A Cross Sectional Study on the Knowledge, Attitude and Usage of Stethoscope among Medical and Nursing Students

Tanya Manisha Machado¹ & Princy Louis Palatty²
¹,² Father Muller Medical College, India

ABSTRACT
OBJECTIVES: To assess basic stethoscope knowledge and maintenance practices among medical and nursing students, and factors affecting proper stethoscope usage.

INTRODUCTION: We have ventured upon an aspect that is the appropriate application of a core technique in the biomedical arena. A doctor is identified by his tool - the stethoscope; it is but natural to know all the aspects of this implement. There is very little literature regarding this pertinent topic hence we conducted a study to assess the knowledge, attitude, and practices of medical and nursing students with respect to the stethoscope in Mangalore, India.

DESIGN: A descriptive, cross-sectional design was conducted using a self-administered questionnaire. The questionnaire included sections pertaining to demographic details, practices, attitude, and knowledge of the stethoscope.

SETTING: Medical college and research centre.

PARTICIPANTS: A total of 110 participants ranging from 1st to 4th year MBBS and 30 nursing students completed the questionnaire.

RESULTS: Incorrect basic knowledge and poor confidence in their skills were noted among the participants. Most students attributed their inadequate skills to poor teaching and lack of interest. Nursing students had significantly lower mean scores in all the items as compared to medical students. Majority of the students followed appropriate stethoscope hygiene but did not believe in its importance.

CONCLUSION: Our medical and nursing students have very poor knowledge on appropriate use of the stethoscope. Their lack of confidence while using the stethoscope is a reflection of their inadequate knowledge and skill in effective use of stethoscope. Students believed the cause was poor teaching and lack of interest on their part. Majority of students depended on online sources for learning the appropriate usage of stethoscope.

KEYWORDS: stethoscope; abnormal heart sounds; knowledge of medical students; nursing students; diaphragm of stethoscope; auscultatory sounds; nosocomial infections; appropriate use of the stethoscope.

ARTICLE SUMMERY
• The medical and nursing students at our centre were assessed by an indigenous validated questionnaire on the appropriate usage of stethoscope under the domains of knowledge, attitude and practice.
• A significant number of medical and nursing students showed inappropriate knowledge on the use of the stethoscope and had an attitude that preferred to rely on electronic gadgets than subjective tool.

STRENGTHS
• This is one of the few studies on this topic which is pertinent, relevant and also economically significant when millions are being spent nationally to avert cardiovascular disorders
• We have quantified the magnitude of this problem and were surprised to note that there is a significant lacuna in appropriate stethoscope usage.

LIMITATIONS
• This study is only limited in it being a single centred study without corroborative references at present.
• The questionnaire tool should be standardized for reliability and validity.

INTRODUCTION
-BACKGROUND OF STUDY
The stethoscope is commonly described the single vital instrument used by physicians and many other health professionals to diagnose various diseases just by hearing the sounds made by the heart, lungs and other body organs. The stethoscope has survived for years in the medical field and is as relevant as it was years back. It's proof being that it has survived 200 years in an ever advancing field. It's an instrument designed to help physicians diagnose and treat their patients by listening to normal and abnormal sounds produced by the body. Though the stethoscope has been an iconic and essential instrument in most diagnosis, there exist cons with the same. Over the years physicians have begun to slowly depend on more accurate and expensive tests, and the art of listening to the heart with the simple stethoscope has fallen on hard times. Cardiovascular disease is one of the most common causes of death globally, around 17.3 million deaths per year, and by 2030 the numbers will be 23.6 million and more [1]. The importance and regular usage of stethoscopes in the primary diagnosis of murmurs and irregularities can't be belittled. Reports have shown that stethoscopes used in hospitals by medical personnel for evaluating patient health now threaten patient welfare by being a potential fomite, aiding in nosocomial infection spread. This is happening on globally [2]. In the words of Sir William Osler (Father of Modern medicine) “one must listen to your patient, as he is telling you the diagnosis”. One should be able to do so by using the time-tested aid -the stethoscope. Unfortunately, this is not so, as medical practitioners and those undergoing train for the same, have not mastered the art and skills that involve the stethoscope. Even if the stethoscope is being used appropriately, it remains highly subjective with the lack of corroborative evidence on the findings heard. A recent study showed that Electronic stethoscopes offer potential advantages as compared to conventional pneumatic stethoscopes [3]. After the 20th century, the existence of devices such as the stethoscope in the medical field were threatened with the possibility of being replaced by more accurate diagnostic tools that seemed to be favoured by both patient and doctor. This resulted in declined interest and importance of the auscultation practice. As a result, the auscultatory skills of students and physicians have decreased to a disappointingly low level [8]. A study that tested the skills involved with appropriate stethoscope usage showed that, experienced doctors were as bad as third-year medical students, and showed poor stethoscope skills [4]. With the advent of the electronic stethoscope, the pneumatic stethoscope may have lost its importance. In recent years, a plethora of studies have shown that only 20 percent of new doctors and 40 percent of practicing primary-care doctors can differentiate between healthy and abnormal diseased heart sounds by auscultation[5]. In spite of its shortcomings, the time-honoured stethoscope still is seen by many as an effective, economical, patient-friendly, instrument in today’s medical practice [6]. This study was undertaken as the literature search on this topic drew out only a handful of newspaper reports and research papers. The appropriate use of stethoscope is an imperative need in today’s medical world. Our study ventures to evaluate, the proper use of stethoscope and inculcation of right attitude among medical and nursing students. This study also briefly assessed the basic knowledge students possessed, assessing their physiology and clinical knowledge. Topics like heart murmurs, diseased respiratory sounds; appropriate sites where one must place the stethoscope to identify murmurs, normal and basic knowledge about abnormal heart sounds were briefly assessed through the questionnaire. The poor confidence in their skills could be caused due to the lack of confidence in their basic medical science knowledge since practice is directly influenced by the knowledge. Knowledge is defined as the capacity to acquire, retain, and use information by a person. It is a complex balance of comprehension, experience, discernment, and skill. Attitude refers to “inclinations to react to certain situations”. Practice refers to” the application of rules and knowledge that leads to action”. [21]

Other than the basic knowledge, skills, and confidence possessed by students, their stethoscope hygiene practice was also assessed. The transfer of nosocomial infections is via fomites - in this case, the stethoscope. Students were specifically asked about their attitude towards stethoscope hygiene and if they believed in its importance.

This is undertaken as a pilot, project and hence uses only a small sample to actually investigate the existence of any undercurrents or problems in this area.

OBJECTIVES: To evaluate stethoscope knowledge and maintenance practices among medical and nursing students and analyze the factors affecting proper stethoscope usage.

NEED FOR STUDY:
(1) The stethoscope is an integral part of a medical student and clinician. The appropriate usage and the attitudes towards this instrument are integral to being a good practitioner.
(2) The formal training for the use of this equipment would throw light on its effective usage.

METHODOLOGY:
A descriptive, cross-sectional study was conducted among medical and nursing students at the Fr
Muller Medical College (FMMC), Mangalore, India

Using a self-administered, semi-qualitative questionnaire. Consenting Medical and nursing students will be recruited for this study. This included 20 students each from 1st, 2nd, 3rd and 4th MBBS and 30 nursing students. Participants were selected via purposive casual random sampling.

No background information on correct stethoscope practices and appropriate stethoscope knowledge was provided to any of the approached participants. Data were collected using a predesigned, self-administered questionnaire (Supplementary Appendix 1), from April 22, 2016, to May 20, 2016. The questionnaire consisted of 3 sections: section 1 contained questions regarding demographic details of participants such as age, gender, year of study; and section 2 consisted of items testing the knowledge, attitude, and practices of students regarding stethoscope usage. The details of scoring and analysis for each item in each category are mentioned in Supplementary Appendix 2. The study was overseen and evaluated by the Ethics Review Committee at FMMC before initiation. Verbal and written informed consent was obtained, and the nature of the study was explained to each participant before administration of the questionnaire. The informed consent forms were separated from questionnaires to maintain the anonymity of the participants. Participants were approached during regular workdays at the institution. Data were encoded in Microsoft Excel.

Statistical analysis was done using SPSS version 13. Qualitative data were summarized using frequency distribution. Quantitative data were summarized using mean and standard deviation, chi-square test for assessing significance between qualitative data, and t-test and p-value for assessing the significance of quantitative data. An alpha value of 0.05 with a 95% confidence interval was used to measure significance for all statistical tests.

RESULTS AND OBSERVATION
Students who answered incorrectly on low pitch sounds:

- 1st MBBS
- 2nd MBBS
- 3rd MBBS
- 4th MBBS
- Nursing

Students who wanted to opt for a more modern stethoscope:

- 1st MBBS
- 2nd MBBS
- 3rd MBBS
- 4th MBBS
- Nursing

Students unsure of appropriate placement of the stethoscope:

- 1st MBBS
- 2nd MBBS
- 3rd MBBS

Students who can't differentiate a wheeze or crackle:

- 1st MBBS
- 2nd MBBS
- 3rd MBBS

Students who don't believe the stethoscope needs to be cleaned:

- 1st MBBS
- 2nd MBBS
- 3rd MBBS
- 4th MBBS

Students who practice cleaning their stethoscope:

- 1st MBBS
- 2nd MBBS
- 3rd MBBS
- 4th MBBS
- Nursing

Students that believe tapping the diaphragm is a wrong practice:

- 1st MBBS
- 2nd MBBS
- 3rd MBBS
- 4th MBBS
- Nursing

Students who believe dropping the stethoscope damages it:

- 1st MBBS
- 2nd MBBS
- 3rd MBBS
- 4th MBBS

Students who use their stethoscope daily:

- 1st MBBS
- 2nd MBBS
- 3rd MBBS
- 4th MBBS
- Nursing
students that feel the stethoscope has become a status symbol

students who would agree with others having not heard a murmur

feel that the stethoscope can't be replaced

students who feel their batchmates have appropriate knowledge of the stethoscope

Students incorrectly inserting the ear piece

students incorrect on their knowledge of heart sounds

students incorrectly inserting the ear piece around the neck

students incorrectly inserting the ear piece clipped to the neck

students incorrectly inserting the ear piece friends/seniors

students incorrectly inserting the ear piece online
DISCUSSION

Our study explored the knowledge, attitude, and practice of the use of stethoscope by medical and nursing students. The demographic details showed that; the mean age was 18-20 in the medical and nursing students. The sex ratio of males to females was 21:59 (for all years)in the medical subjects and the nursing were all female. The students included in the study had consented and the questionnaire was administered in random casual encounters. There were 23 items in the questionnaire administered which looked into the technique, the knowledge, ability and the beliefs associated with it. The question enquiring into the sensitivity of the tool brought us to realize that students (60%) believe it’s of no consequences. The Kruskal value test on this item of the questionnaire produced a p-value that was significant. Hence the idea that the stethoscope sensitivity is not of concern to the students is highly significant. Second-year students with scepticism would have the thought that sensitivity is not of sole importance; as the inherent knowledge is necessary to gather information from a tool. The lack of confidence as shown in the statistical analysis among the various groups was highly significant. The confidence for optimal use of the stethoscope is negated by most medical and nursing students. The medical students cannot rely on the use of this tool maybe because of inadequate teaching, inadequate practice and lack of relevance. The doctors of yore relied heavily on the stethoscope for their diagnosis as compared to doctors of today who have other technologies to rely on diagnosis (i.e. Echocardiograph, ECG, Doppler, spirometer, X-rays) .It is interesting to note that the fourth and second-year students have answered incorrectly on the basic knowledge involved with the use of the stethoscope. The fundamental knowledge of the use of the diaphragm to hear high-pitched sounds is lost to the students. This basic “must know” should be taught in the first year and reiterated often in the clinical. The lack of basic knowledge among the years is statistically highly significant. The fourth-year medical students from among the made observation, are surprisingly unaware of the use of the bell of the stethoscope. The fundamental knowledge of the usage of the stethoscope should be known to all students, at all times. The lack of basic knowledge of the use of bell of stethoscope among the years is statistically highly significant. Although 38.9% of first years have claimed that they can differentiate murmurs, it should be considered a fallacy as they haven’t been exposed to diseased individuals. The fourth years despite their close contact with patients are hesitant in their ability to identify murmurs. YouTube, audio of heart sounds, murmurs, beats should be an integral part of the mass teaching technique on the use of the stethoscope. The confidence in their inability to distinguish between murmurs among the years is statistically highly significant. Among of the fourth years, 53% are aware of the latest technology in stethoscopes and would be ready to opt for this improved stethoscope so that they would be more
The use of an electronic sensor-based stethoscope cardiac auscultation skills were not influenced by stethoscope with a similar group using medical students using an electronic, sensor based compared the auscultation skills of undergraduate stethoscope. Moreover, a previous study that knowledge involved with the electronic to say the same won’t occur with the training and pneumatic stethoscope proved to be weak, what’s knowledge and skill with the conventional training [10]. If their training involving basic from a conventional stethoscope, thus requiring training [10]. The general opinion of students wanting to shift to using the electronic stethoscope over the pneumatic one, need to remember that the sound picture from an electronic stethoscope is different from a conventional stethoscope, thus requiring training [10]. If their training involving basic knowledge and skill with the conventional pneumatic stethoscope proved to be weak, what’s to say the same won’t occur with the training and knowledge involved with the electronic stethoscope. Moreover, a previous study that compared the auscultation skills of undergraduate medical students using an electronic, sensor based stethoscope with a similar group using conventional stethoscopes showed that ; The cardiac auscultation skills were not influenced by the use of an electronic sensor-based stethoscope [10]. The general opinion of students wanting to shift to using the electronic stethoscope is statically highly significant in our study. The specific sites for placing the stethoscope is unknown in approximately 75% of the medical students in their 2nd, third and fourth years. The placement of stethoscope to catch significant discrepancies at specific locations is a basic knowledge that should not be compromised by any student. The reasons of confidence while using the stethoscope stems from students not being through with the skills and knowledge that the posses. Dr. Salvatore Mangione, from Thomas Jefferson Medical College (Philadelphia), said that since auscultation skills are not tested on medical board exams prospective doctors tend to not want to always focus on them. [4].The lack of knowledge in knowing where to place the stethoscope on the chest during auscultation is found to be highly significant statistically. The majority of fourth years (85%) declared their inability to distinguish between wheeze and crackle. The first years despite their agreement, can’t be considered due to their lack of exposure to the different possible breath sounds among diseased and normal individuals. In fact, this lack of knowledge is found to be continuous even among fourth-year medical students. The inability to identify abnormal breath sounds was statistically highly significant. First years (65%) do not feel the need to clean the stethoscope but these students have been used to their colleagues as volunteers which could be the reason for this assumption. The third years (85%) and fourth years (75%) have scant regard for the cleaning of the stethoscope from patient to patient. This trend would compromise the safety of patients as the stethoscope is a probable fomite for multidrug infections. Multiple studies in different countries and in different settings all demonstrated the stethoscopes potential as a pathogenic fomite [12]. In a Nigerian study, 79% (n=84) stethoscopes were discovered to be contaminated with several organisms including Pseudomonas aeruginosa, Enterococcus faecalis, and Escherichia coli. [13]. Furthermore, in regard to parts of the stethoscope, studies have shown that the stethoscope diaphragm is the most contaminated portion of the instrument. In a study involving 58 Nepalese Health Care Workers, it was found that over 89% of diaphragms grew at least one microorganism and 65% of bells and 72% of ear buds were contaminated [12]. Predominantly coagulase-negative staphylococcus was isolated from the diaphragm surfaces. [18]. The need for cleaning the stethoscope before using it on other patients was statistically not significant among the students in this study. The fourth years (65%) perform the cleaning ritual of stethoscope although they do not believe it should be cleaned as seen in the above paragraph. From the above analysis, one may note that most students are not inclined to clean their stethoscope in future practice; this can easily result in an easy spread of nosocomial infections. In a previous study of Bacteriological Assessment of Stethoscopes Used by Medical Students (Nigeria), 80.1% of the stethoscopes were infected and was noted as being the major cause for the spread of infection within the hospital. Nosocomial infections due to the high microbe count were due to lack of emphasis on the importance of stethoscope cleanliness [2]. Training and awareness are the best primordial prevention methods one can take. One barrier to Stethoscope hygiene is a lack of formal training: in a study involving over 300 British medical students, only nine reported ever being taught to clean their stethoscopes in school [14]. In a Pakistani survey of medical practitioners over 90% reported never being taught Stethoscope Hygiene [15]. To further assess if primordial intervention made a difference, an educational intervention was conducted in a hospital in the Philippines. This study involved 172 Health Care Workers and consisted of a four-week program of lecture, performance feedback, and
various reminders including flyers and stethoscope tags to remind the user to clean the stethoscope. An experimental group received the training while a control group did not. The experimental group’s stethoscope contamination was reduced from 69% pre-intervention to 27% post-intervention. Post-intervention surveys also showed improved knowledge and frequency of Stethoscope Hygiene by the participants of the given intervention. [16]. Studies have also shown that stethoscope cleaning practices tend to be suboptimal where health care personnel are resistant to improving the current practices.[19]. Two techniques have been identified as effective in removing a majority of microbes from a stethoscope. A study by Lecat et al [17] showed that using standard isopropyl alcohol pads to thoroughly wipe the stethoscope diaphragm reduced colony forming unit colony-forming units by 92.5% and colony-forming unit reduced to 92.8% while using hospital-grade ethanol-based cleanser (EBC). Cleaning the stethoscope diaphragm reduces the bacterial count effectively. One study showed that the most effective way to clean stethoscopes was by using alcohol swabs, which reduced the bacterial count by 94%, while non-ionic detergent reduced it to 90% and antiseptic soap reduced it to 75%.[20]. In the study that we conducted, it was found that the practice of cleaning the stethoscope among students was highly significant. It was comforting to note medical students of all years agreed that tapping the diaphragm of the stethoscope to check if it was unlocked, wasn’t a good practice as the sensitivity of the diaphragm would be compromised in such a practice. The practice of tapping the diaphragm to check if the stethoscope was on was found to be insignificant in the statistical difference among the groups. The wrong and improper use of stethoscope leading to its damage did not fair significantly among the groups in this study. The first years (7%) are unaware of the damage incurred to the stethoscope on frequent falling as opposed to their seniors who are a careful lot, the disregard, for the careful of the instrument, shows the disrespect for the major tool of this profession. The carelessness in handling the stethoscope among the different groups was statistically significant.

The second and fourth years are inclined to use their stethoscope on a daily basis as part of their clinical encounter but not the third year as they are in postings like ophthalmology, Otolaryngology, and community medicine where stethoscopes are sparing used. The first years in their practicals will be having an almost regular usage. The frequency of daily usage of the stethoscope was found to be highly significant among the groups. All medical students agree that the stethoscope has become a status symbol (70%). This was found to be statistically significant among the groups. It is truly disheartening to note the senior medical students i.e. 2nd, 3rd, 4th year (40-50%) are ready to agree with seniors or staff, to have heard a murmur when they have not. The lack of honesty among medical students is disconcerting. The humility of declaring one’s error is lost to fall in line with the majority and avoid hassles. The honesty among students of different groups was found to be statistically significant. The students may have caved in to ‘peer pressure’ or to avoid peer pressure altogether by accepting to having heard murmurs when they have not.

It was unanimously disagreed that the stethoscope is a tool that could be replaced (70-88%) in the medical field due to the advancement and available technology in the medical field. This finding was in agreement with that of a previous study that assured the survival of the stethoscope as it has remained as a tool of critical diagnostic importance for over 200 years. [6]. There are two sides to every coin, and many argue that maybe alternative tools are required for today’s “new age” practice. Dr. Jagat Narula from Mount Sinai School of Medicine who is also the editor-in-chief for the journal Global Heart stated that Hand-held ultrasound devices are becoming less expensive and soon would be able to offer a viable and preferable alternative to the stethoscope. To counter argue; Dr. Charles Cutler, from the American College of Physicians’ Board of Regents, expressed that in spite of the forward growth in the field of medicine due to technological advances; in medicine, more is not always better. [7]. The stethoscope remains under the threat of becoming obsolete due to the technological advances, yet doctors are want to retain the instrument as a symbol of the skill and knowledge they possess. But they too believe it to be increasingly devalued and undermined in modern medicine. [5]. Reviewing literature and keeping in mind the settings in which patients present and more importantly the availability of advanced diagnostic facilities at all times. We conclude that in spite of its limitations, the time-honoured stethoscope still has potential as a patient-friendly, effective, and economical instrument in today’s medical practice.[8]. The agreement of the probable replacement of the stethoscope among different groups was found to be statistically not significant. Most 2nd and 4th year medical students are confident of their batch mates using their stethoscopes appropriately. The first-year students are agreeable that all their batch mates know how to use their stethoscope appropriately; as they are in a contrived setting where they are constantly being evaluated. The confidence among students of different groups in the ability and skills of their batch mates was found
to be statistically highly significant. It was shocking to learn that 95% of 4th-year students, 90% of the 3rd year and 74% of 2nd year students did not know how to insert the earpiece of the stethoscope correctly. 71% of the first year students were wrong in this assumption as well. The practice of incorrectly inserting the earpiece of the stethoscope was found to be statistically highly significant among the different groups. The first-year students are unaware of other than physiological heart sounds and hence only 18.8% agree that S1 and S2 sounds are normal. But it was only 31-35% of 2nd and 4th years that were aware of the normal and abnormal heart sounds. The basic knowledge of normal and abnormal heart sounds was found to be statistically highly significant among the different groups. As we would see in question no 20, with the diagram of the stethoscope when not in use, C is an absolutely wrong method, i.e. Stuffing the stethoscope in the coat pocket damages the parts of the stethoscope and passes nosocomial infection. Placing the stethoscope on the shoulders is the commonest and most widely followed practice while clipping it around the neck as seen in diagram b is “cool”. The majority of medical students across the years are placing the stethoscope the right way; in a mimicking fashion. The different ways students carry their stethoscope was found to be statistically significant among the different groups. In this day of technological advancement, learning the use of the stethoscope is not learned from physiology or medicine staff but rather online; even the first years (75%) despite having dedicated physiology practical classes have resorted to online sources. Among the second year students, 35% have learnt the skills of properly using a stethoscope from their friends or seniors, and 30% have relied on online methods. Majority of the 3rd year (55%) and 4th year (50%) have depended on online sources for the appropriate use of the stethoscope. To avoid misinterpretations that may directly harm the patients and generate extra costs for the hospital, new initiatives are required to train students, physicians and allied health professionals in cardiac auscultation as part of primordial prevention and part of proactive thought [8].

The source of knowledge and skills learnt with respect to the stethoscope was found to be statistically not significant among the different groups. The first year students have contradicted their general opinion of being honest and reporting to not having heard murmurs instead of agreeing with others as asked in question 15, as 65% of first years say that they would simply agree with others findings (of having heard murmurs). This makes their statement null and void. The response received from the thirds and fourth years remains in sync with their earlier response to question 15. Among the 4th years 80% and 55% of third years would agree with others' findings. Second years are of a different opinion, with 40% of the students choosing to alter their method of practice in order to hear a murmur better. The different practices and approaches followed by students on not being able to detect or hear what their peers or staff could, was found to be statistically highly significant among the different groups.

Among the first years, 75% of them attributed their poor knowledge of the use of the stethoscope to their lack of interest and laziness on their part. Majority of the 2nd years (60%) also blame themselves. While the third and fourth years; each of 55%, believe their poor knowledge and skills stems from the poor teaching provided to them. Robust measures to rectify the same need to be put in place. A study was conducted by Dr. Barrett, a cardiologist, which involved intervening and teaching third-year medical students how to discern heart abnormalities. The study was done to evaluate if certain teaching methods had a more long lasting effect on correcting the fundamental mistakes commonly done during auscultation. At first, without intervention, medical students on average could identify six abnormal heartbeats, four times out of ten. On exposure to training that involved computer-generated "templates" of diseased heart sounds, that were specifically free of any background noise, the students drastically improved. One should note that these students heard these murmurs at least 500 times. The majority of the students made individual copies in the form of MP3 files and downloaded them to their iPods when assessed at the end of the year. It was interesting to note that the "intensive repetition" was key in ensuring that the group of students exposed to training were able to recognize those murmurs 89 percent of the time. In contrast, another group of students (the control group) simply received regular instructions within the classroom and were given the same level of hands-on experience during clinical rounds. The control group showed no improvement. [9]. This goes to show that timely intervention and repetitive auditory learning accompanied by the regular theoretical orientation given to students makes a drastic impact on their ability to identify heart sounds in the future. The reasons given by different groups as to being the cause of their poor use of the stethoscope was found to be statistically not significant.

Nursing students have consistently shown in the 23 item questionnaire, the absolute lack of knowledge of the appropriate use of the stethoscope. The nursing students are even indifferent to the cleaning of the stethoscope that impacts the patients directly and propels nosocomial infections. A majority of
the nursing students do not believe that the stethoscope has become merely a status symbol. Nursing students learn the use of stethoscope; mainly from their friends and from online. The questions3, 5,7,2,8,19;8,19;2,3,5,15 were

Analyzed by cross tabulation to explore the definite causal relationship.

**TABLE 1**

Table 1 can be inferred as having an association between the first year students who have poor knowledge of the basics involving the bell and diaphragm of the stethoscope; the same students also do not know the appropriate site where the stethoscope needs to be placed to hear specific cardiac abnormalities. Among the fourth years, the same poor basic knowledge pattern follows and is greatly disturbing as these students are at the closing of their undergraduate training. The poor knowledge in the placement of the stethoscope and ability to discriminate auscultatory sounds is the underlying flaw in medical education. Among the fourth years, 5 among 19 students who answered incorrectly on the basic knowledge of the stethoscope said they knew where to appropriately place the stethoscope. This indicated either false confidence or superficial learning i.e. they have just learnt where to physically place the stethoscope without knowing why and the physiology or pathology behind it. Wide table 1. The basic medical course should reiterate the effective use of the stethoscope from 1st year in physiology to every clinical discipline so that the appropriate use of stethoscope shall not be compromised.

The basic knowledge on the use of stethoscope among the first years is definitely wanting. The fallacious and overconfidence in the identification of auscultatory sounds is not factual. Basic knowledge of S1,S2 heart sounds plays an important role in the student's confidence while using the stethoscope in clinical practice. The fourth years, despite having some basic knowledge on the use of stethoscope need more instruction and practice to be confident on auscultation.

**Table 2**

Wide table 3 shows a correlation between basic knowledge learnt and clinical skills practiced in the later years of medical training.
stethoscope is an underlying feature of all the years. The lack of appropriate knowledge in the use of the stethoscope is a 'faith accompli' as far as the clinical years. Moreover, the stethoscope should be used with the right attitude as it stands to be not a psychomotor skill but also a harmonious blend of cognition and behaviour. The lack of appropriate knowledge in the use of the stethoscope is an underlying feature of all the years of medical practice. Most students explained that the incorrect procedures followed throughout the years will hinder efficient health care delivery. Our recommendation thus stands to develop psychomotor skill in the effective use of stethoscope among medical students. An attitude is an inward thought that is inculcated an invariably express out.

CONCLUSION

The stethoscope remains a tool of great importance in spite of the advancements in the medical field. Basic knowledge and skill must be possessed by all medical professionals. This can be ensured by the early training given at the undergraduate level. Although this study is limited by its small sample size, the extrapolation of these results or even the raw data, itself spells out the frantic need for addressing this issue of inappropriate use of stethoscope. A questionnaire-based study was done involving 110 undergraduate medical and nursing students; assessing their basic knowledge, practices, and attitude towards their stethoscope. Results inferred poor basic knowledge and incorrect procedures followed throughout the years which reflected in the students having poor confidence while using the stethoscope during clinical practice. Most students explained that the lack of proper teaching and evaluation was to blame. Many students used non-formal teaching sources like online videos and peer learning to solidify their basics. The appropriate use of stethoscope is a ‘faith accompli’ as far as the curriculum is concerned. The discerning questionnaire employed in this study brought forth an unexpected revelation that has to be necessarily remedied by re-designing and reiterating the use of stethoscope right from the pre-clinical right through the clinical years.

Incidentally, this study has brought out a few lacunae that need to be addressed in the proper use of stethoscope. Moreovever, the stethoscope should be used with the right attitude as it stands to be not just a psychomotor skill but also a harmonious blend of cognition and behaviour.

The table 4 indicates honestly among few of the first years’ in spite of poor basic knowledge. These students put on false confidence in spite lack of knowledge. It is alarming to note that majority (7 out of 9) would not be honest enough to admit to having not heard a murmur when indicated so by staff or seniors. Poor basic knowledge seems to be a factor as to why a student would be inclined to being dishonest and prone to easily agreeing with others findings. This might be done to hide their lack of knowledge and skill; while still appearing to possess the skill and knowledge required to identify murmurs. This might be due to the need to be at par with peers and seniors. The fourth years, the majority seem to be dishonest (12 out of 20) as they might feel too silly or scared to ask for help or orientation, as they are currently in the last year of their undergraduate training and are expected to have learnt their basics much earlier. Among the fourth years, it is interesting to note that only 8 honest students among the 20 (selected in the study); were all from the group that said they weren’t confident using the stethoscope. We can infer that despite their ignorance, honesty is still a virtue.

Table 4

The table 4 indicates honestly among few of the first years’ in spite of poor basic knowledge. These students put on false confidence in spite lack of knowledge. It is alarming to note that majority (7 out of 9) would not be honest enough to admit to having not heard a murmur when indicated so by staff or seniors. Poor basic knowledge seems to be a factor as to why a student would be inclined to being dishonest and prone to easily agreeing with others findings. This might be done to hide their lack of knowledge and skill; while still appearing to possess the skill and knowledge required to identify murmurs. This might be due to the need to be at par with peers and seniors. The fourth years, the majority seem to be dishonest (12 out of 20) as they might feel too silly or scared to ask for help or orientation, as they are currently in the last year of their undergraduate training and are expected to have learnt their basics much earlier. Among the fourth years, it is interesting to note that only 8 honest students among the 20 (selected in the study); were all from the group that said they weren’t confident using the stethoscope. We can infer that despite their ignorance, honesty is still a virtue.

Incidentally, this study has brought out a few lacunae that need to be addressed in the proper use of stethoscope. Moreover, the stethoscope should be used with the right attitude as it stands to be not just a psychomotor skill but also a harmonious blend of cognition and behaviour.

The lack of appropriate knowledge in the use of the stethoscope is an underlying feature of all the years of the medical course. Despite their clinical
their skills can be corrected and evaluated may bring about significant improvement.

**CONTRIBUTORSHIP STATEMENT**

We the authors declare equal quantum of work done in realising this paper from scratch. The contributions were as follows:

Tanya Machado: Concept, design, analysis, data collection and scientific writing. Dr Princy Palatty: Analysis, Scientific writing.

**COMPETING INTERESTS**

We the authors declare no conflict of interest whatsoever.

**FUNDING**

This research received no specific grant from any funding agency in the public, commercial or not-for-profit sectors.

**REFERENCES**


[6] Bank I, Vliegen HW, Bruschke AV; “the 200th anniversary of the stethoscope: can this low-tech device survive in the high-tech 21st century?”, Eur Heart J, 2016 Feb 22

[7] Jagat Narula, M.D., associate dean, global affairs, Mount Sinai School of Medicine, New York City, and editor-in-chief, Global Heart; Charles Cutler, M.D., chairman, American College of Physicians’ Board of Regents; Robert Bonow, M.D., cardiologist, Northwestern Memorial Hospital, Chicago, and spokesman, American Heart Association; December 2013 Global Heart stated in the article “Is the Stethoscope Living on Borrowed Time?”; HealthDay News; By Dennis Thompson HealthDay Reporter; Jan. 23, 2014

[8] Bank I, Vliegen HW, Bruschke AV; The 200th anniversary of the stethoscope: Can this low-tech device survive in the high-tech 21st century?; Published on behalf of the European Society of Cardiology

[9] Tom Rice; The hallmark of a doctor’: the stethoscope and the making of medical identity; University of Exeter

[10] Henning Høyet, Torstein Jensen, and Knut Gjesdal; Cardiac auscultation training of medical students: a comparison of electronic sensor-based and acoustic stethoscopes


[16] Grecia, S., Malanyaon, O., & Aguirre, C.; The effect of an educational intervention on the contamination rates of stethoscopes and on the knowledge, attitudes, and practices regarding the stethoscope use of healthcare providers in a tertiary care hospital’ *Philippine Journal of Microbiology and Infectious Diseases*; 2008; 37(2), 20-33.


[22] Soidemer Claire Grecia, M.D., Olympia Malanyaon, M.D., and Cynthia Aguirre, M.D.; “The Effect of an Educational Intervention on the Contamination Rates of Stethoscopes and on the Knowledge, Attitudes, and Practices Regarding the Stethoscope Use of Healthcare Providers in a Tertiary Care Hospital”; *Philippine Journal of Microbiology and Infectious Diseases*; July-December 2008; Vol. 37, Issue 2,