives, risks, and benefits of the study and were asked to sign an informed consent prior to the interview and history taking. Simplified, age-appropriate

information sheets were utilized to explain the study to subjects under 18 years and their assent was obtained, and written informed consent was given on their behalf by a parent or guardian. The protocol was approved by the UERMMCI Ethics Review Committee.

## Results

A total of 20 patients were enrolled in the study. Four patients eventually withdrew while 16 completed the entire treatment and monitoring period. Eight patients completed the study in each group. Two patients in the apple cider vinegar-ketoconazole group and one patient in the control group withdrew due to inability to comply with follow up requirements. One patient in the control group withdrew after day 13 when he transferred residence.

The two groups were comparable in terms of sex distribution and duration of disease as seen in Table 1. However, the apple cider vinegar-ketoconazole group was younger than the control group. Table 2 shows the clinical evaluation of the two groups at baseline. Scaling was recorded in all patients in both groups. Pruritus was noted in 90% of the patients in the apple cider vinegar-ketoconazole group compared to 80% in the ketoconazole group. Erythema was recorded in 20% in the apple cider vinegar-ketoconazole group compared to 30% in the ketoconazole group. All the patients in both groups tested positive in the wood's light and KOH tests.

On day 6 of the study (Table 3), more patients had absence of scaling (50% vs 11%) and pruritus (75% vs 67%) in the apple cider vinegar-ketoconazole group compared to the control group. Erythema was absent in all of the patients in the apple cider vinegar-ketoconazole group compared to the seven patients

in the control group. More patients in the apple cider vinegar-ketoconazole group were negative on Wood's light (88% vs 56%) and KOH testing (75% vs 44%) compared to the control group. The incidence of burning sensation was similar in the treatment and ketoconazole groups. No one reported increased itchiness in the treatment group compared to one patient in the ketoconazole group. No one reported extensive dryness in both groups.

On day 13 of the study (Table 4), more patients had absence of scaling in the apple cider vinegar-ketoconazole group compared to the control group (88% vs 78%). The absence of pruritus was similar in the apple cider vinegar-ketoconazole group and control group. Erythema was absent in all patients in both groups. More patients in the apple cider vinegar-ketoconazole group were negative on Wood's light (75% vs 56%) compared to the control group. One patient in the treatment group was positive on KOH test. None of the patients in both groups reported burning sensation. There were no reports of increased itchiness in the treatment group compared to one patient in the ketoconazole group. The two groups had similar results in terms of extensive dryness.

On day 20 of the study (Table 5), both apple cider vinegar-ketoconazole and ketoconazole groups had similar findings in terms of absence of scaling and erythema. However, there were more patients who reported absence of pruritus in the apple cider vinegar-ketoconazole group compared to the control group (88% vs 67%). All of the patients in the apple cider vinegar-ketoconazole group were negative on Wood's light and KOH testing while one patient in the ketoconazole group was still positive on both tests. None of the subjects in both treatment and control groups reported burning sensation, increased itchiness or extensive dryness.

**Table 1.** Baseline characteristics of apple cider vinegar-ketoconazole and ketoconazole groups.

Demographic characteristics	Apple cider + ketoconazole	Ketoconazole	P value
Age (years; mean ± SD)	18.1 ± 7.5	35.2 ± 17.04	0.01*
Sex			
Male	8 (80%)	7 (70%)	1.00**
Female	2 (20%)	3 (30%)	
Duration of disease (years; mean ± SD)	2.47 ± 5.5	2.81 ± 3.2	0.87*

\* T-test

\*\* Fisher's exact test

**Table 2.** Baseline clinical and laboratory evaluation of apple cider vinegar-ketoconazole and ketoconazole groups.

Parameters	Apple Cider + Ketoconazole	Ketoconazole	P value
<b>Scaling</b>			
Absent	0 (0%)	0 (0%)	— <sup>b</sup>
Present	10 (100%)	10 (100%)	
Minimal involvement	8 (80%)	8 (80%)	
Distinctive presence	2 (20%)	1 (10%)	
Marked/intense	0 (0%)	1 (10%)	
<b>Pruritus</b>			
Absent	1 (10%)	2 (20%)	1.000 <sup>a</sup>
Present	9 (90%)	8 (80%)	
At least occasionally present but seldom bothersome	8 (80%)	6 (60%)	
Present and bothersome some of the time	1 (10%)	1 (10%)	
Present and so bothersome that the patient thinks about it often	0 (0%)	1 (10%)	
<b>Erythema</b>			
Absent	8 (80%)	7 (70%)	1.000 <sup>a</sup>
Present	2 (20%)	3 (30%)	
Minimal Involvement	2 (20%)	2 (20%)	
Distinctive presence	0 (0%)	1 (10%)	
Marked/intense	0 (0%)	0 (0%)	
<b>Wood's Light Testing</b>			
Negative	0 (0%)	0 (0%)	— <sup>b</sup>
Positive	10 (100%)	10 (100%)	
<b>10% KOH Testing</b>			
Negative	0 (0%)	0 (0%)	— <sup>b</sup>
Positive	10 (100%)	10 (100%)	

a Fisher's exact test

-b No statistics are computed because results at baseline are constant

**Table 3.** Clinical and laboratory evaluation of apple cider vinegar-ketoconazole and ketoconazole groups on day 6.

Parameters	Apple Cider + Ketoconazole	Ketoconazole	P value <sup>a</sup>
<b>Scaling</b>			
Absent	4 (50%)	1 (11%)	0.131
Present	4 (50%)	8 (89%)	
Minimal involvement	4 (50%)	8 (89%)	
Distinctive presence	0 (0%)	0 (0%)	
Marked/intense	0 (0%)	0 (0%)	
<b>Pruritus</b>			
Absent	6 (75%)	6 (67%)	1.000
Present	2 (25%)	3 (33%)	
At least occasionally present but seldom bothersome	2 (25%)	2 (22%)	
Present and bothersome some of the time	0 (0%)	1 (11%)	
Present and so bothersome that the patient thinks about it often	0 (0%)	0 (0%)	
<b>Erythema</b>			
Absent	8 (100%)	7 (78%)	0.471
Present	0 (0%)	2 (22%)	
Minimal Involvement	0 (0%)	2 (22%)	
Distinctive presence	0 (0%)	0 (0%)	
Marked/intense	0 (0%)	0 (0%)	
<b>Wood's Light Testing</b>			
Negative	7 (88%)	5 (56%)	0.294
Positive	1 (12%)	4 (44%)	
<b>10% KOH Testing</b>			
Negative	6 (75%)	4 (44%)	0.364
Positive	2 (25%)	5 (56%)	
<b>Adverse Effects</b>			
<b>(1) Burning sensation</b>			
Negative	7 (88%)	8 (89%)	1.000
Positive	1 (12%)	1 (11%)	
<b>(2) Increased Itchiness</b>			
Negative	8 (100%)	8 (89%)	1.000
Positive	0 (0%)	1 (11%)	
<b>(3) Extensive dryness</b>			
Negative	8 (100%)	9 <sup>a</sup> (100%)	— <sup>b</sup>
Positive	0 (0%)	0 <sup>a</sup> (0%)	

a Fisher's exact test

-b No statistics are computed because results at baseline are constant

On Day 27 of the study (Table 6), all the patients in the apple cider vinegar-ketoconazole group had absence of scaling compared to one patient in the control group. All the patients in the apple cider vinegar-ketoconazole group reported absence of pruritus while five patients in the ketoconazole group had pruritus. All the patients reported absence of erythema in both groups. All the patients in the apple cider vinegar-ketoconazole group were negative on Wood's light while one patient in the control group was positive. All patients in both groups were negative on KOH test. As noted during the previous week, none of the subjects in both treatment and control groups reported burning sensation, increased itchiness or extensive dryness.

A greater percentage of resolution each week was observed in the apple cider vinegar-ketoconazole

group compared to the control group. Complete resolution of the three clinical parameters (pruritus, erythema and scaling) was achieved earlier in the apple cider vinegar-ketoconazole group than in the control group. Erythema was the first symptom to resolve completely - earlier in the apple cider vinegar-ketoconazole group and sustained in both groups until the end of the study. Pruritus and scaling, on the other hand, resolved completely only in the apple cider vinegar-ketoconazole group by the end of the study. These show that the resolution of signs and symptoms were faster in the apple cider vinegar-ketoconazole group than in the control group.

There was no significant difference between the apple cider vinegar-ketoconazole and ketoconazole groups in terms of scaling, pruritus, erythema, Wood's Lamp testing, 10% KOH testing, and adverse

**Table 4.** Clinical and laboratory evaluation of apple cider vinegar-ketoconazole and ketoconazole groups on day 13.

Parameters	Apple Cider + Ketoconazole	Ketoconazole	P value <sup>a</sup>
<b>Scaling</b>			
Absent	7 (88%)	7 (78%)	1.000
Present	1 (12%)	2 (22%)	
Minimal involvement	0 (0%)	2 (22%)	
Distinctive presence	1 (12%)	0 (0%)	
Marked/intense	0 (0%)	0 (0%)	
<b>Pruritus</b>			
Absent	7 (88%)	8 (89%)	1.000
Present	1 (12%)	1 (11%)	
At least occasionally present but seldom bothersome	1 (12%)	1 (11%)	
Present and bothersome some of the time	0 (0%)	0 (0%)	
Present and so bothersome that the patient thinks about it often	0 (0%)	0 (0%)	
<b>Erythema</b>			
Absent	8 (100%)	9 (100%)	_b
Present	0 (0%)	0 (0%)	
Minimal involvement	0 (0%)	0 (0%)	
Distinctive presence	0 (0%)	0 (0%)	
Marked/intense	0 (0%)	0 (0%)	
<b>Wood's Light Testing</b>			
Negative	6 <sup>a</sup> (75%)	5 (56%)	0.620
Positive	2 <sup>a</sup> (25%)	4 (44%)	
<b>10% KOH Testing</b>			
Negative	7 (88%)	9 (100%)	0.471
Positive	1 (12%)	0 (0%)	
<b>Adverse Effects</b>			
<b>(1) Burning sensation</b>			
Negative	8 (100%)	9 (100%)	_b
Positive	0(0%)	0 (0%)	
<b>(2) Increased Itchiness</b>			
Negative	8 (100%)	8 (89%)	1.000
Positive	0 (0%)	1 (11%)	
<b>(3) Extensive dryness</b>			
Negative	7 (88%)	8 (89%)	1.000
Positive	1(12%)	1 (11%)	

a Fisher's exact test

-b No statistics are computed because results at baseline are constant

events on days 6, 13, 20 and 27 as seen in Tables 3, 4, 5 and 6, respectively. At the end of the four-week clinical evaluation, eight subjects in the apple cider vinegar-ketoconazole group and seven in the ketoconazole group met the criteria for treatment success. One subject in the control group was considered as a treatment failure due to persistence of mild scaling, pruritus, and a positive result on Wood's light. Using the Fisher's exact test, results showed that there was no significant difference regarding the response between the two groups as seen in Table 7.

### Discussion

There are numerous accounts on the use of apple cider vinegar as home remedy for fungal skin infections,<sup>1</sup> however, its safety and efficacy has not been sufficiently studied.<sup>2</sup>

This study showed that the treatment and control groups are comparable in terms of sex and disease duration. The duration of disease in our subjects is consistent with the findings of Abdulah that the duration of clinically obvious lesions in tinea versicolor may vary from one week up to 20 years.<sup>13</sup> The lesions may last months to years and may fade during the cooler months of the year. Duration as long as 35 years has been reported.<sup>13</sup> Despite randomization, the ketoconazole group turned out to be significantly older, probably because of the small sample. Nevertheless, a previous study showed no correlation between the effectiveness of treatment with ketoconazole and the age of subjects<sup>17</sup> as well as with gender, hyperhidrosis, greasiness of the skin and involved body area.

The use of apple cider vinegar as an adjunct to ketoconazole showed a trend toward the resolution

**Table 5.** Clinical evaluation and laboratory evaluation of apple cider vinegar-ketoconazole and ketoconazole groups on day 20.

Parameters	Apple Cider + Ketoconazole	Ketoconazole	P value <sup>a</sup>
<b>Scaling</b>			
Absent	7 (88%)	7 (88%)	_b
Present	1 (12%)	1 (12%)	
Minimal involvement	1 (12%)	1 (12%)	
Distinctive presence	0 (0%)	0 (0%)	
Marked/intense	0 (0%)	0 (0%)	
<b>Pruritus</b>			
Absent	7 (88%)	6 (67%)	1.000
Present	1 (12%)	2 (25%)	
At least occasionally present but seldom bothersome	1 (12%)	2 (25%)	
Present and bothersome some of the time	0 (0%)	0 (0%)	
Present and so bothersome that the patient thinks about it often	0 (0%)	0 (0%)	
<b>Erythema</b>			
Absent	8 (100%)	8 (100%)	_b
Present	0 (0%)	0 (0%)	
Minimal involvement	0 (0%)	0 (0%)	
Distinctive presence	0 (0%)	0 (0%)	
Marked/intense	0 (0%)	0 (0%)	
<b>Wood's Light Testing</b>			
Negative	8 (100%)	7 (88%)	1.000
Positive	0 (0%)	1(12%)	
<b>10% KOH Testing</b>			
Negative	8 (100%)	7 (88%)	1.000
Positive	0 (0%)	1(12%)	
<b>Adverse Effects</b>			
<b>(1) Burning sensation</b>			
Negative	8 (100%)	8 (100%)	_b
Positive	0 (0%)	0 (0%)	
<b>(2) Increased Itchiness</b>			
Negative	8 (100%)	8 (100%)	_b
Positive	0 (0%)	0 (0%)	
<b>(3) Extensive dryness</b>			
Negative	8 (100%)	8 (100%)	_b
Positive	0 (0%)	0 (0%)	

a Fisher's exact test

-b No statistics are computed because results at baseline are constant

**Table 6.** Clinical and laboratory evaluation of apple cider vinegar-ketoconazole and ketoconazole groups on day 27.

Parameters	Apple Cider + Ketoconazole	Ketoconazole	P value <sup>a</sup>
<b>Scaling</b>			
Absent	8 (100%)	7 (88%)	1.000
Present	0 (0%)	1 (12%)	
Minimal involvement	0 (0%)	1 (12%)	
Distinctive presence	0 (0%)	0 (0%)	
Marked/intense	0 (0%)	0 (0%)	
<b>Pruritus</b>			
Absent	8 (100%)	5 (62%)	0.200
Present	0 (0%)	3 (38%)	
At least occasionally present but seldom bothersome	0 (0%)	3 (38%)	
Present and bothersome some of the time	0 (0%)	0 (0%)	
Present and so bothersome that the patient thinks about it often	0 (0%)	0 (0%)	
<b>Erythema</b>			
Absent	8 (100%)	8 (100%)	_b
Present	0 (0%)	0 (0%)	
Minimal involvement	0 (0%)	0 (0%)	
Distinctive presence	0 (0%)	0 (0%)	
Marked/intense	0 (0%)	0 (0%)	
<b>Wood's Lamp Testing</b>			
Negative	8 (100%)	7 (88%)	1.000
Positive	0 (0%)	1 (12%)	
<b>10% KOH Testing</b>			
Negative	8 (100%)	8 (100%)	_b
Positive	0 (0%)	0 (0%)	
<b>Adverse Effects</b>			
<b>(1) Burning sensation</b>			
Negative	8 (100%)	8 (100%)	_b
Positive	0 (0%)	0 (0%)	
<b>(2) Increased itchiness</b>			
Negative	8 (100%)	8 (100%)	_b
Positive	0 (0%)	0 (0%)	
<b>(3) Extensive dryness</b>			
Negative	8 (100%)	8 (100%)	_b
Positive	0 (0%)	0 (0%)	

a Fisher's exact test

-b No statistics are computed because results at baseline are constant

**Table 7.** Treatment success in apple cider vinegar-ketoconazole and ketoconazole groups at the end of the 4-week study.

Parameters	Apple cider + ketoconazole	Ketoconazole	P value <sup>a</sup>
Treatment success	8 (100%)	7 (88%)	1.00
Treatment failure	0 (0%)	1 (12%)	

<sup>a</sup> Fisher's exact test

of signs and symptoms such as pruritus, erythema and scaling. The results of this study support the findings of antifungal properties of apple cider vinegar as previously studied *in vitro*.<sup>2</sup>

The laboratory parameters used showed that not all subjects in the ketoconazole group had negative results at the end of the study. The Wood's light examination may fail to show a false negative result if the area is washed prior to the test.<sup>13, 14</sup> In the 10% KOH examination, all subjects in the ketoconazole group showed negative results at the end of monitoring despite one subject who tested positive only on day 20. In comparison, treatment success for all subjects in the apple cider vinegar-ketoconazole group was achieved by day 20, based on both laboratory examinations, and was sustained until the end of the study.

The diagnosis of tinea versicolor was based on the observation of short hyphae and yeast ("spaghetti and meatballs") in the scales of a specimen examined by a dermatology resident.<sup>13</sup> However, cases where only hyphae were seen were not signed out as positive.<sup>13</sup> This seems evident in this study wherein most of the samples taken after the treatment no longer demonstrated the classical "spaghetti and meatballs" appearance under the microscope. Wood's lamp examination is less sensitive compared to KOH examination and culture<sup>15</sup> in diagnosing tinea versicolor. All subjects tested negative on day 27, the last day of monitoring.

Side effects were manifested in both treatment and control groups, including burning sensation and extensive drying, while increased itchiness was observed in some patients in the ketoconazole group. The other known side effects of ketoconazole include local irritation and itching while with apple cider vinegar, chemical burns.<sup>16</sup> However, these side effects were mild enough not to cause discontinuation of the treatment.

The limitations of this study were inability to obtain the computed sample size, documentation of pruritus and adverse events based on self-report, and significant attrition. Percentage difference in parameters from week to week was found to favor the apple cider vinegar-ketoconazole group. Thus, it is concluded that apple cider vinegar may be a safe and efficacious adjunct to 2% ketoconazole shampoo in the treatment of tinea versicolor.

## Acknowledgements

UERMMMCI College of Medicine: Dean Alfaretta Luisa T. Reyes, Dr. Jennifer M. Nailles

UERMMMCI Section of Dermatology: Dr. Gemma C. David, Dr. Jennylyn R. Chun and Dr. Arceli T. Castillo

Department of Microbiology and Parasitology: Dr. Disraeli Europa, Dr. Benida Fontanilla, Prof. Margarita Eduardo, and their laboratory staff

Municipal Health Officers of San Juan City: Dr. Victor Lacandola and Dr. Jesus Olano

Barangay Chairs of San Juan and Quezon City: Hon. Roberto Alba (Bgy. Onse), Hon. Francis Ocampo (Bgy. Pedro Cruz) Hon. Edgar Corre (Bgy. Isabelita), Hon. Christopher Punzalan (Bgy. Kabayanan), Hon. Dennis Pardinez (Bgy. San Perfecto), Hon. Sancho Hicap (Bgy. Pasadena), Hon. Teodoro Calaunan (Bgy. West Crame), Hon. Gerardo Gorayeb (Bgy. Balong-Bato), Hon. Ronald Mallari (Bgy. Ermitaño), Hon. Charles Tejoro (Bgy. Salapan), Hon. Ryan Llanos-Dee (Bgy. Batis), Hon. Artemio Samson (Bgy. Maytunas), Hon. Eustaquio Betches, Jr. (Bgy. Sta. Lucia), Hon. Concepcion Malañgen (Bgy. Doña Imelda)

Barangay Health Workers of San Juan City, especially to their president, Ms. Aries Dawa and of Brgy. Doña Imelda: Dr. San Domingo, Dr. Philip Patrick Co

The research subjects

The Ambatali family,

The parents of the researchers,

Jesus Christ, our Lord and Savior,

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# Anthelmintic efficacy of pineapple fruit in treating light-intensity soil-transmitted helminthiases among school-age children in Barangay Doña Imelda, Quezon City: A randomized controlled trial

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## Abstract

**Introduction** The Philippines is endemic to soil-transmitted helminthiases, thus programs like the Soil-Transmitted Helminth Control Program are necessary. This study aimed to compare the efficacy of pineapple fruit puree with albendazole in treating light-intensity soil-transmitted helminthiases.

**Methods** This was a randomized controlled trial comparing the efficacy of pineapple puree with albendazole among school children in Barangay Doña Imelda, Quezon City. Ova counts were compared in the pineapple and albendazole groups before and after the intervention was given. Egg reduction rates were computed to assess the anthelmintic efficacy of the pineapple puree compared with albendazole in treating light-intensity soil-transmitted helminthiases. A worst-case scenario analysis was done.

**Results** Majority of subjects in both groups had a single infestation with *Ascaris lumbricoides*. There was a 55.1% and 52.6% reduction, respectively, in the mean ova counts after treatment in the pineapple and albendazole groups. The difference was not significant. A worst-case scenario showed no difference in the treatment success of the pineapple and albendazole groups (RR = 1.03, p = 0.76).

**Conclusion** The results of the study showed that the pineapple fruit puree is comparable to the standard drug albendazole in the treatment of light-intensity soil-transmitted helminthiases.

**Key words:** Soil-transmitted helminthiasis, STH, pineapple fruit, anthelmintic, albendazole, Kato-Katz

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Presented in the 17th Annual Research Forum, February 17, 2015, University of the East Ramon Magsaysay Memorial Medical Center, Quezon City

The Philippine government has implemented several projects to aid communities in education and health. The Department of Health (DOH) has a breastfeeding program, Garantisadong Pambata, National Dengue Prevention and Control Program, Infant and Young Child Feeding (IYCF), Ligtas Tigdas, and the Soil Transmitted Helminth Control Program.<sup>1</sup> Soil-transmitted helminthiasis (STH) is listed as one of the neglected tropical diseases by the World Health Organization (WHO)<sup>2</sup> and has a high prevalence worldwide and locally,<sup>3</sup> with an infection rate of 54%.<sup>4</sup> A study among children in Metro Manila showed a prevalence of 62%.<sup>5</sup> A similar study in Davao del Norte indicated a higher prevalence of parasitism among indigenous people school children than children from a non-indigenous community.<sup>6</sup> STH has a huge impact on the children especially on their health, school performance and every day activities. Untreated infections can lead to anemia, mental retardation and malnutrition, impeding a child's development.<sup>7</sup>

According to the WHO Helminth Control in School-Age Children guide book, the Philippines is one of the countries that require preventive chemotherapy in more than two-thirds of children 1 to 14 years with STH.<sup>8</sup> The standard treatment given by various STH control and elimination guidelines is albendazole or mebendazole given once or twice a year.<sup>9</sup> For *Ascaris lumbricoides* infection, albendazole is the drug of choice and is given at 400 mg single dose and 200 mg for children under two years, while mebendazole is given at 500 mg single dose. In light *Trichuris trichiura* infection, albendazole is given at 400 mg single dose, and mebendazole, the drug of choice, is given at 500 mg single dose.<sup>10</sup> Aside from anthelmintic drug treatment, the country has several programs for school children to practice good hygiene and prevent STH infection, such as "Fit for School" and provincial health care programs.<sup>1</sup> Belizario proposed optimization of school-based intestinal helminth control interventions in our country to further effectively control STH.<sup>11</sup>

The DOH and the WHO included in their programs the use of conventional drugs, such as mebendazole and pyrantel pamoate, in the treatment of STH. There are no non-drug options. Studies that show increasing resistance to these anthelmintic drugs and researchers have been exploring new sources of anthelmintics such as plant cysteine proteinases.<sup>12</sup> Akhtar did a scientific review of the

anthelmintic activity of medicinal plants due to the increasing resistance to commercial anthelmintics.<sup>13</sup> Another review on the development of novel anthelmintics from plant cysteine proteinases stated the resistance of some livestock nematodes to standard synthetic drugs, while human hookworms are becoming less responsive to benzimidazoles and nicotinic acetylcholine agonists. The same paper suggested exploiting naturally-occurring compounds from plants and trees, now known as plant cysteine proteinases. One of the first plants mentioned was pineapple (*Ananas comosus*);<sup>14</sup> it has exhibited antihelmintic properties through in vitro and animal studies.<sup>12, 15, 16</sup>

In addition to the problem of resistance, studies suggest that there is a need to have a more comprehensive program for elimination of STH even when there is enough evidence that biannual deworming programs are effective. Also, lack of awareness of such programs or lack of proper education as to when and how to give the drugs add to the problem of STH.<sup>7</sup> Thus, the researchers believe that the pineapple fruit, which is readily available and has little or no adverse effects, may be an alternative and organic way to deal with the problem of helminthiasis.

As future medical professionals, the researchers aspired to contribute to the alleviation of the STH problem in the Philippines by conducting this study which aimed to compare the efficacy of the pineapple fruit with albendazole in treating light-intensity soil-transmitted helminthiasis.

## Methods

A randomized controlled trial comparing the efficacy of pineapple puree with albendazole was conducted among school children in Barangay Doña Imelda, Quezon City. Ova counts were compared in the pineapple puree and albendazole groups before and after the intervention was given. Egg reduction rates were computed to assess the anthelmintic efficacy of pineapple puree compared with albendazole in treating light-intensity STH. The study was approved by the Ethics Review Committee.

Children from Barangay Doña Imelda in Quezon City, aged 5 to 13 years, male or female, who were positive for soil-transmitted helminthiasis with light intensity based on WHO criteria, were recruited. The parents gave consent before the subjects participated in any part of the research. Assent was obtained from

the children when appropriate. Subjects were excluded if there was a coexisting infection, i.e., cough and colds, fever, diarrhea; had passage of worms two weeks prior the administration of treatment; or had known allergy to pineapple. Non-probability purposive sampling was used to gather 82 participants. Sample size was based on the cure rate of pineapple at 68.9%<sup>17</sup> and albendazole at 88%,<sup>18</sup> using 1.96 and 0.84 as values for alpha error and beta error, respectively. An additional 20% was allocated for dropouts.

Through community survey and fecalysis, the researchers were able to identify the children with helminthiasis. Age in years, weight in kilograms, and height in centimeters of the subjects were determined. History of illnesses and other symptoms, intake of anthelmintic drugs, previous history of passage of worms, and allergies to food and medications were also obtained. Complete physical examination was performed by licensed physicians. All of these data were documented on standardized data collection forms. Using the Kato-Katz method, the number of eggs per sample were quantified and the subjects with light-intensity STH were determined using the WHO criteria.<sup>27</sup> They were randomly assigned to treatment and control groups.

The control group was given albendazole, 400mg chewable tablet, single-dose while the experimental group took the one-week pineapple treatment. Each participant in the experimental group was given a 750 ml pineapple fruit puree made from 720 grams of pineapple fruit sweetened with 30 grams of white sugar. One preparation was consumed for a day in three divided doses (250 ml per dose) for seven days. The investigators, with the help of the parents and

the barangay health workers, ensured subject compliance and proper administration.

Post-treatment stool analysis was done in the experimental group after the seven day treatment intervention. Post-treatment stool analysis was done one month after albendazole administration in the control group. Egg reduction from the baseline was computed to determine the anthelmintic efficacy of pineapple fruit in treating light intensity STH. Adverse reactions were monitored directly during and after administering the pineapple preparation and the medication. Parents were also advised to report and contact the investigators if any untoward symptoms were noted after the procedures until the time that the second specimen was collected.

Results were analyzed using worst-case scenario due to the number of dropouts. T-test and chi-square were used to determine the relationship between the baseline age, weight, height, pretreatment ova count and the reduction rates of albendazole and pineapple puree.

## Results

Table 1 shows that mean age, weight and height of the subjects were higher in the albendazole group than in the pineapple group. Baseline ova counts were comparable for both groups. Table 2 shows that majority of the subjects had a single infection with *Ascaris lumbricoides*, which was the most prevalent parasite.

Both the albendazole and pineapple groups had significant reductions in the mean ova count after treatment, as seen in Table 3. The difference in reduction in the mean ova counts between the

**Table 1.** Baseline characteristics of the subjects in the pineapple and albendazole groups.

	Pineapple n = 35	Albendazole n = 21	P-value
Sex (n,(%))			
Male	11 (31.4%)	12 (57.1%)	0.21
Female	24 (65.6%)	9 (42.9%)	
Age (yr)	8.4 ± 1.96*	9.4 ± 2.20*	0.04
Weight (kg)	21.2 ± 6.29*	31.6 ± 11.64*	< 0.01
Height (cm)	122.0 ± 11.85*	129.2 ± 13.63*	0.03
Baseline ova count	1022.9 ± 842.93*	678.9 ± 693.35*	0.12

\* Mean ± SD

pineapple and albendazole groups was not significant ( $p = 0.42$ , T-test).

Table 4 shows a significant difference in the treatment success favoring pineapple over albendazole among those who completed the study (RR = 1.5,  $p < 0.01$ ). The pineapple group had six dropouts while the albendazole group had 21. With dropouts more than 20%, a worst-case scenario was done as seen in Table 5. Dropouts in the pineapple group were considered as treatment failures while those in the

albendazole group were considered as treatment success. The recomputed relative risk showed no difference between the pineapple and the albendazole groups (RR = 1.03,  $p = 0.76$ ).

### Discussion

There were significant differences in the demographic and clinical characteristics of the study groups in terms of age, weight and height. These results were similar to the findings of Manabo, who found that

**Table 2.** Parasites found on baseline examination using Kato-Katz technique in pineapple and albendazole groups.

Parasite	Pineapple n = 35	Albendazole n = 21	P-value
Ascaris	29 (82.9%)	15 (71.4%)	44 (78.6%)
Trichuris	3 (8.6%)	1 (4.8%)	4 (7.1%)
Ascaris & Trichuris	3 (8.6%)	5 (23.8%)	8 (14.3%)
Total	35 (100%)	21 (100%)	56 (100%)

**Table 3.** Comparison of the baseline and post-treatment ova counts and mean reduction in pineapple and albendazole groups.

	Baseline ova count (eggs per gram)	Post-treatment ova count (eggs per gram)	Mean reduction	P-value
Pineapple (n = 35)	1022.9 ± 842.93	582.9 ± 747.01	55.1%*	< 0.01
Albendazole (n = 21)	678.9 ± 693.35	246.9 ± 409.56	52.6%*	< 0.01

\* P = 0.42, T-test

**Table 4.** Comparison of treatment outcomes in pineapple and albendazole groups.

	Treatment success	Treatment failure	RR (95% CI)	P-value
Pineapple	35	0	1.5 (1.11, 2.03)	< 0.01
Albendazole	14	7		

**Table 5.** Worst case scenario analysis of treatment outcomes in pineapple and albendazole groups.

	Treatment success	Treatment failure	RR (95% CI)	P-value
Pineapple	35	6	1.03 (0.85, 1.24)	0.76
Albendazole	34	7		

these differences did not affect the results.<sup>17</sup> Majority of the subjects in this study were infected by *Ascaris lumbricoides* and the parasites found in dual infections were *Ascaris* and *Trichuris*, similar to Manabo's study and consistent with the results of Andrade.<sup>19</sup>

In this study, both the treatment intervention and the standard treatment for STH had significant reduction rates. The pineapple fruit puree had 55.1% reduction rate after seven days. Albendazole, on the other hand, had 52.6% reduction rate. Manabo had a reduction of 83.5% seven days after administering pineapple puree. Adriano had a 50% reduction in 17 out of 20 subjects.<sup>20</sup>

Stepek mentioned that pineapple has large amounts of cysteine proteinases in the stem and fruit.<sup>16</sup> Being a part of the bromeliad family, a significant component of the pineapple fruit is its proteolytic enzyme bromelain which has been proven to demonstrate properties as an anti-tumor and anti-diarrhea agent, and promotes the debridement of burns, inhibits thrombus formation, and provides strong immunogenicity.<sup>7</sup> Bromelain is also responsible for the pineapple's anthelmintic property being composed mainly of a sulfhydryl proteolytic fraction; it also contains peroxidase, acid phosphatase and other protease inhibitors.<sup>17</sup>

According to Alternative Medicine Review, bromelain has very low toxicity in and testing in humans did not exhibit any side effects; however as with other proteolytic enzymes, can cause IgE-mediated respiratory allergies. Similarly, there were no observed side effects among the subjects in this study's treatment group. The same review mentioned that "bromelain has demonstrated therapeutic benefits in doses as small as 160 mg per day; however it is thought for most conditions the best results occur at doses of 750-1,000 mg daily" but not specifically for STH.<sup>21</sup> Tochi's study suggested administration of the fruit with a buffering agent like water, or in a solution containing nutrients, to aid in fluid and nutrient absorption to protect bromelain from digestion by acid proteases in the gut.<sup>7</sup>

This study revealed a 55.1% and 52.6% reduction, respectively, in the mean ova counts in the pineapple and albendazole groups. Verduyze suggests that fecal egg count reductions lower than 95% for *A. lumbricoides* following single dose of albendazole should be viewed with concern in light of potential drug resistance.<sup>10</sup> The researchers theorize that albendazole's lower reduction rate may be due

to the one month interval between its administration and post-treatment stool collection for ova analysis. Being an endemic country for STH infection, some of the children might have been re-infected during this interval. This phenomenon has been reported in some studies.<sup>22, 23</sup> Edelduok stated that low reduction "may be attributed to differences in geographical locations, climatic conditions and hygiene."<sup>23</sup> The same study also mentioned that "treatment failures recorded after 4 weeks of treatment may be attributed to re-infection, resistance of the parasites to drugs and decline in the efficacy of the drug."<sup>23</sup> Some of the parents in our study were hesitant to give albendazole because of past bad experiences with it and hearsay such as worms passing out through different orifices of their children's bodies.

The results of the study showed that the pineapple fruit puree is comparable to the standard drug albendazole in the treatment of light-intensity soil-transmitted helminthiases.

### Acknowledgements

The researchers would like to acknowledge the help and expertise shared by Dr. Jennifer Nailes and Dr. Jose Ronilo Juangco, as well as Mr. Mark Anthony N. Salido, for his skills as medical technologist.

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# Folk healthcare seeking behaviors among selected residents of Marikina City

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## Abstract

**Introduction** This study explored how folk medicine healthcare seeking behavior manifests in the low- and middle-income socioeconomic classes within Marikina.

**Methods** A case study approach was employed to determine pathways and mechanisms between causes and effects of such behaviors. Informed consent was obtained from all six participants who were purposefully chosen according to the inclusion criteria that they (1) should use folk medicine, and (2) belong to either the low- or middle-income class.

**Results** The cases consisted of six men and women from the low and middle classes who utilized the services of a folk medicine practitioner. Based on in-depth interviews, themes were identified and grouped into the following emerging concepts: archetypes of folk healers; healing through family patterns; letting in, letting go and letting God; repairing and saving life; channeling life; chopping and changing. The following drives were identified: trust, faith in the capacity to heal, genuine concern, and influence of family.

**Conclusion** Our findings reveal that regardless of family income and available resources for healthcare, participants sought folk healthcare because of trust, genuine concern, and faith in the healer's capacity to heal and influence of family. These human drives occur within the participant's individual experiences and contexts.

**Key words:** folk medicine, folk practitioners, healthcare systems, healthcare seeking behaviors, health seeking behaviors, Marikina City, health utilization

In studies that relate to healthcare seeking, several researchers have mentioned relationships of medical professionals to their patients. In these kinds of studies, perceptions on health and illness have been

redefined to a number of concepts different from their orthodox definition. In 1978, Eric Cassell redefined disease as a condition of an organ, and illness as a condition experienced by the totality of an individual.<sup>1</sup> He says that individuals interpret illnesses and diseases uniquely based on their culture, social background and context, and that these unique interpretations affect their health seeking behaviors. Helman coined the phrase 'hierarchy of resort' referring to the course of action taken by an individual ranging from self-medication to consultation of another person.<sup>2</sup>

As early as 1980, Kleinman had already identified explanatory models of disease processes used by all individuals that are engaged in the clinical process.<sup>3</sup> He says that these individuals always have an

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Presented in the 17th Annual Research Forum, February 17, 2015, University of the East Ramon Magsaysay Memorial Medical Center, Quezon City

explanation for the etiology of the disease, timing and mode of onset of symptoms, pathophysiological processes involved, natural history and severity of illness, and appropriate treatments for the condition. In addition, the involvement of these individuals using their own unique or borrowed explanatory models makes illness a social process.<sup>2</sup> Furthermore, Kleinman classified individuals involved in disease processes into three: lay, folk and health professionals. Basically, Kleinman defined the patterns of involvement based on several criteria unique to each category.<sup>3</sup>

The dynamics of explanatory models utilized by individuals involved in the disease process can illuminate gray areas where integration between the folk and the professional sectors can occur. Health seeking behavior and patterns and the identification of medical care sought from folk medicine practitioners will open an avenue towards better primary health care approach by making it more culture-sensitive and by identifying links for sound integration.

The researcher believes that in a multi-awarded city in terms of primary health care coverage such as Marikina, folk-medicine health care and health-seeking behaviors can provide explanatory models to further primary health care utilization and to enhance the integration of folk medicine service to mainstream practices. Thus the study aimed to: (1) identify potential integration links of the folk and allopathic healthcare systems, (2) describe how folk medicine is sought in the urban setting and (3) describe the impact of individual contexts in folk healthcare seeking.

## Methods

The use of qualitative researches in studying access to and utilization of traditional, complementary and alternative medicine has been suggested in the WHO traditional medicine strategy for the years 2002–2005.<sup>4</sup> The case study approach, considered by Yin as a comprehensive type of research inquiry,<sup>5</sup> was used to capture the folk-medicine health seeking and healthcare seeking behaviors of selected residents of Marikina City. A multiple-case design was utilized to compare how folk medicine seeking behaviors occurred in different scenarios. A cross-case analysis was made to increase the internal validity and rigor of the study. The target behaviors were analyzed in participants coming from different income brackets

to pin down specific mechanisms and pathways between causes and effects.<sup>6</sup> The researcher referred to the folk-medicine health seeking and healthcare seeking behavior as the case bounded by the current setting and conditions in Marikina.

Participants of the study were clients of specialized folk medicine practitioners who were classified and qualified according to Maraña and Galvez Tan.<sup>7</sup> The socio-economic classes of these clients were considered in order for them to be included in the study. Specifically, the study chose six clients of a folk medicine practitioner coming from different income brackets. The participants were taken from the lower and middle classes of society as defined by the National Statistics Coordinating Body and the study of Virola, Addawe and Querubin<sup>8</sup> based on the following criteria: owning a house and lot, having a housing unit with strong roof materials, owning a radio and a refrigerator. The researchers found that the scheme was consistent with statistical projections of the middle-income class. Middle class families for the year 2007 were those with annual income ranging from PHP 25,283 to PHP 2,045,280. Thus, those falling below the minimum were classified as lower socio-economic class. Those who went beyond the upper limit were regarded as upper socio-economic class. These parameters were used to qualify participants as coming from a low, middle or high socio-economic status.

Marikina City was chosen as the study site primarily for its exceptional primary health care coverage and government health services based on the latest Center for Health Development Metro Manila reports. In addition, the city did not have data on health care subscriptions to folk medicine. It has been cited as a model city in healthy cities initiatives and was even awarded Most Outstanding City in Public Health in 1998. Furthermore, all the 16 health centers of Marikina are Sentrong Sigla certified. Despite all these, the city does not have statistics on folk medicine practitioners and practices that they perform or support.

Patients of folk medicine practitioners in Marikina city were purposefully selected according to their first-hand experiences. Thematic analyses were applied after transcription of information. Data analysis was a continuous process, occurring even at the very point of data gathering. Data were organized to bring structure and meaning to information gathered. Emergent categories were

further analyzed into categories and finally refined into categories to identify themes that were relevant to the topic. This approach continued until a point of saturation was reached or when no new categories emerged.

Data was analyzed using Yin's explanation building methods and program logic model.<sup>5</sup> Explanation building focused on identifying and zeroing in on what Yin called "causal links" to the current folk medicine healthcare seeking behavior of the participants.<sup>5</sup> The argument of the study was used to guide and examine data to provide iterations until a final explanation was reached. The program logic model allowed the researcher to analyze the complex patterns of decision-making and behavior that occurred over a certain time period in the context of seeking folk-medicine healthcare. This model, being a combination of pattern-matching and time series analysis, enabled the researcher to identify key cause and effect patterns in the said context.

The use of Yin's program logic model is distinct from logic models for program planning and evaluation.<sup>5</sup> The program logic model was used after the data had been analyzed through the explanation building method. Doing so produced algorithms and rationale of folk medicine health seeking and healthcare seeking behavior patterns of the participants.

Aside from ruling out rival plausible rival explanations as part of the data analysis, the researcher increased the strength of the study by (1) choosing participants according to their first-hand experiences of the topic, (2) choosing a location that the researcher is familiar with (the researcher being

a resident of Marikina), (3) spending time in the community of interest thereby allowing the researcher to check and re-check findings especially on consistency of information gathered, and (4) triangulating data collection and interpretation of measures to reduce bias and to come up with the most accurate description of reality.

The study was approved by the Ethics Review Committee. All information from the participants was kept confidential. Codes rather than names appeared on transcriptions and other documents. Only information within the objectives of the research was utilized. Measures to maintain and ensure the confidentiality of the participants' records were implemented. The participants were each given a token of appreciation.

## Results

As seen in Table 1, of the six purposefully chosen participants, five were women and two were senior citizens. All participants from the middle class were employed with health insurance coverage while those from the low-income class were either self-employed or dependent on allowances given by their children. All participants from the latter also did not have health care coverage. Cases 1, 4, 5, and 6, sought folk healthcare from the same practitioner. Cases 2 and 3 served as rival cases as they sought folk healthcare from different practitioners.

### Case 1: "Haplos ni Nanay"

ROP of Case 1 is a 29 year old married man with two children. Currently working in an

**Table 1.** Profile of research participants.

Case	Age	Sex	Civil Status	Social Class	Employment	Health Insurance
Haplos ni Nanay	29	M	M	Middle	Employed	Present
Hilot Pampamilya	41	F	M	Middle	Employed	Present
Ibang Pananaw	31	F	S	Middle	Employed	Present
Salbabida	62	F	M	Low	Non-Employed	Absent
Daluyan	66	F	M	Low	Non-Employed	Absent
Medyas na Butas	58	F	M	Low	Non-Employed	Absent

educational institution within Marikina, his annual income is within the range set for middle class by the NSCB. The school he works for provides HMO coverage, Philhealth, and other insurance. His wife also works for the same institution. He has sought the services of folk medicine practitioners for 20 years now. He has been under the care of his current folk medicine practitioner for three years. Sprain is his most common reason for availing folk medicine services from a female *hilot* whom his mother knew through church activities. The folk healer in this case is distinct for ROP.

For case “Haplos ni Nanay”, impaired body movement and activity resulted in yearning for care from a motherly folk practitioner. Folk healthcare seeking in this case was brought about by the desire to cure illness and disease and relieve their social and emotional consequences. Healthcare seeking occurs directly or indirectly. In order to access folk medicine services directly, he went to a folk practitioner that he knew. However, he also accessed folk healthcare indirectly by tapping social networks of actual family, friends, or even acquaintances for referral to a folk practitioner. Both direct and indirect seeking involves screening or evaluating the character and competency of the folk healer.

As ROP sought a practitioner within his social circle or in his immediate environment, he has found for him self a practitioner who was always within reach. Since folk healers primarily serve to restore health and wellness, the interactive dynamics between ROP and his healer allowed a deeper connection to develop. ROP identified the archetypes of both a mother and a healer within his folk practitioner as he moved towards a better state of health and wellness. In seeking folk healthcare, he considered how he had been taken care of by his mother when he was sick.

### **Case 2: “Hilot Pampamilya”**

SMTC of Case 2 is a 41 year old married woman with two children. She works for an educational institution within Marikina and her annual income is within the range set for middle class people by the NSCB. Her company provides health benefits that include an HMO coverage, Philhealth and private insurance. She no longer lives with her husband and raises her children with the help of her parents.

With the nature of her profession, work, hobbies and her lifestyle in general, SMTC seldom pushed her body to the limit. This produced disturbances and disruptions in health and wellness that made SMTC yearn for folk medicine. With this yearning, she sought folk healthcare. Initially, she tapped her own family network to provide her access to a reputable and competent folk practitioner. Her father referred a trusted folk practitioner whom SMTC did not doubt due to the guarantee of his father’s trust. Later on, SMTC directly consulted the folk practitioner referred by her father. The folk healer from then on has been readily available for any concern coming from SMTC’s family.

The interaction between SMTC and the folk healer revolved around the health and wellness concerns of different family members. Improvement of health and wellness status had set in for SMTC through her family and familiar family patterns. The practitioner entered the realm of their family treating illness and disease from her father to her children. Non-exploitation and the delivery of unremarkable service have convinced SMTC that her folk healer was effective and competent.

### **Case 3: “Ibang Pananaw”**

JC of Case 3 is a 30 year old single woman who works for an educational institution within Marikina. Her annual income is within the range set for middle class people by the NSCB. Her company provides health benefits that include an HMO coverage, Philhealth and private insurance. Due to the health benefits provided by her current work and transfer of residence, she has stopped seeking the folk medicine services that she availed of during her teenage and college days. She illustrates how parents play a role in influencing family members to go for folk medicine services and how HMOs have changed her health care seeking behavior. JC’s folk healer is distinct from other cases. Mystical illnesses, the influence of the elderly, and the different pushes for folk medicine had previously led JC to seek folk health care. Mystically sourced illness such as *usog* or *bati* had been reasons for JC to seek folk healthcare. She was already familiar with their signs and symptoms that once recognized became the cue to seek folk treatment. Pushes of folk medicine on the other hand included the role of parents and the encouragement of other people in the family or community to seek folk

healthcare. She also specifically identified the influence of the elderly in making people seek folk healthcare. According to her, elders transmitted folk medicine knowledge and their belief in the system allowed the practice to thrive. These were the reasons JC shared to explain how she ended up having her illnesses and diseases treated by her folk healer. On the other hand, as her employer granted her allopathic health benefits, she had shifted from her previous folk healthcare pattern. She no longer sought folk healthcare except for future experiences of “usog”. She also transferred residence to a place far from the folk healer.

Her faith and in belief prayer remain unchanged. Regardless of the type of healthcare system, faith and prayer was an essential component for healing to take place. She now seeks healing within the boundaries of two health systems.

On a side note, Giveon and AL-Krenawi state that diagnosing and treating disease through complementary and alternative systems involves the identification and control of social forces.<sup>9</sup> This shows the importance of understanding social constructs such as the theory of humor and mystical sources of illness for Filipinos.

#### **Case 4: “Salbabida”**

EP of Case 4, a 62 year old married woman, is neighbor, patient, and friend to the folk medicine practitioner. She is currently taking maintenance medications for hypertension and had previous experiences of managing crises through folk medicine. She and her husband live with the families of their children who give them money for their daily expenses.

EP testified on the effectiveness of her folk practitioner’s methods as she had gone from one practitioner to another. She exaggerated that she might have been dead by now if it weren’t for her folk practitioner friend. Aside from this, she also availed of services from allopathic health facilities especially in managing visual complications of hypertension. Feelings of impending doom had been the cue for EP to seek folk medicine within her community. She experienced this whenever she suffered from the complications of her chronic diseases. In these times she chose to seek the services of her folk healer who was both a healer and a friend.

This pattern was also driven by her mechanistic and functional views on health. Responses of EP illustrate how she compared the body to a machine that needed to be fixed. Whenever she experienced disease, in her desire to be cured right away, she availed of the most inexpensive and accessible healthcare. These drove her to seek both allopathic and folk medicine to restore her health and wellness state in the shortest possible time so that she could maintain typical family routines and processes. Most of the time however, she sought the services of her folk practitioner because of the trust and the effectiveness of the treatments regarded and rendered by the healer, respectively. She exhausted all means, whether allopathic or folk, to manage her health and wellness in an effort to fulfill social roles such as taking care of grandchildren. Regardless of the healthcare system, she held on to her faith in God who served as her divine protector and healer.

#### **Case 5: “Daluyan”**

NL of Case 5 is a woman in her late 60’s living with the families of her children. She receives no compensation from the government insurance and only depends on the allowances given by her children. The folk medicine practitioner in their community had been a friend and neighbor for more than 20 years. Her landline telephone allowed clients coming from other places to contact her folk medicine practitioner friend. In this light, NL got to screen the potential and regular clients of her friend. In doing so, she had become familiar with patient profiles. Interestingly, NL herself was knowledgeable of some folk medicine techniques. However, she only performed these for children especially of her own grandchildren. She cited that her husband might get jealous if she treated adult patients of the opposite sex.

Testaments of character and competency within the community are why she sought folk services from her neighbor-healer. This added to the reputation her folk healer had built for her practice. Successful healing experiences and outcomes added further to the testaments of character and competence of the folk healer. This worked like a feedback mechanism for folk medicine.

Times to seek the folk and allopathic were very clear to NL. She, too, affirmed that an individual’s faith in God played a great role in the betterment of

their health. Regardless of healthcare system, faith in God was an invaluable healthcare resource.

#### **Case 6: “Medyas na Butas”**

CE is a woman in her late 50s who earns a living by repairing and reselling socks. At present, she lives with her daughter and grandchild. She has another daughter working in Dubai as a massage therapist who is able to remit around PHP 2,000 every month. The responsibility of taking care for the educational needs of her granddaughter was left to her.

She had worked with the folk medicine practitioner in their community as both of them were members of the community organization council. In addition, she considered the practitioner as friend and neighbor who helped her manage illnesses that affected her and her family. CE’s folk healthcare seeking was influenced by her plane of existence. She obtained her daily needs by selling and mending socks. As much as possible, she utilized inexpensive and readily available healthcare services for her very own and her family’s health and wellness needs.

The desire for convenient healing attracted CE to seek folk health care. The practitioner, being in the same plane of community existence as CE, was familiar with the context of the latter. It was easy for both practitioner and CE to adjust for their health and wellness needs. Thus, the practitioner was able to embrace the allopathic while CE could appreciate and classify those which were allopathic and those which were of folk medicine. Since allopathic healthcare had already established its roots, techniques and ways, CE used actual, unique, and convenient healing experiences as bases to seek folk practices time and time again. Simply put, she sought whatever worked, whatever was available, and whatever was within her budget.

#### **Discussion**

Table 2 shows a summary of the themes and emerging concepts for the six cases. The original identity of each case was retained in the local language to give meaning to the unique social dimension. The summary of the themes shows the “essentials” for each case representing a range of meanings for each case and finally the emerging concept, which attempted to capture the themes into a conceptual construct.

Each case revealed the individual context of folk healthcare seeking among the participants of the study. Beyond the unique concepts that have emerged from each case are human links to folk healthcare seeking. These intangibles unify the six cases by being present at one point or another within the boundaries of each participant in folk healthcare seeking. Throughout these six cases, faith in the capacity to heal, trust, and the manifestation of genuine concern and family support are the human links that transpire in folk healthcare seeking. In complementary and alternative medicine, process, context and experience outweigh outcomes.<sup>10,11</sup>

Ultimately, all participants sought folk medicine services for the restoration of health and wellness. It served as the effect, the goal, or the expectation that needed to be fulfilled within the participants. Likewise, it was the same reason for these participants to go to allopathic medicine practitioners. For these participants, however, restoration of health and wellness through folk medicine manifested in specific physiologic conditions or within the Filipino concepts of disease causation. Restoration of health and wellness fulfilled through folk medicine is folk medicine that “works”.

The interaction between healer and practitioner was the sphere where the patient and practitioner communicated, exchanged and created experiences. It was what uniquely existed between the contexts of the practitioner and the patient. This interaction between patient and practitioner resulted in a dynamics or a relationship that allowed the participant to return to the folk practitioner for previously consulted illnesses, signs or symptoms, or diseases that the folk practitioner was known to treat. This was again done by the participants in the same context of practicality considering the milieu, their resources and personal responses to the allopathic system.

For the six cases, the experience of seeking folk healthcare manifested with human constructs of trust, genuine concern, family influence and faith in the healer’s capacity to heal. Folk healthcare seeking was more than just making practical decisions, going beyond patients saving time, money, energy and resources. Rather it was the human interaction between folk healers and patients as they adapted to their own contexts and milieus. The healing experience became individualized and

**Table 2.** Emerging concepts for the six cases.

Case	Themes	Emerging Concept
"Haplos ni Nanay"	Yearning for motherly care as signal to seek folk medicine	Archetypes of folk healers
	Healers as interactive conduits of health and wellness	
	Healer and mother	
"Hilot Pampamilya"	Transforming trust into guarantee	Healing through family patterns
	Welfare of kin	
	Tailor-fit of folk treatments	
	Healing through different life stages	
"Ibang Pananaw"	Healers as wells of advice	Letting in, letting go and letting God
	Foregoing the folk for "free" systems	
	Elders as carriers of folk medicine	
"Salbabida"	Healing in good faith to higher powers	Repairing and Saving Life
	Exhausting means to restore social roles	
	Adherence, Acceptance and Response to folk advice	
	Children as sources of financial support	
"Daluyan"	Surrendering to God and the Folk healer	Channeling life
	Faith in God as ordinary resource	
	Seats and Pedestals of practitioners	
	Hearing voices yet unheard of	
	Testament of Character and competency	
"Medyas na Butas"	Reaching healers beyond reach	Chopping and changing
	Interlocking the folk and allopathic	
	Healers embracing the orthodox	
	Thriving within the same plane	
	Convenient healing	

unique due to these human components that drew these participants to seek folk healthcare. Pelicci supports this in saying that the various health and wellness restoration approaches in complementary and alternative medicine allows experiencing unique ways of healing in a highly diverse world.<sup>12</sup>

**Trust** Trust, in folk healthcare seeking, is something that is earned and given. For cases 1 to 3, the folk practitioners worked with integrity and proved that they were worthy of their patients' trust. In cases 4 to 6, living within the same community and context as that of the healer made it easier for

them to establish trust. This was evident in cases where food, telephone access and other community resources were shared with the folk practitioner. Referrals and successful treatment also merited the giving and earning of trust. In a deeper sense, trust manifested in the form of surrender to God's will of healing. The role of faith was enriched in their trust for hand that healed them.

**Faith in the healer's capacity to heal** With trust and rapport established, the participants engaged in a unique healing experience with the healer. The capacity of the healer to heal then unfolded for the

patient. Afterwards, this became a testimony and later on a resource of faith to overcome obstacles in health and wellness. According to Apostol, folk healers are not just sought for the inexpensive services they render but also because they are able to produce satisfying results. He adds that people have the advantage of the two worlds and that people shuttle from one system to another in search for hope.<sup>13</sup> Faith in higher powers manifests in both the patient and the healer. The role of faith in healing was derived as the belief that divine forces were there in times of illness and disease.

**Genuine concern** “Pagmamalasakit” captured the genuine concern the healers manifested. They interacted with patients more than the illnesses and diseases that needed treatment. They saw their patients as humans who needed individualized and careful attention. This genuine concern was evident in the cases as being (1) called using their first name, (2) seen more than just a customer who needed service, (3) someone of family, and (4) a neighbor and community resource. Genuine concern was also shown by the patients to the folk practitioner manifesting every time the patients thought of how much to give or how much they had not given for the services rendered. They considered the healer’s family, situation, source of income, and safety as in NL’s screening of telephone calls.

**Family influence** The family contributed much in influencing individuals to seek folk healthcare. Patients gave consideration to parental roles and influences, family resources, and referrals from family and family member’s network in seeking healthcare. More than individual experiences, these patients entrusted in good faith the health of other family members to the care of healers. The concept of family allowed the patient-practitioner relationship to start, grow, and blossom into meaningful and unique experiences of health and wellness. Folk healthcare seeking for these six cases encompassed the action of seeking folk treatments to improve health and wellness status. Figure 1 summarizes the different human drives of folk healthcare seeking, illustrating the importance of the human component in healthcare systems.

Research results call for practitioners of both allopathic and folk systems to establish a genuine therapeutic relationship with their respective patients. It is a relationship that goes beyond knowing the disease and treating illness. It banks on presence and

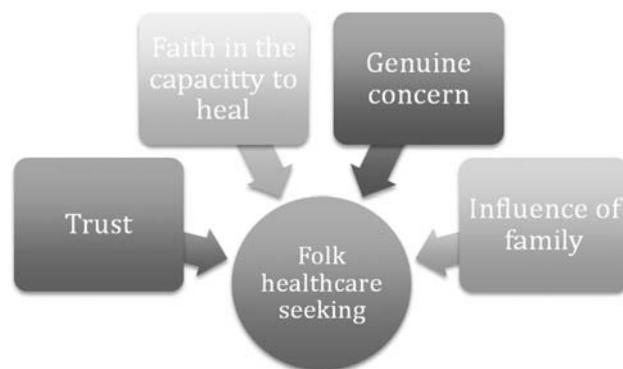
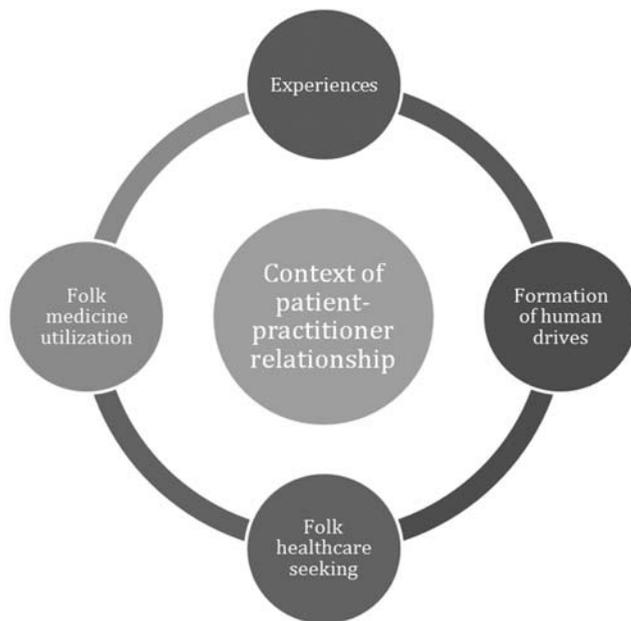


Figure 1. Human drives in folk healthcare seeking.

genuine concern that delivers health and wellness to patients. Although it is already taught in certain health professions, it is actually a social skill that needs to be developed. Since therapeutic relationships are built on trust and rapport, practitioners should utilize these values for the betterment of their patients. In doing so, practitioners will be more sensitive and open to the particular health and wellness needs that arise from a patient’s context. The researcher calls for building of better therapeutic relationships between healthcare practitioners and their patients.

The emergence of human drives such as trust, faith in the healer’s capacity to heal, genuine concern and influence of family, identified among the cases analyzed and studied, entails locating these within the context of the patient-practitioner relationship. In this framework, the patient-practitioner relationship is depicted as a process that involves experiences, formation of human drives, folk healthcare seeking and folk medicine utilization. This process involves a feedback between patient and folk practitioner as they engage constantly and creatively with each other (Figure 2). Previous or new experiences involving the patient and the practitioner spark the formation of human drives. These drives propel individuals to engage in folk medicine healthcare seeking behaviors through referrals, family influence or active consultation with a folk healer. Folk healthcare utilization begins when the patient starts to interact with a folk practitioner. These interactions would then produce new sets of experiences that reinforce human drives and the cycle continues.

The context of patient-practitioner relationship refers to the milieu, the immediate environment



**Figure 2.** Location of human drives in folk healthcare seeking.

where the relationship takes place. However, it extends beyond the setting, as it is everything that exudes and manifests outside the patient and the practitioner. It may involve people other than the patient or practitioner. Situations, events, and even the weather are included in this context. These contribute in making the interactions that occur within the patient-practitioner relationship unique.

Experiences refer to everything that has happened either previously or initially to the patient. These are stored inside the patient’s mind, and along with his/her individual context, form human drives that translate to folk healthcare seeking behavior. These may include experiences of healing, socializing with other people, accessing folk practitioners through referrals, receiving treatments and many more. Almost everything that occurs within and beyond this very process is an experience.

Human drives are intangible or abstract concepts. They are products individual context and unique experiences in folk healthcare seeking. These human drives remind or influence an individual to seek folk healthcare again and again or for the first time. They serve as answers when we are asked for reasons to seek folk health instead of allopathic care.

Folk healthcare seeking refers to the actions done or behaviors such as actions to promote health, illness

or responses to threats to health. This may also refer to the engagement with a particular healthcare system. MacKian states that behavior is an essential part of the identity of a community, family, and more importantly, of an individual.<sup>14</sup> She even added that these behaviors are constantly evolving along with social, personal, cultural and even experiential factors. Furthermore, she discusses that for the different health systems to be utilized and to work along with the reflexivity of localities and nations is the main point in studying these behaviors. Once engaged with a folk practitioner, folk healthcare utilization occurs as new experiences are formed throughout assessment, treatment and the evaluation of patients. This process has no point of origin or end because it is operating within patients’ individual contexts.

This study basically revealed the role of human drives in folk healthcare seeking. The results pinned-down four of these drives as they exist in six cases as (1) trust, (2) “faith in the healer’s capacity to heal”, (3) genuine concern, and (4) family influences. These drives occur within the participant’s individual experiences and contexts that dictate their healthcare seeking. These human drives bind folk healthcare seeking patterns of the participants who live in the urban setting in their very own social contexts.

Although different resources are available for these participants such as health insurance or the presence of immediate family in the urban setting, folk healthcare seeking still depends on individual choices based on personal experiences and individual contexts. From these, individuals may draw or form human drives to seek folk medicine. As human drives are based on individual context, they vary from one individual to another. Having identified personal experiences and contexts as sources of human drives, patient-practitioner relationships are crucial. Focusing on these relationships may be used as a way to seek and promote folk healthcare systems. This concept may also be superimposed over allopathic healthcare systems to increase utilization and coverage.

Several integration links were identified throughout the analysis of data. Folk practitioners can facilitate referrals for allopathic medicine systems due to the limited scope of diseases and illnesses that folk medicine can treat. Folk healers encounter and are familiar with signs and symptoms of illnesses that need immediate medical attention. Thus, they

can also be tapped in keeping the health of communities by interacting creatively with its members. Thus, folk healthcare seeking is not just an action but also a search for a truly human interaction.

### **Acknowledgements**

The author is grateful for the guidance and supervision of Dr. Gemiliano D. Aligui and the invaluable contribution of Dr. Sherlyne Almonte-Acosta in this research.

### **Support/funding**

This study was funded by a grant from the Department of Science and Technology – Philippine Council for Health Research and Development.

### **Conflict of Interest Declaration**

The author declares that there is no conflict of interest in the creation, completion and publication of this study.

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# "It's all about them": A grounded theory on young nurse mentors

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## Abstract

**Introduction** This research explored the perception of young nurse mentors in the current practice in the local setting and discovered the nature of the phenomenon.

**Methods** Modified grounded theory methodology was used. The process included a technical review of literature necessary to define and focus the scope of the problem and define the tentative framework. Data analysis was characterized by literal and theoretical replication across cases which confirmed, extended and sharpened the theoretical framework. Six Filipino young nurses identified as mentors by their peers served as participants. Data collection methods were observations and in-depth interviews of participants regarding their perceptions of their mentoring in the current clinical practice environment.

**Results** Three phases of young nurse mentoring were identified: the first phase explained how mentoring relationship began. The second phase discussed the focus of the mentoring relationship which was the learning process. The third phase described the transcendence of the mentoring relationship, where the Filipino culture of "barkada" and "hiya" played a significant role in the development of the relationship. The core variable was found to be professional commitment.

**Conclusion** Mentoring in a clinical nursing environment is a complex multi-purpose interaction which allowed the young nurse mentors to act on their service orientation by focusing on the mentoring process. The professional mentoring relationship naturally and gradually developed into a transcending personal and professional relationship where the activities of the people in the "barkada" shared a mutual bond of commitment in nurturing the academic, professional and personal aspects of their growth in a very Filipino way.

**Key words:** mentoring, young nurse mentors, grounded theory

**T**he Philippines has been experiencing a fast turnover of health care workers including skilled

nurses who are among the first to leave the country.<sup>1</sup> This has been related with the brain drain phenomenon where professionals leave the country for better economic opportunities. This scenario has not only depleted health care facilities of nurses but also of experienced or even expert mentors who are supposed to guide the new nurses.

Mentoring has been reported as one of the programs in healthcare that remained misunderstood and under-utilized.<sup>1</sup> Moreover, mentoring is still generally related to nursing education and administration, and staff nurses in most hospitals may have preceptors but rarely do they have mentors.<sup>2</sup> With mentors becoming inaccessible due to retirement and experienced staff nurses in exodus, mentoring

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Presented at the 6th Philippine Nursing Research Society-National Nursing Research Conference, November 28-29, 2013, Baguio City

Presented at the 16th Annual Research Forum, February 13, 2014, University of the East Ramon Magsaysay Memorial Medical Center, Quezon City

by young nurse mentors can be possible: in the absence of qualified mentors, a person can turn to another person who can provide guidance whether or not she fits into the old view of a "mentor".<sup>3</sup> The emerging paradigm postulated by Horton states that mentors are experienced but not necessarily older for as long as the mentor has the capability to assist the mentee with personal, career and professional development.<sup>4</sup> Hence, the traditional concept of a mentor has evolved because young nurses are taking the lead in the informal mentoring, deviating from the old notion where a mentor is someone who is older, more experienced, and advises, supports, monitors and nurtures the progress of a younger, less experienced individual.<sup>5</sup>

The gap in the literature is evident in the concept and construct of "being a young nurse mentor". The need for further research to shed light on the conceptualization of this contemporary issue emerging from an old perspective in a new practice setting is imperative to redirect standards and influence later the practice of nursing; thus this research aimed to understand from the experiences and feedback of young practitioners, the emergence of young mentors and their roles as opposed to the traditional and sedimented idea and practice of mentoring in nursing.

## Methods

This was a grounded theory, a qualitative research approach that reflected inductive analysis, from practice to theory, utilizing everyday behaviors or organizational patterns to generate a theory.<sup>6</sup> This approach was chosen because it is most useful in researches where there is limited knowledge on certain subjects or human phenomena because the theory generated from data provide a new understanding of human social process.<sup>6</sup> Grounded theory is rooted in symbolic interactionism, where the researcher gears toward the understanding of how people define their reality through their artifacts, clothing, gestures and words whenever they interact with one another.<sup>7</sup> Since the aim of this research was to discover and conceptualize the essence of complex interactional processes of young nurse mentors in clinical practice, and there was a need to understand how they perceived mentoring and why they consciously or subconsciously chose to mentor a new nurse, a grounded theory was the most appropriate qualitative methodology.

In-depth interviews were conducted with six young nurses currently employed as regular staff at a tertiary teaching and training hospital in a province north of Manila who were recognized by their peers as mentors. All six young mentors had clinical nursing experience less than 5 years after licensing by the Professional Regulations Commission (PRC); this was to ascertain that the nurse mentor had not reached the expert level as prescribed by the Novice to Expert Theory.<sup>8</sup>

At the beginning of the study, there was no limit set on the number of participants<sup>7</sup> thus, the researcher identified young nurse mentors by word of mouth from colleagues employed or affiliated with the hospital training center. Four young nurse mentors who met the eligibility criteria served as initial participants. The sampling continued until each category was saturated.<sup>7,9</sup> The number of possible participants for this research endeavor was determined by the information obtained from previous participants. Pandit suggested that recruitment of participants should be continuous and end when a category or theory has reached "theoretical saturation".<sup>10</sup> Therefore, the actual sample size for this study was dependent on the point when theoretical saturation had been reached.

The data analysis is central to grounded theory building research.<sup>10</sup> Using the constant comparative method of data analysis, all interview transcripts were read and analyzed. Coding and analysis of data from interviews, observations and documents was done simultaneously, the researcher looking for patterns and comparing incident with incident, incident with category, category with category.<sup>11</sup> Constant comparison was aimed at generating theoretical constructs, and with substantive codes and categories and their properties, forming a theory that encompassed as much behavioral variation as possible.<sup>12</sup>

When grounded theory analysts code reflectively, they act very much like investigative reporters asking the questions what, when, where, why, how and with what result or consequence.<sup>13</sup> Answering these questions weaves together all the unraveled threads of data created during open coding, with the objective of identifying and naming the core category or central phenomenon of the study.<sup>13</sup> In order to understand the relational dynamics of the nine primary categories, the researcher developed the Conditional Relationship Guide (Table 1) for this

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**Table 1.** Conditional relationship guide.

Category	What (Category defined as...)	When (Category occurs during...)	Where (Category occurs in...)	Why (Category occurs because of ...)	How (Category occurs as ...)	Consequence (The consequence of category is...)
Approachability (of young nurse mentor)	<ul style="list-style-type: none"> <li>- Easily accessible</li> <li>- Invitingly friendly/welcoming</li> <li>- Open/open-minded</li> </ul>	<ul style="list-style-type: none"> <li>- Initiating mentoring relationship</li> <li>- Collaborating as colleagues</li> <li>- Clarifying/asking questions</li> <li>- Settling conflicts</li> </ul>	<ul style="list-style-type: none"> <li>Informal meetings (inside and outside the clinical area)</li> <li>-clinical rotations</li> </ul>	<ul style="list-style-type: none"> <li>- Need to establish rapport</li> <li>- Need to get to know your mentee</li> </ul>	<ul style="list-style-type: none"> <li>- Entertaining questions</li> <li>- Volunteering assistance/guidance</li> <li>- Keeping an open mind</li> </ul>	<ul style="list-style-type: none"> <li>- Open communication lines</li> </ul>
The Barkada	<ul style="list-style-type: none"> <li>- Dual role of mentors: friend and mentor</li> <li>- Overlapping personal and professional relationship</li> </ul>	<ul style="list-style-type: none"> <li>- Discussion of clinical decisions or challenging situations</li> <li>- Everyday professional life</li> <li>- Interpersonal communications</li> <li>- Clinical Interactions</li> </ul>	<ul style="list-style-type: none"> <li>- Clinical duty</li> <li>- Peer interactions</li> <li>- Personal and professional Life</li> <li>- Clinical environment</li> </ul>	<ul style="list-style-type: none"> <li>- Seeking different perspectives</li> <li>- "Pakikisama" and "pakikibagay"</li> </ul>	<ul style="list-style-type: none"> <li>- Mutual respect and trust</li> <li>- Overlapping personal and professional boundaries</li> </ul>	<ul style="list-style-type: none"> <li>- Transcending personal and professional relationship</li> </ul>
Hiya in the mentoring relationship	<ul style="list-style-type: none"> <li>- Part of a person's personality</li> <li>- Filipino culture of hiya when dealing with people</li> <li>- Hiya as part of self-preservation</li> </ul>	<ul style="list-style-type: none"> <li>- Discussions of patient care and clinical decisions</li> <li>- Interpersonal communications</li> <li>- Presentation of ideas</li> </ul>	<ul style="list-style-type: none"> <li>- Clinical duty</li> <li>- Group discussions</li> <li>- Personal and professional life</li> </ul>	<ul style="list-style-type: none"> <li>- Deficiency in knowledge and skills</li> <li>- Weak skills in communication and clinical decision making</li> <li>- Self-preservation</li> </ul>	<ul style="list-style-type: none"> <li>- Keeping to one's self questions or clarifications</li> <li>- Living up to the expectations of the society (example: If from the same age group or older age group, nurses should be at the same level of knowledge and skills)</li> <li>- Taking negative criticisms</li> </ul>	<ul style="list-style-type: none"> <li>- Blocks lines of communication</li> <li>- Limits learning</li> </ul>
Initiative and willingness (of mentees)	<ul style="list-style-type: none"> <li>- Choice to be involved in the mentoring relationship</li> <li>- Active participation</li> <li>- Internally motivated</li> </ul>	<ul style="list-style-type: none"> <li>- Clinical work hours</li> <li>- Informal meetings outside the clinical area</li> <li>- Peer interactions</li> </ul>	<ul style="list-style-type: none"> <li>- The workplace during scheduled work hours</li> <li>- Informal meetings outside the clinical area</li> </ul>	<ul style="list-style-type: none"> <li>- Need to establish rapport</li> <li>- Deepening of the mentoring relationship</li> </ul>	<ul style="list-style-type: none"> <li>- Seeking answers, clarifications, guidance</li> <li>- Raising concerns</li> </ul>	<ul style="list-style-type: none"> <li>- Nurture learning, experience and professional growth</li> <li>- Open communication lines</li> <li>- Professional commitment</li> </ul>

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Laid-back learning environment	- Safe and enjoyable learning environment	- When allowed to make mistakes - Responsible mix of work and play	- Clinical duty especially when providing care to patients - Informal meetings (inside and outside the clinical area)	- Encouraged and practiced by nurse mentors - Connects "updated" knowledge with current practice and past knowledge - Allowed to be themselves and commit mistakes	- Creating an atmosphere of learning that promote interaction	- Encourage learning attitude - Maximizing the mentoring experience - Transcending personal and professional relationship
Mentor-mentee compatibility	- Having the same vibe/like-minded - Congruent values	- Initiation of mentoring relationship - Collaborating as colleagues - Teaching-learning techniques/style - Settling conflicts	- Scheduled work hours - Informal meetings (inside and outside the clinical area) - Social gatherings	- Deepening of the mentoring relationship - Established rapport and trust	- Getting to know each other's working style - Neutralizing "hiya" and "yabang"	- Meeting in the middle - Open communication lines - Professional commitment
Service orientation (by young nurse mentor)	- Helping out of obligation - Pure intentions to share knowledge, skills and experience - Providing mentoring services without monetary gains - Advancing the profession	- Initiating, facilitating and ending the mentoring relationship - Everyday professional life	- Clinical work schedules - Informal meetings (inside and outside the clinical area) - Peer interaction	- Moral obligation to fellow nurses - Desire to advance the profession	- Paying forward/giving back - Getting involved	- Professional commitment
Sharing and reinforcement of knowledge and skills	- Give and take of knowledge and skills - Experience provides a variety of perspectives to knowledge and skills	- Discussion of clinical case study and challenging situations - Clinical decision making and interactions	- Clinical duty - Application of theory and skill mastery - Informal peer interactions	- Need to make good clinical decisions - Mastery of skills - Connecting theory and practice	- Continually guiding and evaluating mastery of skills and knowledge - Theory to practical application in the clinical area	- Highly competent and qualified nurses - Better quality of nursing care*
Tailored-fit and holistic learning	- Individualized teaching-learning interactions - Giving time and attention is necessary	- Assessment and evaluation of mentee's strengths and weaknesses - One-to-one teaching sessions	- Mastery of skill (demo and return demonstration) - Clinical duty - Peer interactions (discussions)	- Differences in learning styles and needs - Differences in learning curves	- Recognizing mentee's learning needs and developing teaching content and approach dependent on those needs	- Encourages learning attitude - Faster and better learning and professional growth - Maximizing mentoring experience - Highly competent and qualified nurses* - Better quality of nursing care*

\* These consequences were combined and renamed as Progression of Practice

study. The guide was created by asking the investigative questions of Scott in each of the nine categories in a purposeful manner to discover the relationships among categories.<sup>13</sup> Beginning with the *Approachability* category, the format was designed to ask and answer each relational question about the category.

Moreover, the Conditional Relationship Guide identified the consequences as the key consequence categories about which all other categories were focused. Thus, in order to work with the consequences, all categories in the guide that did not appear as consequences or appeared only once were temporarily set aside and these "set-aside categories" were predicted to become the dimension of the Reflective Coding Matrix.<sup>13</sup>

The Reflective Coding Matrix (Table 2) was constructed as a relational hierarchy to contextualize the core category, the central phenomenon to which all other major and minor categories relate. Once a core category was determined, all other categories became subcategories. Eventually the subcategories became core category descriptors: the properties, processes, dimensions, contexts, and modes for understanding the consequences. Identification of the Reflective Coding Matrix descriptors began and was contingent upon the relationships established by the Conditional Relationship Guide.<sup>13</sup>

After examining the data and filling the core category block in the matrix, all other blocks were filled with categories (set-aside consequence categories and primary categories and their properties) that

**Table 2.** Reflective coding matrix.

Core Category		Professional Commitment: "It's All About Them"	
Properties	Encourage learning attitude	Nurture learning, experience and professional growth	Progression of practice
Processes	Open communication lines	Maximizing the mentoring experience	Transcending personal and professional relationship
Dimensions	Approachability	Sharing and reinforcement of knowledge and skills	Pakikisama at pakikibagay
	Getting involved	Laid-back learning environment	Established rapport and trust
	Service orientation	Limits learning	Meeting in the middle
	Initiative at willingness	Neutralize "hiya" and "yabang"	Mentor-mentee compatibility
	Established rapport and trust	Getting to know each other's working style	"Hiya"
	Deepening of mentoring relationship	Tailored-fit and holistic learning	Barkada
	Blocks lines of communication	Mastery of skills	Overlapping of personal and professional boundaries
	Entertain questions	Connecting theory and practice	
	Raise concerns	Faster and better learning and professional growth	
Contexts	Everyday professional life	Clinical and academic/theoretical environment	Interaction between young nurse mentor and nurse mentee
Modes for understanding	Terms of engagement	Creating a true learning environment	Necessary for advancement of the profession

supported the core category and verified that the matrix and its elements fit the data. This iterative process wove continually back to the open coding and back further to the data in the literature to sort and verify relevance and fit.<sup>13</sup>

The last stage of the data analysis was selective coding, which happened when the researcher had integrated all the interpretive work done. The principal objective of selective coding was to explain the story line. The story line was a general descriptive overview of the phenomenon.<sup>13</sup> The Reflective Coding Matrix read left to right revealed the story line. The remainder of the selective coding process entailed refining the order and sequence of the categories, always maintaining the central phenomenon at the heart. The conditions and dimensions of the core category were more fully developed at this time, and the threads were developed to reflect the variability and boundaries of the central phenomenon.<sup>14</sup> Finally, the researcher looked for repeated relationships and grouped data accordingly to give the emerging theory specificity.<sup>13</sup> By providing credibility, transferability, and dependability of the data across all participants and the literature, trustworthiness of the story line and the emerging theory was accomplished.

## Results

The core category was defined as the phenomenon that linked subcategories in complex ways.<sup>10</sup> The three phases of "It's All About Them" that emerged during data analysis were *The Essentials of Young Nurse Mentoring*, *Real Learning Experience* and *"Pakikisama and Pakikibagay"*.

*The Essentials of the Young Nurse Mentoring* was the first phase: it referred to the basic requirements for the mentoring relationship to be established and kept going. Three subcategories were identified, *Approachability*, *Service Orientation*, *Initiative and Willingness*. *Approachability* entailed the quality that every young nurse mentor should possess and the environment created by the open, approachable, and composed personality of the young nurse mentor as verbalized by participant "Francis":

"Ako kasi pag nagtuturo, e yung tipong approachable na type. Approachable in the sense that gusto ko e they will feel comfortable na tinuturuan at hindi pwersahan." (When I am teaching, I consider myself as the approachable type. Approachable in the sense

that they will feel comfortable while being taught and it does not send the feeling that it is forced upon them.)

Another subcategory is *Service Orientation* which referred to the inclination of the young nurse mentor to engage in a mentoring relationship. This inclination was fueled by an obligation/responsibility that came with being a nurse or it may have been driven by the genuine desire to serve as evidenced by a statement from participant Bonji:

"Kasi as a nurse, I have an obligation, obligasyon ko na turuan or i-guide yung mga yung mga younger nurses, basically. Pero, gusto ko lang makatulong in any possible way I can. I want to see better nurses." (As a nurse, I have an obligation to teach or guide our younger nurses. I wanted to help [them] in any possible way I can. I want to see better nurses.)

On the other hand, to get the ball rolling in the mentoring agreement, initiative and the willingness of the nurse mentee was needed. This initiative and willingness was driven by either of the two factors, their needs or their attitude as reflected by participant "Francis":

"Pano magkakaroon ng learning pag hindi interested yung isang tao but then may mga instances naman na yung tipong kailangan i-offer ang sarili. Parang you have to convince that person or parang i-encourage yung person para at least free will pa rin kasi di ba pano mo lalagyan ng tubig ang bote pag sarado ganun hehe so dapat prepared din sya ganun." (How can learning take place when the mentee is not interested? However, there are instances where you have to offer yourself and convince or encourage the mentee [to initiate] because they still have the free will to do so. How can you fill a container with water when it is already sealed? The mentee should also be prepared [to step up].

The second phase *Real Learning Experience* was related to the teaching-learning interaction of the young nurse mentor and the nurse mentee. Three subcategories of this phase were identified, *Sharing and Reinforcement of Knowledge and Skills*, *Laid-Back Learning Environment* and *Tailored-Fit and Holistic Learning*. *Sharing and Reinforcement of Knowledge and*

*Skills* was defined as the mutual sharing of knowledge and skills of the young nurse mentor and the nurse mentee and was echoed by participant April:

*"Syempre I want to makapag-share pa ng knowledge sa ibang tao especially sa mga magiging nurses in the future kasi na-experience ko na, kasi yung ibang kasama ko parang kulang pa sila sa skills kaya dapat sana nung college pa sila alam na nila yung mga skills na mga yun."* (I wanted to share knowledge to others, especially the future nurses because I have experienced that some of my colleagues lack some skills that should have been part of their nursing foundations.)

Being in the second phase of young nurse mentoring, the young nurse mentor and the mentee had already created a *Laid-Back Environment*, the second subcategory. In this atmosphere, learning, experience and professional growth was nurtured as shared by participant "Francis":

*"Tsaka iba kasi yung way ng pagtuturo ngayon, I can say na iba kasi dati lecture lang or dinemo. Ngayon eh may interaction. Yung hindi na-bobore yung tinuturuan kasi nga included sya sa learning nya and parang mas may energy at mas nakaka-relate ang bawa't isa kasi nga mas bata."* (Teaching had changed nowadays. I can say that it is no longer the usual lecture or demonstration, it is now interactive. It is less boring because the mentee is involved in the learning process. Also, young nurse mentors have more energy and that they can relate [with their mentees] because of the minimal age difference.)

*"Yung mentors na mas fresh and updated ang mga ideas, syempre may help din dyan ang technology that makes learning cool. Yung tipong natututo ka ng hindi nahihirapan at nag-eejoy at the same time natututo na pala."* (Young mentors have fresher and more updated ideas with the help of technology that makes learning cool. Learning has become more comfortable and you enjoy while learning.)

The third subcategory was *Tailored-Fit and Holistic Learning* where the teaching-learning dynamics were adjusted from time to time to suit the

needs of the nurse mentee and the capability of the young nurse mentor as captured by the statement of participant "Francis":

*"Siguro ang masasabi ko lang is that, one should be sensitive sa mga learning needs ng isang baguhan. Hindi lang sa learning needs but also one should be dealing a person holistically. Kailangan din i-consider mo yung mismong recipient kasi kung di natin gagawin yun di rin magiging effective ang pagtuturo."* (All I can say is that one should be sensitive to the learning needs of a novice but also on how to deal with them holistically. You have to consider the recipient because if you are not going to do that, teaching will be ineffective.)

The third and final phase was "*Pakikisama and Pakikibagay*", related to the mentoring connections of the young nurse mentor and the mentee that had developed throughout the mentoring experience. Three subcategories were identified, *Mentor-Mentee Compatibility*, "*Hiya*" and "*Barkada*". *Mentor-Mentee Compatibility* was described as the "same vibe" of the young nurse mentor and the mentee:

*"Sa ngayon ang practice ko sa ngayon sa mga medyo matagal ko nang nakakasama medyo na-memorize ko na yung actions nila kumbaga. Kapag toxic na sila or hindi. Kung alam nila yung isang bagay o hindi. Uhm ayun ewan ko kung paano pero basta na-develop na lang siguro over the years."* (My current practice with the ones I have grown accustomed to is that I have learned to read their actions. I know if they are 'toxic' or not, they don't know what they are doing. I don't know, I may have developed that [instinct] over the years.)

Having the "same vibe" removes the Filipino concept of "*hiya*" in the *Mentoring Relationship*; the second subcategory explains the roots of "*hiya*" from the perspective of the mentor and the mentee as reflected by participants Erich and Cangel as either:

*"Mas matanda ako sa kanya so nga dapat mas marami akong alam, mas marami akong experience pero bumalikad ngayon eh. Iba kasi yung expectation na ako yung mas matanda tapos nagmementor sa akin eh mas bata pa sa akin ng 3 years at dahil lang mas may experience siya sa akin."* ("I am older than they are and I have

more experience" was supposed to be the scenario. Expectations are different when the mentor is younger than the mentee just because the mentee has more [clinical] experience.)

*"Parang na-iintimidate sila kasi magkaka-age lang kami, usually mas matanda pa sila, senior batches, na-iintimidate sila syempre."* (The mentee is usually intimidated either because they are older or we are in the same age range.)

Meanwhile the participant Drei expressed that "hiya" could be eventually be minimized:

*"Nawawala din naman yung "hiya" kapag tumagal eh kasi nagkakakilala na kayo ng style. Something na naturally dumadating, hindi pinipilit."* ("hiya" is eventually eliminated through time because you get to know each other's [working] style. This comes naturally and is not forced.)

With the neutralization of "hiya", a deeper relationship is developed - the "Barkada". The "Barkada" covers the dual role of the young nurse mentor as a friend and as a mentor almost simultaneously.

*"Hindi ko alam, basta nung nakilala ko na siya, parang naging mas madali ang yung pakikitungo. Kabiruan mo na kasi, alam mo na yung kiliti niya. Tapos kapag kunwari wala na kami sa ward, tinatawag na naming siya ah sa pangalan niya. Wala na kasing "hiya", "hiya" kasi nga barkada na kayo."* (I don't know, I just get to know them because it helps in the relationship. You get to know their quirks. Outside of the workplace, we call them by their first name. "Hiya" is gone because we are now friends.)

## Discussion

The core category, *Professional Commitment* guided the timeline of the relationship where it was present from the first phase until the third phase of the relationship as seen in Figure 1. In the first phase, *Essentials of Young Nurse Mentoring (Signed)*, the young nurse mentor and nurse mentee agreed to enter the relationship as partners; *Service Orientation* was now switched on. *Service Orientation* became the main spotlight and focused on the mentoring process. The

*Service Orientation* of the young nurse mentors was deeply rooted in the very being of the young nurse mentors because they were fully aware that they had the responsibility towards their fellow nurses and that they genuinely wanted to be of service to the new nurses who were transitioning into clinical practice.<sup>15</sup> It was also during this phase that nurse mentors pledged their commitment to support and develop their nurse mentees. On the other hand, the nurse mentee expressing his/her interest in building a mentoring relationship with the chosen young nurse mentor completed the prerequisites of the mentoring relationship. Further, the *Professional Commitment* started to give color and texture to the relationship since it was during this phase that mentor and the mentee established a mutual understanding on how mentoring was going to be conducted in their particular context.<sup>16</sup> Therefore, given this scenario, the mentor's *Professional Commitment* thus facilitated the encouragement of the learning attitude of the nurse mentee through open communication.

As time passed, the mentoring relationship moved on to the succeeding phase of the young nurse mentoring which is *Real Learning Experience (Sealed)*. In this phase, it became evident that the dynamics of traditional mentoring also applied in the context of young nurse mentoring in the clinical environment. In this phase of the mentoring relationship, the mentor began to get to know his/her mentee at a deeper level. The young nurse mentor now understood the working and learning style of the nurse mentee as well as his/her strengths and weaknesses. It was through continuous assessment and evaluation of the mentee and his/her progression that the young nurse mentor was able to personalize the mentoring service he/she needed to provide.<sup>16</sup> Moreover, the creation of a laid-back learning environment aided both the young nurse mentor and mentee in maximizing the mentoring relationship.<sup>17</sup> A maximized mentoring relationship enabled the nurturing of the mentee's learning and experience in the clinical area which greatly contributed to his/her professional growth and development.

The next phase of the young nurse mentoring relationship, *"Pakikisama and Pakikibagay"* (*Delivered*), became overshadowed by the mentoring process. During this phase, the young nurse mentor and mentee continued to work on their differences

and celebrate their similarities in order to keep the relationship in constant check. The constant compatibility check between the stakeholders of the relationship helped in the cultivation of a trusting relationship that enabled them to get to know each other's quirks and opinions that could affect the relationship. This compatibility affected the social interaction between the mentor and the mentee which highlighted our Filipino culture of "barkada" and "hiya". "Hiya" in the mentoring relationship was dependent on which perspective it was based. On the part of the young nurse mentor, "hiya" was initially present in the relationship because the nurse mentor took into consideration that his/her mentee may be older and giving feedback might become an issue. Meanwhile, from the perspective of the nurse mentee, "hiya" sprang from the feeling of inadequacy in terms of knowledge and skill. However, it is important to note that at this phase of the young nurse mentoring, the relationship had reached a deeper level where "hiya" had been neutralized or eliminated because of the strong bond that developed, contributing to the development of "barkada". In the young nurse mentoring context, "barkada" was a strong social bond that united the nurse mentor and the mentee in their growth as

professionals resulting in the progression of the practice of nursing.

As this third phase established and developed, it returned into the second phase through its process, transcending personal and professional relationships and characterized by the progression of practice. These two phases became cyclical as the relationship continued to develop. Thus, this seemingly vague interplay of the traditional mentoring and the Filipino concepts "hiya" and "barkada" that affected social interaction of the mentor and mentee became a distinct characteristic of young nurse mentoring.

Finally, the characteristics and processes of *Professional Commitment* are depicted in color (Figure 1) because they provided "color and texture" to the young mentoring experience while *Professional Commitment* is depicted in black and white because it symbolizes the gray areas of this core category. One of gray areas of *Professional Commitment* may be traced back to the drivers that caused young nurse mentors to be involved in a mentoring relationship which were "comes with the job" and "genuine desire to help". Despite the gray areas of *Professional Commitment* in the young nurse mentoring context, the experience was given life by colorful properties such as *encouraged learning attitude, nurtured learning and professional*



Figure 1. "It's All About Them": A Grounded Theory on Young Nurse Mentors

progression, maximizing the mentoring relationship and transcending personal and professional relationships. In this study, due to the service orientation of the young nurse mentor where he/she offered himself to help in the development of the nurse mentee the researcher found it appropriate to incorporate a line in a Stevie Wonder song, "Signed, Sealed, Delivered, I'm Yours" to capture the entirety of the "mentoring" provided by young Filipino nurse mentors. Finally, to give a "face" to *Professional Commitment* we went back to the data, where one of the participants, Cangel, verbalized :

*"Yung talagang you want to reach, reach out to them ... not about money, not about any goods in particular, but to reach out sa kanila na you are affectionate. You feel the empathy kung ano alam, kung saan sila nahihirapan doon ka nagcoconcentrate, parang ganun[...]. I don't have an example, pero ayun nga I just try to think na I want to be in their shoes. It's all about them, it's not about me, it's all about them. I don't know how to explain it."* ("I just wanted to reach out to them... It's not about the money, not about any goods in particular, but to reach out and show that you are affectionate. You feel empathy; help them work on their weaknesses. I don't have an example but I just want to be in their shoes. *It's all about them*, it's not about me, *it's all about them*. I don't know how to explain it.")

Therefore, staying true with the purpose of this research endeavor and discovering the conceptual elements of young nurse mentoring in the clinical practice setting, this study offers the following definition: mentoring in a clinical nursing environment is a complex multi-purpose interaction which allows the young nurse mentors to be able to act on their service orientation by focusing on the mentoring process. The professional mentoring relationship naturally and gradually develops into a transcending personal and professional relationship where the activities of the people in the "barkada" share a mutual bond of commitment to nurturing all aspects of their growth - academic, professional and personal - in a very Filipino way.

**Conflict of interest** None

## Acknowledgements

The author would like to thank Dr. Jesson V. Butcon for his guidance throughout the research process and data analysis, and Dr. Teresa Yap, Ms. Arianne Coballes and Dr. Sherlyne Acosta for technical inputs as research panel.

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# Students' perceptions of the learning environment in the University of East Ramon Magsaysay Memorial Medical Center, Inc.

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## Abstract

**Introduction** The influence of the learning environment on learning outcomes has been shown in several studies. The study sought to describe the learning environments of selected classes in the UERMMMCI and to identify areas for improvement.

**Methods** The study utilized the Dundee Readiness Education Environment Measure (DREEM). The DREEM is a 50-item questionnaire with a Likert-type scale which was administered in one session to Year Level 2 students of the Colleges of Medicine, Nursing, and Allied Rehabilitation Sciences. Class means on each item were computed and items were clustered according to the following subscales: teaching and learning, teachers, academic self-perception, social self-perception and atmosphere.

**Results** The responses indicated a favorable or positive perception of all factors. Students were generally contented and had good comments on their learning, their teachers and personnel, and the physical environment. Areas that needed improvement were assessment of learning and support services, such as the canteen and library.

**Conclusion** The respondents of the study had favorable perceptions and were generally satisfied with the faculty, personnel and physical facilities in UERMMMCI.

**Key words:** Learning, learning environment, students' perceptions

**T**he influence of the learning environment on the experience and learning outcomes of students has

been shown in several foreign<sup>1-4</sup> and local studies, including that of Mencias and Rivera<sup>5</sup> and unpublished studies by the faculty of the College of Allied Rehabilitation Sciences of the University of the East Ramon Magsaysay Memorial Medical Center Inc. (UERMMMCI). The quality assurance for Outcome Based Education (OBE) includes the learning environment as one of the components of the framework.<sup>6</sup>

Studies of the learning environment, as experienced by the students, present more valid measures for the following reasons: (1) the students are the clients or recipients of the interaction, (2) the

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Presented in the 17th Annual Research Forum, February 17, 2015, University of the East Ramon Magsaysay Memorial Medical Center, Quezon City

students are present in almost all sessions, and (3) the students in a class see the environment from various perspectives. Students' perceptions of the educational environment give a better representation of what really happens in the classrooms.

Harden and Laidlaw<sup>7</sup> cite Genn "that while education climate may seem rather intangible, unreal and insubstantial, its effects are pervasive, substantial, very real and influential." Among the factors that contribute to and influence the learning of the students are (1) how students are taught and the strategies adopted, (2) how they are assessed, (3) types of teaching and clinical experiences offered, (4) what they are taught, (5) values expressed by teachers, and (6) physical factors.

Many instruments for classroom observations use Likert-type questionnaires because these are easy to administer and interpret. Such questionnaires are favored over other data collecting tools because they are considered "low inference" and they elicit responses on the raters' perceptions of the object of study. This study used the Dundee Ready Education Environment (DREEM) developed by McAleer and Roff<sup>8,9</sup> at the University of Dundee in 1997, who incorporated inputs from 80 international educators who visited Dundee from 1995 to 1997. DREEM is a tool that can be used to evaluate education environments of medical and other health professional schools.<sup>4</sup> The review of studies done by Miles<sup>10</sup> concluded that the DREEM was the most suitable instrument for learning environments.

The study sought to describe the learning environments of selected classes in the UERMMMCI and to identify areas for improvement. The results of the study will provide feedback to teachers and administrators on students' perceptions of the learning environment of students in the Basic Medical Education, Nursing, and Physical Therapy programs. It will complement other studies on the curriculum and faculty evaluation.

## Methods

This was a survey of second year students from the College of Medicine (COM), College of Nursing (CON) and College of Allied Rehabilitation Sciences (CAREs) enrolled in the second semester of school year 2013-2014 conducted in February 2014. Students who were absent during the survey and irregular students were excluded. No sampling was done as the intention was to get the perceptions of all subjects

in the target population. The study was approved by the respective deans of the three colleges involved and by the Ethics Review Committee.

The instrument used was the Dundee Ready Education Environment (DREEM), a 50-item questionnaire with a 5-point Likert-type scale that measures the respondents' perceptions of learning, teachers, academic self, social self and atmosphere. The responses range from "strongly agree" to "strongly disagree". Forty items were stated positively and the rest were stated negatively. The investigators modified the DREEM by adding two open-ended questions at the end: (1) "List down three (3) things you like at UERMMMCI" and (2) "If you could change three (3) things in school, what would they be?" Two questions on learning were replaced with two questions on assessment. Some items were edited to use terms more familiar with the target respondents. Faculty members designated by their respective deans arranged the schedule and administered the questionnaire to the target student groups. Students were given adequate time to answer the questionnaire before the start of the class.

The responses to the questionnaires were scored by the members of the study group. Positively stated items were scored 4 for strongly agree (SA), 3 for agree (A), 2 for uncertain (U), 1 for disagree (D) and 0 for strongly disagree (SD). Negatively stated items were scored 4 SD, 3 D, 2 U, 1 A, 0 SA. Mean scores were computed for each item and for each subscale (perceptions of learning, teachers, academic self, social self and atmosphere) using Excel and checked by manual computation. The mean scores were interpreted as follows: < 2 = negative and is problem area, 2 to 3 = area that is positive and could be enhanced, > 3 = area that is high positive and should be sustained. The answers to the open-ended questions were recorded verbatim. Similar answers were tallied to obtain frequency and trends were determined by content analysis.

## Results

Four hundred ninety-six students from the three colleges answered the questionnaire for an 87.1% response. Two-thirds of respondents were from the College of Medicine (Table 1). It took the respondents 20 to 40 minutes to answer the questionnaire. The results of the mean scores of respondents from each college on the different items in each of the subscales are presented in Tables 2 to 6. Items with mean scores

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of 2 or less are least favorable or negative (†) while items with mean scores of 3 or more are most favorable or positive (\*). The original numbers of the items in the questionnaire were retained for easy reference.

Table 2 shows that the students' perceptions of their learning and teaching were generally positive. However, the physical therapy students gave lower scores in this subscale. Nursing students rated five statements (16, 20, 22, 38 and 44) high (3.00 to 3.30). The medical and physical therapy students also rated these items higher than other items but their scores ranged from 2.43 to 2.93. Item 16, on developing the student's competence, received the highest overall score in this subscale. It was the highest scored item among all the colleges; nursing students gave the highest score. Based on the scores, two areas for improvement were over emphasis on factual learning and on assessments.

The students generally had a positive perception of their faculty as shown in Table 3. The nursing

students gave higher scores while the physical therapy students gave lower scores in this subscale. Students from all three colleges perceived their teachers as knowledgeable and well-prepared; they explained clearly and communicated well with students as shown in the scores of items 2, 19, 37 and 40. Item 8, "teachers ridicule their students" and item 39, "teachers often get angry in class" were negatively stated but most students disagreed with these statements and when compared with item 6, "teachers are patient" these responses show that student perceived their teachers favorably on these traits.

Students generally perceived their academic self in a positive way as seen in Table 4. The nursing students gave the highest scores while the physical therapy students gave lower scores. Statements 10, 21, 26, 31 and 45 were rated high by nursing and medical students. These ratings were supported by their responses to the open ended questions where they described their teachers as being kind, compassionate, nurturing. Although there were

**Table 1.** Number of respondents from the Colleges of Medicine (COM), Nursing (CON) and Allied Rehabilitation Sciences (CAREs).

College	Number of students	Number of respondents	Percentage of respondents
COM (Section A)	203	191	94.1
COM (Section B)	186	146	78.5
CON	70	57	81.4
CAREs (PT)	108	102	94.4
Total	567	496	87.1

**Table 2.** Number of respondents from the Colleges of Medicine (COM), Nursing (CON) and Allied Rehabilitation Sciences (CAREs).

Statements	COM(A)	COM(B)	CAREs	CON	Overall
1. I am encouraged to participate in class.	2.23	2.43	1.76?	3.25*	2.42
7. The teaching is often stimulating.	2.11	2.26	1.80?	2.79	2.24
13. The teaching is student-centered.	2.37	2.65	1.76?	2.95	2.41
16. The teaching helps to develop my competence.	2.42	2.93	1.87?	3.30*	2.63
20. The teaching is well focused.	2.38	2.84	1.78?	3.16*	2.54
22. The teaching helps to develop my confidence.	2.30	2.55	1.89?	3.12*	2.46
24. The teaching time is put to good use.	2.25	2.54	1.80?	2.98	2.39
25. The teaching over emphasizes factual learning.	1.39?	1.41?	0.98?	1.19?	1.24?
38. I am clear about the objectives of the course.	2.36	2.92	1.74?	3.00*	2.51
44. The teaching encourages me to be an active learner.	2.22	2.58	1.80?	3.00*	2.40
47. Long term learning is emphasized over short term learning.	2.15	2.46	1.82?	2.74	2.29
48. The assessment is based on learning objectives.	2.43	2.86	1.79?	2.98	2.52
49. There is too much emphasis on assessments.	1.69	1.78	1.50?	1.23	1.55
Means of scores	2.18	2.47	1.71?	2.74	

**Table 3.** Mean scores of students' perceptions of teachers.

Statements	COM(A)	COM(B)	CAReS	CON	Overall
2. The teachers are knowledgeable.	2.64	3.34	1.78?	3.68*	2.86
6. The teachers are patient.	2.41	2.79	1.91?	3.14*	2.56
8. The teachers ridicule the students.	2.66	2.83	2.40	2.05	2.48
9. The teachers are authoritarian.	2.17	2.02	1.76?	1.54?	1.87?
19. The teachers have good communication with students.	2.32	2.56	1.75?	3.11*	2.44
29. The teachers are good at giving feedback to students.	2.27	2.50	1.88?	3.00*	2.41
32. The teachers provide constructive criticism.	2.38	2.82	1.79?	2.98	2.49
37. The teachers explain clearly.	2.31	2.66	1.90?	3.09*	2.49
39. The teachers often get angry in class.	2.94	2.76	2.28	2.32	2.58
40. The teachers are well prepared for their classes.	2.42	2.94	1.74?	3.00*	2.52
Mean of scores	2.45	2.72	1.92?	2.79	

**Table 4.** Mean scores of students' perceptions of academic self.

Statements	COM(A)	COM(B)	CAReS	CON	Overall
5. Learning strategies that worked for me before continue to work for me now.	2.04	2.07	1.76†	2.91	2.20
10. I am confident about my passing this year.	2.33	3.03*	1.79†	3.05*	2.55
21. I feel I am being well prepared for my profession.	2.41	2.80	1.69†	3.09*	2.50
26. Last year's work has been a good preparation for this year's work.	2.38	2.80	1.75†	3.00*	2.48
27. I am able to memorize all I need.	1.65†	1.17†	1.91†	2.37	1.78
31. I have learned a lot about empathy in my profession.	2.58	3.06*	1.84†	3.12*	2.65
41. My problem-solving skills are well developed here.	2.32	2.73	1.81†	2.93	2.45
45. Much of what I have to learn seems relevant to health care.	2.55	3.21	1.82†	3.25*	2.71
Mean of scores	2.28	2.61	1.80	2.97	

variations in the rating of students in different sections/colleges, the rating of statement 27 (memorization) was consistently low across all colleges.

The students' scores were generally positive on the subscale on social self (Table 5). Item 15 "having good friends in this school" and item 46 "my living accommodation is pleasant" were scored as highly positive. The CON students also expressed agreement that they had forged friendships in school. COM students cited that they had good friends in school and the school offered good extracurricular and social activities. Two problem areas identified by the students were boredom and poor support system.

Students' perceptions of the atmosphere in school were generally positive as seen in Table 6. The physical therapy students were noted to give lower scores compared to the other students. Although students found the atmosphere in their classes relaxed, they

admitted that they had a lot of stresses as shown in item 3 in Table 5 and item 42 in Table 6. On the other hand, students also agreed that they had support when they were stressed. In the responses to the open ended questions, students said that one of the things they like were their friends and the personnel whom they described as, "Almost everyone is nice from the consultants, to staff, janitors and others." Students also verbalized their appreciation of clean classrooms and restrooms, multimedia room, equipped skills lab and the availability of the Wi-Fi facilities. A concern expressed by students was cheating.

Table 7 shows the items with the highest mean scores. The two statements marked with an asterisk (\*) are negatively stated, scoring was reversed. The values of 2.93 and 2.58 indicate that the students' perceptions were positive and favorable, meaning that their experience in UERMMMCI and their classes

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were not disappointing and their teachers did not often get angry in class. The items with the three highest mean scores belonged to the atmosphere,

social self and teacher subscales. The teacher, academic self and learning subscales had the most number of items with the highest scores.

**Table 5.** Mean scores of students' perceptions of social self.

Statements	COM(A)	COM(B)	CAReS	CON	Overall
3. There is good support for students who are stressed.	1.97†	1.81†	1.91†	2.65	2.08
4. I am too tired to enjoy the course.	2.14	2.20	2.65	2.15	2.28
14. I am rarely bored in this course.	1.96†	1.96†	1.99†	1.79	1.92
15. I have good friends in this school.	2.69	3.54	1.88†	3.47*	2.90
18. My social life is good.	2.25	2.89	1.82†	2.96	2.48
28. I often feel lonely.	2.63	2.58	2.36	2.37	2.48
46. My living accommodation is pleasant.	2.45	3.13*	1.83†	3.09*	2.62
Mean of scores	2.30	2.58	2.06	2.64	

**Table 6.** Mean scores of students' of perceptions of the atmosphere.

Statements	COM(A)	COM(B)	CAReS	CON	Overall
11. The atmosphere is relaxed during clinical teaching.	2.32	2.67	1.83†	2.61	2.36
12. The school schedule is done well.	2.02	1.93†	1.89†	1.82†	1.92
17. Cheating is a problem in this school.	2.28	1.82†	1.96†	2.05	2.03
23. The atmosphere is relaxed during lectures.	2.53	3.12*	1.79†	3.05*	2.62
30. There are good opportunities to develop interpersonal skills.	2.26	2.66	1.83†	2.89	2.41
33. I feel comfortable in my class socially.	2.39	2.98	1.83†	3.12*	2.58
34. The atmosphere during tutorials is relaxed.	2.44	2.69	1.86†	2.80	2.45
35. I find my experience here disappointing.	2.99	2.95	2.97	2.81	2.93
36. I am able to concentrate well.	2.09	2.32	1.85†	2.47	2.18
42. The stresses outweigh the enjoyment of the course.	1.94†	1.98†	1.60†	1.60†	1.78
43. The atmosphere motivates me as a learner.	2.30	2.62	1.84†	2.89	2.41
50. I am able to ask the questions I want.	2.18	2.47	1.79†	2.79	2.31
Mean of scores	2.31	2.52	1.92	2.58	

**Table 7.** Items with the highest mean scores.

Statement	Subscale	Mean score	Rank
I find my experience disappointing.*	Atmosphere	2.93	1
I have good friends in this school.	Social self	2.90	2
The teachers are knowledgeable.	Teachers	2.86	3
Much of what I have to learn seems relevant.	Academic self	2.71	4
I have learned a lot about empathy in my profession.	Academic self	2.65	5
The teaching helps to develop my competence.	Learning	2.63	6
The atmosphere is relaxed during lectures.	Atmosphere	2.62	7.5
My living accommodation is pleasant.	Social self	2.62	7.5
The teachers often get angry in class.*	Teachers	2.58	9.5
I feel comfortable in my class socially.	Atmosphere	2.58	9.5
The teachers are patient with students.	Teachers	2.56	11
I am confident about my passing this year.	Academic self	2.55	12
The teaching is well focused.	Learning	2.54	13
The assessment is based on learning objectives.	Learning	2.52	14.5
The teachers are well prepared for their classes.	Teachers	2.52	14.5
I am clear about the objectives of the course.	Learning	2.50	16.5
I feel I am being prepared well for my profession.	Academic self	2.50	16.5

\*Negatively stated, scoring was reversed

Table 8 shows the items which received the lowest scores. The over emphasis on factual learning had the lowest score and not far behind was the item on memorization. The last two items on Table 8 indicate that students wanted the schedule to be improved and that they were bored in their courses. These items were negatively stated and students should have disagreed if they had positive perceptions. As with other negative items, the scoring was reversed and results showed that students truly agreed with these statements.

In the open-ended question which asked what they like, students responded that their teachers were “kind, compassionate, approachable, effective, inspiring, helpful, competent, motivating.” Students also wrote that their teachers “are not only knowledgeable but also value-oriented.” Another response was, “they emphasize the true meaning of empathy.” Among the practices and facilities that the students cited in their responses to the open ended questions were the opportunities to discuss matters with the administrators, “they talk and listen to students,” “they get feedback from students.”

Regarding suggestions on what they want to change, the responses of students covered a wide range of concerns from financial to class size, cheating, and food or canteen services. Some responses were: “we want to know where our fees are going,” “there are fees for certain stuff like school papers but we cannot see any publication” and “no tuition fee increase every year.”

In general, students were satisfied with the teaching methods but they would like to have standardized preceptorials, smaller classes and earlier community exposure. Students cited the student centered approach of teaching, skills laboratory and clinical experiences as favorable. Some comments

given were: “feedback on exams should be more than just telling the correct answer but also telling why,” “the way questions are asked in exams are too plain and encourage memorization,” “professors should also use the board to make things clearer, PowerPoints are not enough.” Suggestions on services include longer library hours and availability of infirmary services during lunch breaks. Several students expressed that they want “more food choices, more affordable food and better canteen facilities.

**Discussion**

The students generally gave scores in the positive range in all five subscales. However, the low scores of the physical therapy respondents cannot be ignored since these affected the overall mean scores. Possible reasons for their low scores are a previous exposure to the questionnaire and the higher number of “Uncertain (U)” choices that they selected compared to the COM and CON students. Unlike medical and nursing students who answered the DREEM for the first time, the physical therapy students had been respondents to the questionnaire in their first year. This experience may have raised their expectations and resulted in lower scores this year. Polali and Price noted in a similar study on learning environments that first-time respondents held more favorable perceptions than second- or third-time respondents. They explained that “as students progress through medical school, they perceive deterioration in factors in the learning environment which include a growing cynicism.”<sup>11</sup>

The scores from Table 2 (perceptions of learning and teaching) indicate that students think that teaching is well focused, it helps develop their confidence and their competence, teachers encourage them to be active learners and they are clear about

**Table 8.** Items with the lowest scores.

Statement	Subscale	Mean score	Rank
The teaching over emphasizes factual learning.*	Learning	1.24	1
There is too much emphasis on assessments.*	Learning	1.55	2
I am able to memorize all I need.	Academic self	1.78	3.5
The stresses outweigh the enjoyment of the course.*	Atmosphere	1.78	3.5
The teachers are authoritarian.*	Teachers	1.87	5
The school schedule is done well.	Atmosphere	1.92	6.5
I am rarely bored in this course.	Atmosphere	1.92	6.5

\*Negatively stated, scoring was reversed

the course objectives. The nursing students, in particular, feel that their competence is being developed. This may be due to the explicit explanation of the nursing faculty to the students that they are honed and evaluated based on the core competencies prescribed by the Board of Nursing. Such reference leads to more awareness of the outcomes and development of mastery. Medical students also rated these items favorably although not as high as those of nursing students. According to Ames and Archer, when the orientation of learning is geared toward a mastery goal, students' motivation to engage in effective and long term strategies increase.<sup>12</sup> As a result, students generally feel that they are trained to be more competent.

Two problem areas were identified by students in all colleges - items 25 and 49. Most students perceive that teaching over emphasizes factual learning and there is too much emphasis on assessment. These may be related to item 27 where students said they feel that they cannot memorize all they need. The perception of overemphasis on factual knowledge may be due to the heavier subject load in the second year compared to the first year. There are also time constraints in teaching voluminous amounts of basic knowledge.

The study of medicine relies heavily on factual knowledge but this study also underscores the need to further emphasize higher cognitive skills during teaching-learning activities. Students commented that critical thinking should be encouraged and one student commented, "We want to learn more about the thinking process to become doctors." Despite the heavy workload and schedule, students commended the curriculum and academic program. Sixty-five students expressed appreciation for the preceptorial classes, small group learning sessions, remedial classes and tutoring offered in the school, as well as the focus on patient care and clinical exposure.

The perception of overemphasis on assessments is not surprising. Students feel pressured not only with the periodical theoretical and practical examinations but also the clinical histories, case discussions and objective structured clinical examinations (OSCE). The second year medical students are also assessed through a comprehensive examination before they are promoted to the third year where they have more clinical and professional courses. Assessment is inevitable to ensure that students have acquired the necessary knowledge and

skills before going to the clinics. Likewise, educators are obliged to inform students how they will be assessed and the importance of assessments. One of the practices that students like is the feedback after the exams, but there was also a suggestion that the feedback should include explanations of the rationale for the answer and not just stating the correct answer. The CHED Implementation Handbook for OBE and ISA describes "assessment as an interactive process between the learners and the faculty and mutually beneficial to both... Assessment improves the learner's learning; it likewise improves the teacher's teaching."<sup>2</sup>

Students described their teachers not only as knowledgeable but also value-oriented, effective, nurturing kind, compassionate, friendly and inspiring. The faculty is one of the greatest assets of any school and it is good to note that students perceive their teachers positively. On the other hand, students perceived their teachers as authoritarian, considered a negative trait in the Dundee inventory. In this study the perception of being authoritarian may be viewed in context that a number of faculty in the CON and COM are 40 years or older, and teachers who demand that students perform according to "difficult standards".

In the academic self subscale (Table 4), the only item to score negatively was on memorization. This indicates that there is a lot of memorizing required and they are not able to do this. This may be related to the over emphasis on factual learning in the learning and teaching subscale (Table 2).

One factor which may have contributed to the positive perception of social self (Table 5) is the block system of sectioning. It may be conducive to formation of friendships which also serve as a support system, as cited by both nursing and physical therapy students in the open-ended questions. The mentoring program also provides support to stressed students although a few commented that some mentors do not meet them regularly. This implies the need to strengthen the mentoring program. The restoration of the Office of Student Affairs (OSA) to initiate and monitor extracurricular activities and the strengthening of the Guidance and Counselling Center (GCC) were intended to provide support and address the social needs of students. This survey was conducted the year before the OSA and the GCC became functional. It is expected that through these offices the students would be involved in more in

activities such as “Mr. and Miss Nursing” pageant, sports fests, retreats and other events which students found helpful for their holistic development.

Students’ perceptions that there is too much emphasis on assessments, that teaching emphasizes factual information and that they could not memorize all that they need may be related to the problem of cheating. Students in all three colleges shared this perception. This finding has strong implications on the assessments that students are subjected to and which the faculty should evaluate. Students commented on the need to improve security and install CCTV cameras to deter cheating. Students were aware that their classmates were taking inappropriate measures to pass examinations. This indicates that teachers should institute stricter measures and strengthen policies and impose external controls on cheating. More importantly, teachers should investigate the conditions or culture of why and how students cheat. External controls can be instituted but transformation and development of integrity is a must.

Responses to the open ended questions may help clarify these perceptions. Students said they wanted more extracurricular activities and that they liked preceptorials. They also suggested that schedules or changes in scheduled activities should be made earlier and better coordinated. These concerns are being addressed by the Office of Student Affairs and the mentoring program. Faster dissemination of information about schedules and other announcements are now coordinated with other services such as the library and the Information Technology Department. The students also mentioned these two services, library and Wi-Fi, as among the things they liked.

In summary, (1) the respondents have favorable perceptions of their teachers, their classmates, the curriculum and methods of teaching, the physical facilities and the personnel; (2) areas that need to be improved are assessment, content and schedule, and measures to curb cheating; and (3) support services were rated favorably but these should be enhanced with expanded and better services in the canteen, library, and infirmary. In view of these findings, the

faculty and administration should consider the following: (1) enhancing the conditions and practices that were positively rated; (2) responding appropriately to the suggestions of the students; (3) improving conditions that were not rated favorably; and (4) involving the students in finding solutions to some problems or concerns.

### **Acknowledgements**

This study was made possible with the support and cooperation of the administrators, faculty and students of the Colleges of Medicine, Nursing, Allied Rehabilitation Sciences and the Research Institute for Health Sciences, and the assistance of the Guidance and Counseling Center staff.

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# Structural equation modeling: Determining predictors of achievement in the Physician Licensure Examination

Marivic A. Villamor, MD, MHPEd, PhD

## Abstract

**Introduction** This study was conducted to determine predictors of achievement in the Physician Licensure Examination, focusing on the evaluation of a path diagram that illustrates the relationships of achievement in Physician Licensure Examination with key factors: a latent attribute, preadmission academic preparation and medical school academic performance.

**Methods** The records and National Medical Admissions Test results of graduates of the UERMMMCI College of Medicine who took the Physician Licensure Examination from 2010 to 2013 were reviewed. Structural equation modeling was implemented to evaluate fit of the conceptual model to the data.

**Results** The structural equation model applied to 419 graduates showed that the general weighted average in medical school contributed 32.5% likelihood of success in the Physician Licensure Examination. However, the Post-Graduate Internship Board Review had negligible mediation on achievement in the PLE.

**Conclusion** Prediction of achievement in the licensure examination is a function of one's general weighted average in medical school.

**Key words:** structural equation modeling, Physician Licensure Examination, NMAT

The long and arduous years spent in medical school culminate towards passing the Physician Licensure Examination (PLE) as mandated by Republic Act No. 2382 or the Medical Act of 1959, a requirement to practice medicine in the country. As stipulated in Section 8, “no person shall engage in the practice of medicine in the Philippines unless he

is at least twenty-one years of age, has satisfactorily passed the corresponding Board of Examination and is a holder of a valid Certificate of Registration duly issued to him by the Board of Medical Examiners.”<sup>1</sup> A future physician’s practice is therefore contingent on successfully passing the licensure examination. Failure to do so means taking the examination again until one has exhausted the allowable number of attempts at succeeding in the examination or worse, having to enroll in a one-year refresher course.

The framework of the medical curriculum is clearly defined in the Commission on Higher Education (CHED) Memorandum Order (CMO) No. 36 and delineates the goals and content of the medical curriculum. The CMO prescribes the competencies of a primary health care physician which are expected to be taught in all Philippine medical schools and eventually tested in the licensing

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Presented in the 17th Annual Research Forum, February 17, 2015, University of the East Ramon Magsaysay Memorial Medical Center, Quezon City

examination. Therefore, the expectation is the 40 Philippine medical schools should adequately prepare their graduates not only to be competent in the practice of medicine but to pass the licensure examination.

The groundwork towards successful achievement in the licensure examination begins with the acquisition of knowledge and skills in human biology leading to application in the clinical setting. Attainment of these skills is not limited during the medical proper course. Academic proficiency is developed as early as preadmission to medical school. In the past, the required preparatory courses for medicine were science intensive with units in biology, chemistry and physics. Such requirement has been waived allowing non-Bachelor of Science degree holders to seek admission to medical schools. It is a concern of medical school administrators to appraise the use of application data to identify candidates who can successfully meet the challenges of medical education to become competent physicians. It is then essential to analyze the preadmission factors that could contribute success in the medical school and consequently in the PLE.

Several studies have been conducted to establish the factors that predict performance in the PLE. Encelan-Brizuela analyzed selected variables as predictors of successful medical board examination among the University of the East Ramon Magsaysay Memorial Medical Center, Inc. (UERMMMCI) graduates.<sup>2</sup> The authors identified general weighted average (GWA), sex and age as significant predictors in the 2002 board examination. However, for the board examination of 2003, the significant predictors were National Medical Admissions Test (NMAT) score and weighted average in the clinical science subjects.<sup>2</sup> A similar and more recent study from the UP College of Medicine showed that the medical school GWA had the highest correlation to the PLE, followed by pre-medical school GWA. The NMAT scores had the lowest correlation with PLE.<sup>3</sup>

The UERMMMCI College of Medicine regularly monitors the implementation of the medical curriculum. An evaluation of the program is conducted at the end of each academic year to review processes that may be modified for the succeeding year. In addition, the school prepares its students for the licensure examination by conducting weekly review sessions among its fourth year students and the post-graduate interns (PGIs). The conduct of

review sessions is an initiative of the UERMMMCI and is not mandated in the CMO 36. The UERM Department of Educational Measurement and Board Review Courses (UERM-DEMBRC) implements these in-house reviews. It conducts intensive review sessions, providing multiple formats of educational measurement to prepare the reviewees for the licensure examination.

However, it is of interest to determine whether or not these efforts effectively prepare the graduates to practice as physicians. A more pressing question lies on the contribution of these variables to the success in the PLE. Does the preparatory or pre-medical course adequately prepare the students to assimilate the vast knowledge prescribed in the medical curriculum? Is the NMAT percentile score and its components predictive of one's achievement in medical school and in the licensure examination? Are grades in medical school indicative of one's success in paving the path towards the practice of medicine? Is the school where the degree was acquired a factor in the PLE performance? Is the review series associated with success in the PLE? Answers to these shall provide indispensable information for decision-making with regard to the impact of the admission requirements, curriculum implementation, assessment practices and review exercises on the capability of the UERMMMCI graduates to succeed in the PLE. The requisites in the implementation of the medical curriculum have to be analyzed to establish the factors that can contribute to success in the PLE.

The study aimed to determine the predictors of achievement in the Physician Licensure Examination among graduates of UERMMMCI and to formulate a structural equation model incorporating the predictors of achievement. The role of the hypothesized predictors was analyzed using structural equation modeling (SEM) that included a path diagram to illustrate the relationships of achievement in PLE with the key factors such as: a latent attribute, preadmission academic preparation and medical school academic performance, represented by two endogenous variables, GWA in medical school and attendance in a Post-Graduate Internship Board Review.

## Methods

The study used a multivariate design to determine the correlations and covariances between the latent and exogenous variables that can predict achievement

in the Physician Licensure Examination through a review of the records of graduates of the UERMMMCI College of Medicine (COM) from 2009 to 2012. A latent variable, preadmission academic preparation, was proposed as a factor that could influence performance in the PLE. Furthermore, this study measured the mediating effects of the Post-Graduate Internship Board Review sessions, a practice that is unique to the UERMMMCI setting, to prepare the graduates for the PLE. A sample of 419 graduates who took the PLE from 2010 to 2013 was included as sufficient to meet the requirements of SEM. It has been recommended that a sample size of more than 200 can produce empirical conclusions.<sup>4</sup>

A review of records of the UERMMMCI COM graduates from 2009 to 2012 was carried out. Information relevant to the structural model was collated including preadmission characteristics as GWA in pre-medicine course, and NMAT Special Area and Aptitude Scores, premedicine school and course, GWA in medicine, attendance in the PGI Board Review and scores in the PLE.

Data pertaining to the preadmission characteristics of the sample were obtained from various sources that included master lists of NMAT examinees published by the Center for Educational Measurement from 2005 to 2009, the Registrar's Office and COM Admissions Committee. Permission to obtain data from the COM was acquired prior to the study. All information collected were coded and stored in an Excel spreadsheet and converted to SPSS and STATA files. All information pertaining to the scores were kept confidential and anonymous. Analysis of the theoretical model's fit across examinees in the Physician Licensure Examination was performed using structural equation modeling (SEM) and Path Analysis using STATA (Serial number: 93611859953).

Analysis of the SEM was conducted in stages beginning with the graphical representation of the model as a path diagram, discrepancy or fit function where discrepancy or fit between the sample data and the model's attempt to reproduce and iteration to fine-tune the parameter values to make the discrepancy as small as possible.<sup>5</sup> Path analysis using STATA was performed to establish relationship between the predictor variables and covariances of each predictor variable. Confirmatory factor analysis was conducted to determine the measures that indicated the latent trait, preadmission academic

preparation. Three variables served as manifest data to measure the latent trait. GWA in premedicine served as the reference variable.

Model fit was determined using three general fit indices: the chi-square, root mean squares error of approximation (RMSEA) and comparative fit index. The chi-square value is a traditional measure to evaluate overall fit by assessing the magnitude of discrepancy between the sample and the fitted covariance matrices.<sup>6</sup> RMSEA is another fit statistic that is informative in terms of how well the model, with unknown but optimally chosen parameter estimates, would fit the population's covariance matrix.<sup>7</sup>

The mediating effect of the PGI Board Review was tested using the method for testing mediation in psychological research developed by Kenny which involves a series of regression analyses between the predictor and outcome, predictor and mediator and mediator and outcome variable.<sup>8</sup> The total effects were computed based on the correlations between the independent, mediating and dependent variables as recommended by Hair.<sup>9</sup> Regression analysis between the variables was conducted to measure the extent of the correlation between the variables. The output was used to assess the total effect of GWA in medicine was derived using the equation  $Total\ Effects = [(GWA\ Medicine \times PGI\ Board\ Review) + GWA\ Medicine]$ . The final step was to show that the strength of the relation between the predictor and the outcome was significantly reduced when the mediator was added to the model.<sup>8</sup>

## Results

Table 1 shows the demographic profile of 419 graduates sampled for the study. There were more females (67.8%); 63.8% of the study participants graduated from private institutions while the rest obtained their pre-medicine degrees from the University of the Philippines System (Diliman, Manila and Los Baños campuses). Majority of the participants' pre-medicine degree was BS Biology (51.5%). Table 2 shows that 93.6% of the sample passed the licensure examination. There was an increasing trend in the general passing performance: 86.9% in 2010, 96.0% in 2011, 96.7% in 2012 and 100.0% in 2013. The passing rates were consistently higher than the national passing rate. The trend of the participants' overall board performance reflected

the national passing average of the PLE across four years.

The scores of the participants in the 12 board subjects are shown in Table 3. The lowest grade from any subject was 44 while the highest was 94. The examinees performed best in Microbiology and Parasitology and in Legal Medicine. The lowest scores were obtained in Surgery and Anatomy. The

scores indicated an association between subjects that provided competence in similar concepts. A similarity of the examinees' scores in Anatomy (71.36) and Surgery (70.88) is significant because a good comprehension of the concepts in Anatomy prepares students to assimilate the subject matter in Surgery. The scores of subjects related to Internal Medicine approximated the Internal Medicine scores (81.84):

**Table 1.** Profile of UERMMMCI Graduates, 2010-2013 (n= 419).

Year of PLE	Sex		School attended for premedicine degree*		Premedicine degree obtained**	
	Male n (%)	Female n (%)	Private n (%)	Public n (%)	Biology n (%)	Non-Biology n (%)
2010	41 (28.3)	104 (71.7)	95 (66.9)	47 (33.1)	77 (54.2)	65 (45.8)
2011	34 (32.1)	72 (67.9)	58 (56.3)	45 (43.7)	53 (51.0)	51 (49.0)
2012	55 (35.5)	100 (64.5)	103 (66.9)	51 (33.1)	79 (51.3)	75 (48.7)
2013	5 (38.5)	8 (61.5)	7 (53.8)	6 (46.2)	4 (30.8)	9 (69.2)
Total	135 (32.2)	284 (67.8)	263 (63.8)	149 (36.2)	213 (51.5)	200 (48.5)

\* 7 participants with missing data

\*\* 6 participants with missing data

**Table 2.** Distribution of UERMMMCI Graduates in the PLE, 2010-2013 (n= 419).

Year PLE	Number	Failed (% within Year taken)	Passed (% within Year taken)	PLE National Passing (%)
2010	145	19 (13.10)	126 (86.90)	60.87
2011	106	4 (3.8)	102 (96.2)	67.24
2012	155	4 (2.6)	151 (97.4)	70.48
2013*	13	0 (0.0)	13 (100.00)	48.67
Total	419 27 (6.44)	392 (93.56)		

\* Represents results from February 2013 examination

**Table 3.** Distribution of performance of UERMMMCI graduates in PLE according to subject, 2010-2013 (n= 419).

Subject	Mean (SD)	Range	Median	Mode
Anatomy	71.36 (8.21)	44.00 - 87.00	74	76
Biochemistry	81.51 (3.86)	63.00- 93.00	82	80
Legal Medicine	83.79 (4.06)	59.00 - 94.00	84	84
Medicine	81.84 (4.01)	62.00 - 91.00	82	82
Microbiology-Parasitology	84.04 (3.61)	71.00 - 92.00	84	83
Obstetrics Gyne-cology	78.56 (4.86)	56.00 - 89.00	79	79
Pathology	80.63 (4.85)	59.00 - 90.00	81	82
Pediatrics	78.16 (5.07)	54.00 - 89.00	79	79
Pharmacology	80.43 (5.55)	59.00 - 93.00	81	79
Physiology	80.57 (4.71)	57.00 - 90.00	81	81
Preventive Medi-cine	80.62 (3.97)	60.00 - 90.00	81	81
Surgery	70.88 (7.53)	44.00 - 87.00	72	76
Overall GWA	79.38 (3.60)	68.00 - 88.00	79.83	75.00

Biochemistry (81.51), Physiology (80.57), Pharmacology (80.43) and Pathology (80.63). Comprehension of concepts in these subjects is essential in assimilating concepts in Internal Medicine that deal with recognition, diagnosis and clinical management of diseases.

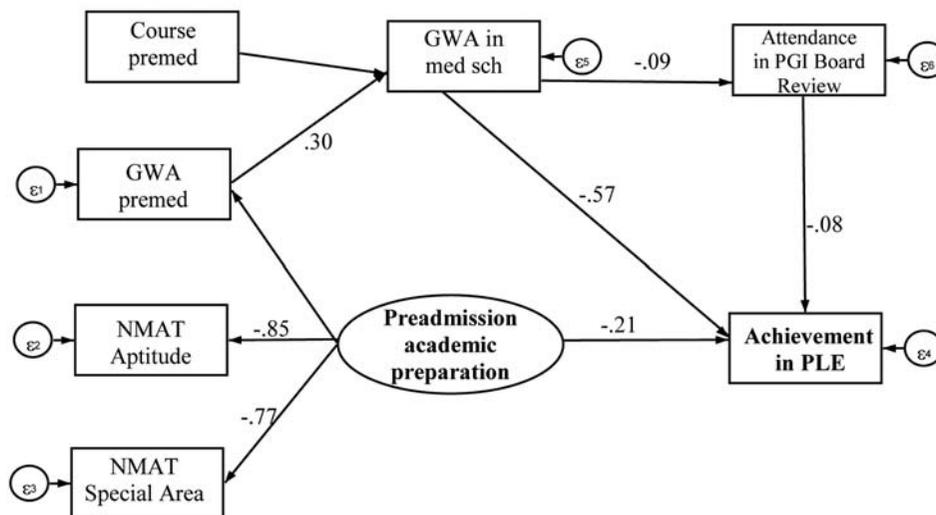
Table 4 presents the distribution of the participants in relation to the NMAT scores. On the whole, the performance of the participant-examinees in the NMAT indicated that 90% obtained a percentile rank higher than the school's cut-off criterion of 55<sup>th</sup> percentile. Thirty-two of the study samples were ranked below the 40th percentile which was lower than the cut-off score set by the school. The mean percentile rank of the participants was 70.90 (SD = 19.83) with a median of 74.0.

Three hundred eighty-nine (93.7%) graduates obtained GWAs ranging from 2.00 to 3.00. This may

be an indication of homogeneity in the participants' academic characteristic ( $p > 0.05$ ). Sixteen participants graduated with a GWA lower than 3.0 implying that at some point in their education they received at a failing grade in at least one subject. Ten of this group took the PLE in 2012. This profile suggests that these participants had to re-enroll a subject resulting in a delay in their graduation. A student can only be promoted to the next year level upon completion of all subjects in the preceding year. Analysis of a hypothesized model of predictors and outcome variables was conducted using structural equation modeling. Figure 1 illustrates the modified model generated after a goodness of fit test and modification were performed. The model illustrates the transformed path relationships between the variables to the criterion, PLE based on the addition of a new path linking GWA in premedicine to GWA in

**Table 4.** Distribution UERMMMCI graduates, NMAT, 2010-2013 (n= 419).

Year of PLE	NMAT Percentile Rank				Total n (%)
	1 - 40 n (%)	41 - 74 n (%)	75 - 99 n (%)	No Data n (%)	
2010	12 (8.3)	59 (40.7)	68 (46.9)	6 (4.1)	145
2011	8 (7.5)	46 (43.4)	48 (45.3)	4 (3.8)	106
2012	12 (7.7)	63 (40.7)	77 (49.7)	3 (1.9)	155
2013	0 (0.0)	6 (46.2)	7 (53.8)	0 (0.0)	13
Total	32 (7.6)	174 (41.5)	200 (47.7)	13 (3.1)	419



**Figure 1.** Modified structural equation model of achievement in PLE (n=383).

medicine. The structural equation model indicated that performance in medicine was influenced by academic performance in the four-year baccalaureate course. Similarly, the GWA in premedicine accounted for 9% of academic performance in medical school. An inverse association signifies that a GWA close to 1.0 would improve the chance of passing the PLE, given all other factors constant. Specifically, GWA in medicine may increase the PLE score by 32.5%.

While the SEM model proved the significant validity of the GWA in medicine to success in PLE, the PGI Board Review attendance was estimated to exert the same influence. The PGI Board Review was institutionalized to augment the preparation of the postgraduate interns for the medical board examination. An unforeseen study inference was the inability of the model to prove a significant predictive validity of the PGI Board Review in both academic performance in medical school and achievement in the PLE.

In contrast to the finding on the contribution of the PGI Board Review to PLE success, the latent factor, preadmission academic preparation ( $p < 0.05$ ), was assessed to significantly influence accomplishment in PLE. However, the relationship was negative: a high preadmission academic preparation score may result in a poor performance in the PLE. This contradictory conclusion is possibly explained by the unidentified mediation of the academic performance in medical school. The preadmission characteristic may have been modified by the learning process in medical school.

The manifest factors used to measure preadmission academic preparation included GWA in premedicine and NMAT component scores. The GWA scale may explain the inverse relationship as it is reported in the nine point scale, with a GWA of 1.0 corresponding to an excellent academic performance. Three reference factors were directly loaded to the latent construct: GWA in premedicine, NMAT Aptitude Score and NMAT Special Score.

The relationships of the predictors of achievement in PLE were analyzed on the basis of the coefficients. However, the output was further tested to address the assumption that PGI Board Review attendance mediated performance in medicine. Mediation was analyzed on grounds that PGI Board Review intervened in the association between GWA medicine and PLE achievement as illustrated in Figure 2.

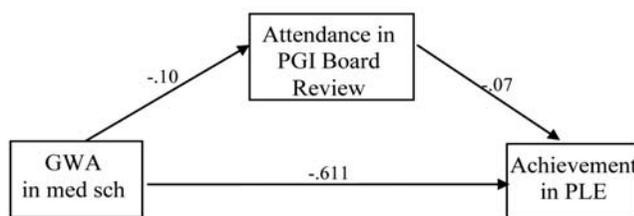


Figure 1. Research flow of the study participants.

The graphical diagram is a representation of the proposed mediation of the PGI Board Review on the overall effect of performance in medical school. Two paths are directly linked to achievement in PLE; concomitantly, attendance in the PGI Board Review was shown to intervene in the relationship between GWA in medicine and achievement in PLE. Scrutiny of the paths clarifies the high direct explanatory effect (-0.61) of performance in medical school on achievement in PLE whereas the direct effect of attendance to the PGI Board Review was minimal (.07). These values by themselves imply a weak mediating effect of the PGI Board Review.

The value of the total effect (-0.604) of GWA medicine was almost the same as the direct effect, despite the mediating effect of PGI Board Review. This result confirms negligible impact of the PGI Board Review as measured in the the structural equation model estimate. In the final analysis, the performance of the participants in medical school remained the most influential factor in determining success in PLE.

## Discussion

Structural equation modeling was used to test a proposed model of the relationships between the academic performance and admission criteria with performance in the licensure examinations for physicians among graduates of the UERMMMCI College of Medicine.

Data analysis had established the factors that were causally related to success in the licensure examination. Among the hypothesized factors, the most significant contribution was academic achievement in medical school. In the same way, a causal association was deduced between the latent trait preadmission academic preparation and PLE. However, the predictive validity of the trait was less sensitive than the contribution of GWA in medical

school. The significant association between GWA in medical school and PLE achievement was an anticipated outcome based on the studies of Encelan-Brizuela<sup>2</sup> and Valbuena.<sup>3</sup>

The general weighted average in medicine is a measure of the overall performance of the students in the first three years of the program depicting achievement in the basic science and clinical science subjects. The strong correlation between this predictor factor and the criterion is explained by the parallel concepts taught in medical school and those tested in the PLE.

The GWA as an indicator of preadmission academic achievement may prove helpful in justifying decisions related to student selection. However, the measurement instruments employed to assess academic achievement may vary across the courses obtained and the schools attended. The confidence on the NMAT as preadmission criterion to any medical school is based on the fact that the test was developed in accordance with psychometric principles. While the CHED recommends a minimum percentile score of 40, medical schools have the prerogative to establish the percentile rank cut-off point for eligibility. As a selection criterion, the UERMMMCI COM set the cut-off at the 55<sup>th</sup> percentile in 2010.

The findings related to the two NMAT subsets may be explained by the learning experiences in medical school which were predominantly teacher-directed. The NMAT aptitude component fundamentally measures the examinee's mental ability including reading comprehension, inductive reasoning, problem solving and data interpretation, and perceptual ability. These learning skills are intermittently assessed in the first three years of medical school. However, the students are expected to demonstrate the skills assessed by the NMAT aptitude component during the clinical application of concepts in the fourth year. The Special Area score, on the other hand, measures concepts in biology, physics, social science, and chemistry. The content coverage of the NMAT Special Area subset is common and basic to the curricula of the degree programs considered as premedical courses.<sup>10</sup>

The NMAT tests the examinees' aptitude and science abilities which are regarded as best suited for learning in medicine. A counterpart test, the MCAT, is administered for admission to medical schools in the United States. The study result on the predictive

value of NMAT special area score is consistent with the inference of a positive relation between of the MCAT and medical school performance.<sup>11</sup> Donnan's conclusion on the predictive function of the MCAT on success in licensure examinations is reiterated in this current study as seen in the significant correlation of preadmission academic preparation with PLE success. Corollary to this, a report from the Center for Education Measurement indicated that NMAT GPS explained 30% of the variation in GWA in medical school of the study population.<sup>10</sup>

Upon completion of the 4-year medical curriculum requirement, a graduate is ready for the board examination. However, a 12-month period between graduation and PLE is devoted for more clinical exposure in a postgraduate internship program. As such, the interval may bring about loss of concepts especially those related to the basic sciences. The university recognized the necessity to assist the postgraduate interns prepare for the PLE, thus the PGI Board Review was instituted. The aim of the program was to augment the knowledge and skills acquired in medical school. The PGI Board Review is integrated in the Post-Graduate Internship program and all PGIs assigned to the UERM Memorial Hospital are expected to attend it. Fifty-two percent (219) of the study sample was accepted to the PGI program of the UERMMMCI from 2009 to 2012. All postgraduate interns accepted to the UERM Hospital were graduates of the institution.

An interesting finding pertains to the model's representation of the relationship between the participant's attendance in the PGI Board Review and PLE achievement. A vital result of the study is the nonsignificant contribution of the PGI Board Review to achievement in PLE. The coefficient of this variable in both the hypothesized and modified models denoted a lack of direct relationship to PLE achievement. The PGI Board Review was reported as a categorical variable with one representing study participants' presence in the review sessions. Half of the study participants attended the PGI Board Review during their postgraduate internship in the UERM Hospital. The modified model indicates that the review sessions have failed to significantly increase the chance of the graduate in succeeding in the PLE.

An alternative explanation of the nonexistence of a significant predictive function of the PGI Board Review in the model could be interns' motivation to attend. The PGI Board Review sessions were

scheduled alongside the daily activities in the clinical setting. A 4-hour long session was held in the afternoons weekly after long hours of patient care. The teaching strategy had been predominantly lecture-based similar to lectures given in medical school. In effect, learning was passive, with a limited environment for active participation and clarificatory interactions. The focus of the participants was consequently divided between absorbing review content and patient care. In most cases, the reviewee preferred to concentrate on attending to the needs of his/her patients. The abovementioned rationale may explain the nonsignificant correlation between attendance in the PGI Board Review and achievement in PLE.

The inferences derived from this study provide essential evidence for decision-making particularly during selection of applicants to medical school. The derived conclusions validated the practice where the NMAT score is a principal source of information in screening and selecting medical students. The NMAT subset scores are significant measures of the construct referred to as preadmission academic preparation which in turn is a valid indicator of achievement in PLE.

The power of the study results was limited by the exclusive use of data collated from a single institution. The study participants from which the data were collected were limited to UERMMMCI board examinees from 2010 to 2013. The modified structural model represented the data from these batches of graduates. The utility of the conclusions from the analysis are therefore true for this sample. However, the structural equation model can be tested for parameter estimates in other batches or expanded in its application beyond UERMMMCI graduates. The study has provided a groundwork upon which further clarification of the casual relationship between student preparatory characteristics and successful performance in the PLE can be done. Furthermore, medical schools can draw on the study findings to evaluate policies governing the admission, education and evaluation of the prospective students and physicians.

The study has verified the existence of multivariate conditions impacting on the performance of UERMMMCI graduates in the Philippine medical boards. Taking into account the contribution of these factors may guide the institution, faculty and students in planning for the Physician Licensure Examination.

Success in the PLE was confirmed to directly improve with exemplary academic performance while in medical school. The first three years of medical education transpire in a variety of learning environments to guarantee adequate and effective instruction. The medical curriculum is designed to equip the learners with competencies to effectively practice medicine. The rigorous training is expected to educate the learners with knowledge, skills and attitudes needed by a physician. It is assumed that the years of learning would be sufficient preparation to pass the licensure examination. However, the predictive merit of the NMAT score is minimal.

The NMAT component scores were confirmed to represent preadmission academic attribute. This validates the current practice of screening of applicants to medical schools. The NMAT scores provide evidence of the academic foundation of the applicants prior to medicine proper. However, the preadmission academic preparation is demonstrated to be negatively correlated with achievement in PLE. Medical schools use the NMAT and premedicine GWA for selecting students. Both measures are cognitive in nature, explaining the confidence of admission committees in relying on this source of information. The application of the NMAT percentile rank as preadmission requirement may be reevaluated to take into account the subset scores which are more descriptive of the examinee's true scores.

Stakeholders like students, faculty, administrators, and patients, may benefit from the study results. An excellent medical education translates to competent health professionals who in turn can effectively render quality health care. The findings may serve as reference for planning and enhancement of the education, training and advising of students. The study is timely in light of the current trend of an increasing number of applicants wanting to get admitted to the 40 medical schools. The playing field has become competitive and admission committees need to guarantee the quality of the admitted medical students, the realization of which depends on a meticulous, objective and thorough selection of applicants to the school of medicine.

In conclusion, the predictive validity of medical school GWA and NMAT score in forecasting achievement in PLE was substantiated. The GWA in medical school exhibited the most significant weight in predicting achievement in PLE. This

finding affirms the quality of the implementation of the medical curriculum in the UERMMMCI. It is apparent that the effective education of the graduates has satisfactorily prepared them to succeed in the medical board examination.

### Acknowledgement

Funding for this endeavor was generously provided by the UERMMMCI Research Institute for Health Sciences under the leadership of Dr. Isaac David E. Ampil II.

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Nyland LJ, Grimmer KA. Is undergraduate physiotherapy study a risk factor for low back pain? A prevalence study of LBP in physiotherapy students. Retrieved from: <http://www.Biomed-central.com/1471-2474/4/22>. 2003. [Accessed 27 August 2011].

Rankin J, Tennant PW, Stothard KJ, et al. Maternal body mass index and congenital anomaly risk: a cohort study. *Int J Obes (London)* [online], 2010, 34(9), pp 1371-1380. Available from: <http://ncbi.nlm.nih.gov/pubmed/20368710>. [Accessed 27 August 2011].

## *Books and other monographs*

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Adams RD, Victor M. *Principles of Neurology*. New York: McGraw-Hill, 1981.

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