HAPPENINGS

A KUHS PUBLICATION ON RECENT ADVANCES

A SAMAGRAM INITIATIVE

Issue 3

September 2020

Message from Vice Chancellor

I am happy to note that the third issue of 'Happenings -A KUHS Publication on Recent Advances' is being brought out. This initiative has caught the fancy of academicians of the affiliated institutions of KUHS in a significant way as evidenced by the responses. The initiative, meant for strengthening the scientific writing skills of the younger generation faculty of each stream of Health Sciences is expected to throw lightvin to what has happened in the past, and what is in store for us in the future. We have also included some invited articles from the Best Teacher Award winners of KUHS. It is hoped that this will definitely serve as an important outreach educational program of the University, and also that this publication will be well received as the previous issues.

Prof. [Dr.] Mohanan Kunnummal

Vice Chancellor, KUHS

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‘Happenings’: A Publication from KUHS on Recent Advances

FACING SHEET OF ARTICLE

1. Stream	Allied Health Science
2. Speciality	Pathology, cytology and cytogenetics
3. Date	9-10-2019
4. Title	Advances in Nanomedicine
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10. Consent for Publication	I hereby declare to abide by the KUHS Rules regarding publication and agree that the article contributed by me may be published in the KUHS publication on Recent Advances.
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Advances in Nano medicine

Relevance

Nano-medicine is rapidly revolutionizing the health care industry providing remarkable improvement in patient diagnosis, treatment and follow-up. Many problems encountered during treatment with conventional drugs such as insolubility, degradation, bioavailability, toxicity, uncontrolled release, localization at nonspecific site and clearance by immune system of the body can be resolved**,** because the various biomolecules involved in cellular interactions such as receptors on cells, functional epitome of protein, DNA, RNA, and other drug targets in our body are in Nano-scale which recognize and interact with **Nano-drugs** much better than bulky chemicals. Hence Nano-medicine has the potential to simultaneously deliver diagnostics and therapeutic agents at targeted sites, along with multiple benefits of early detection and prevention, efficiency and efficacy, dose response and personalization, further addressing many unsolved medical needs due to its broad application in the design and production of medical devices.

- **Nano-medicine** is defined as the use of ultra-fine Nano-materials for diagnosis, monitoring, control, prevention and treatment of diseases. Materials below the size of 100nm are called Nano-materials and when matter is manipulated at molecular level, they acquire remarkable and novel physical, chemical and biological properties leading to interesting changes.
- Currently the Nano-medicine market ranges from various solid **nanoparticles, liposomes, Nano-crystals, Nano-emulsions, Nano-wires, micelle, dendrimers, polymeric-protein conjugates and Nano-complexes** to intricate multifunctional **Nano-biosensors, Nano-robots**, **microarrays**, **biochips** and **probes** many of which have been successfully introduced in clinical practices while more sophisticated ones are under research and clinical trials.
- The application of Nano-medicine can be broadly divided into three – analytic/diagnostic (**Nano-diagnosis**), controlled drug delivery (**Nano-therapy**) and artificial organs and medical devices for regenerative medicine application.
- The treatment of various diseases such as breast cancer by **Abraxane** (nano-particle albumin bound Paclitaxel), ovarian cancer and HIV related Kaposi carcinoma by **Caelyx** (Doxorubicin hydrochloride in pegylated liposomes) metastatic pancreatic cancer by

Onivyde (liposome encapsulated Irinotecan injection), degenerative myopia by **Visudyne** (nano-complex of Verteporfin infusion), acute lymphoblastic leukemia by **Oncasper** (Pegaspargase nano-emulsion), schizophrenia by **Xeplion** (Paliperidone palmitate nano-crystal), acromegaly by **Somavert** (polymer pegvisomant conjugate) are some of the numerous examples of **targeted drug delivery** approved by the FDA**.**

- **Nano-biosensors** are devices incorporated with biomolecules like nucleic acid, enzyme, antibody or inflammatory protein whose interaction with the analytic or the microorganism of interest leads to change in physiochemical properties (such as pH, electron transfer) detected by transducers which in turn, results in quantification of the analyte and/or occurrence of appropriate response such as drug release.
- **Nano-flares** (spherical nucleic acid (SNA) with gold nanoparticle core and oligonucleotide shells) can measure genetic content of the cell and light up when they detect a specific (cancer or stem) cell or even the reaction to small molecule or drug, therefore act as "**sniffers**" of specific cells of our interest which differ from normal cells in their growth, gene expression and protein content.
- **Microarray** (collection of microscopic spots of biomolecules like DNA, RNA or proteins), **lab on a chip** (device that integrates laboratory functions on Nano-chips) and **biochips** (diminished microarray with millions of biosensors) having manifold applications in gene expression analysis, detection of mutation and polymorphisms, drug screening, toxicology and cancer research, are further offshoots of advances in the field of Nano-medicine.
- Implantable Nano-materials for tissue repair and regeneration (e.g. tissue engineering scaffolds, implant coating), structural implant (e.g. bone repair), assessment and treatment devices (e.g. implantable Nano-biosensors like **micro-electromechanical system** (MEMS) and silicon chips) sensory aids (e.g. **Nano-retina**), surgical aids (e.g. da Vinci surgical **robotic system** for gall bladder, prostrate, colorectal, gynecological esophageal and gastric bypass procedures) are valuable contributions as a result of advancement in the field of Nano-medicine.
- **Theranostics** is a new emerging area, which combines treatment strategies with imaging/diagnosis. Proteins (such as albumin, gelatin, ferritin transferrin or specific antibody) Nano-formulations of drugs incorporated with dyes, contrasting agents and

drug payloads in image guided tracking and combinatorial treatment of different diseases provides transition from conventional to contemporary **personalized medicine**.

- Quantum dots or **QDs** (Nano semi-conductor crystals) widely used in *in vitro* as well as *in vivo* imaging techniques as **Nano-probes**, offering great potential in facilitating real time tracing of bio-sensors and drugs during treatment and diagnosis, have been in the forefront of biomedical imaging research and cell culture experiments. For example, in cancer research, QDs can map sentinel lymph node (SLN), trace cancer associated proteins in blood, track circulating tumor cells (CTCs) providing comprehensive understanding of the tumor microenvironment with the help of imaging techniques.
- Nano-medicine is undeniably the most fascinating area of research and will continue to remain so in future with overwhelming prospectus, as the last decade witnessed the completion of several dozens of clinical trials, more than 1500 patents, a staggering output of publications as well as FDA approved **nanotechnology based medical products** along with enthusiasm over development of Nano-robots and medical devices with unimaginable fascinating capabilities.
- Yet, many key fundamental attributes such as potential long term risk to human and environment safety, biodegradability, affordability, consistency in drug loading and release capacity, regulatory and ethical issues pertaining to current implementation of treatment protocol and future pharmaceutical development needs to be critically assessed and addressed. In India the **DBT** (Department of Biotechnology), **ICMR** (Indian council of Medical Research) in collaboration with **CDSCO** (Central Drug Standard Control Organization) have been in the forefront in formulating guidelines for evaluation of Nano-medicines before hitting market and also in initiating new research activities that can significantly change the course of diagnosis and management of several severe life threatening diseases.

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‘Happenings’: A Publication from KUHS on Recent Advances

FACING SHEET OF ARTICLE

1. Stream	Allied Health Sciences
2. Speciality	Physiotherapy
3. Date	11/12/2019
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EFFICACY OF BREATHING EXERCISES IN COPD

- Chronic Obstructive Pulmonary Disease (COPD) is a progressive disease and a leading cause of morbidity and mortality worldwide, it is estimated that 3.17 million deaths were caused by the disease in 2015and the primary cause is tobacco smoking. The condition is non-reversible and the impact is not just on the lungs in that the symptoms reach far beyond just coughing and breathlessness~~,~~ it can ~~come~~ be with anxiety and steal quality of life very easily.
- So today why not spend some time with your patients encouraging them to give up smoking and take up exercise instead?
- Practice regularly; breathing exercises can help you to exert yourself less during daily activities.
- Pursed lip breathing- Best for performing strenuous activities, such as climbing stairs
- Coordinated breathing exercise may have performed if the individual is feeling anxious.
- Deep breathing-This exercise with other daily breathing exercises ~~that~~ can be performed for 10 minutes at a time, 3 to 4 times per day
- Huff cough- should be less tiring than a traditional cough
- Diaphragmatic breathing-This technique can be more complicated than the other exercises, diaphragmatic breathing exercise reduce the oxygen cost and reduce the respiratory rate.
- According to **American academy of family physician a** patient with COPD who uses breathing exercises experiences greater improvements in exercise capacity

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2456-2165

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12. Stream	Allied Health Sciences
13. Speciality	Pathology
14. Date	12.02.2020
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Application of Molecular Techniques in Haematology

RELEVANCE

Normal cell life is dependent on gene expression and any qualitative or quantitative alterations on the genetic information can lead to inappropriate protein production. Such changes induce irregular survival capacities, inappropriate response to external signals, autonomous amplification and deregulation of apoptosis pathway. Nowadays advancement in molecular techniques has led to the diagnosis and management of benign and malignant Haematological disorders. Inherited and acquired haematologic disorders can be diagnosed with this technique. Emerging data indicate that genomic studies can be useful in all aspects of clinical practice including diagnosis, prognosis and prediction of response to specific treatments. The basic principle of these methods include isolation, designation and manipulation of the genes. All methods involve the extraction, isolation of nucleic acid, separation of DNA, RNA, proteins using different enzymes and detergents.

- **POLYMERISED CHAIN REACTION (PCR)**

PCR is the commonest in vitro method in molecular biology. This method is not only being used to amplify DNA but can also be used to design a whole chromosome and to screen it for the presence of any deletion or addition mutations. Currently several types of PCR has been modified like, multiplex PCR to amplify several fragments simultaneously, inverted PCR to amplify unknown region between two primers, RT-PCR for mRNA detection etc.

- **RESTRICTION FRAGMENT LENGTH POLYMORPHISM-RFLP-** In this method by using PCR, DNA fragment of interest is amplified, and cleaved with the help of restriction enzymes. Then the product is applied on an agarose or polyacrylamide gel electrophoresis (PAGE) and different bands are obtained depending on the presence or absence of cleavage site for restriction enzymes.
- **VARIABLE NUMBER TANDEM REPEATS-VNTR-** Amplified DNA which contain repeat sequences is run on PAGE. Depending upon the number of repeats different bands of different molecular weight is obtained.
- **AMPLIFICATION REFRACTORY MUTATION SYSTEM –ARMS-** This method can be used in Beta thalassemia detection. This is a simple method for the

detection of point mutation, small deletions or insertions in a DNA sequence. In this method both the mutant and wild type alleles are detected in a single tube along with an internal positive control.

- **REAL TIME PCR-** This method is used for measuring the gene expression. Real-time PCR has the ability to quantify a specific sequence of DNA and monitor it while the amplification is occurring in the PCR machine. In haematology, it is used in molecular monitoring for CML patients during the period of imagine therapy.

- **NEXT GENERATION SEQUENCING- NGS**

NGS can perform sequencing of millions of small DNA fragments to determine exact mutation. Sequencing is particularly well suited for the analysis of cancer genomes and a number of hematologic malignancies. In this method fluorescence or change in electric current is produced by chemical sequencing reaction. This signal distinguishes the four nucleotides, progressively generating sequencing reads. Analysis of result begins with the alignment of sequencing reads to a reference genome.

- **WHOLE GENOME SEQUENCING-WGS-** This is a common application of NGS that gives comprehensive view of neoplastic genome. These type of analysis identify and interpret somatic variant by comparing the sequence of the neoplastic variation with the matching normal counterpart such as skin or an uninvolved blood part. In case of targeted sequencing, typically screen for somatic mutation hotspots of cancer genes. In Exome sequencing the most functional relevant part of the genome is screened. Mutations like AML FLT3 mutation, AML NPM1 mutation, CLL NOTCH 1 mutation, CLL SF3B1 mutation can easily be identified by WGS.

- **CYTOGENETIC TECHNIQUES**

Karyotyping to investigate genetic changes in Chromosome number deletions, duplications, translocations or inversions. Disadvantage of this method include the necessity to have active mitotic cells.

- **FLUORESCENT INSITU HYBRIDISATION- FISH**

Selected DNA strands combined with fluorophore labelled nucleotides to hybridize onto complementary sequences and later visualized on fluorescent microscope. This technique widely used in identification of deletions, amplifications, detection of intracellular microorganisms and pathogens.

- **PROTEOMICS**

Proteomics include large scale characterization of the entire protein complement of the cell line, tissue or organism. Many proteins undergo extensive post translational modifications that influence their activity and function. This type of analysis uses techniques like Electrospray ionization and matrix assisted laser ionization. This detects the protein- protein, protein- lipid, protein-nucleic acid and enzyme- substrate interactions.

- **CONCLUSION**

Newer molecular techniques have been applied both in diagnosis and treatment. Regarding diagnosis, the sensibility of these methods increases the precision and the speed of results while screening.

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‘Happenings’: A Publication from KUHS on Recent Advances

FACING SHEET OF ARTICLE

1. Stream	Dental
2. Speciality	Orthodontics
3. Date	29-6-2020
4. Title	*NANO*WORLD IN ORTHODONTICS-A SMALL BEGINING
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NANO WORLD IN ORTHODONTICS-A SMALL BEGINNING

Relevance

There is an increasing interest in nanotechnology around the world. Biomaterial science is greatly benefited by these nanoparticles. This technology can give a new dimension to orthodontic diagnosis and treatment.

- The term *Nano* has originated from Greek word *nannos* means “dwarf”.A nanometer is one billionth of a meter.
- The term nanotechnology was first used by Norio Taniguchi a student at the Tokyo Science University in 1974.
- Nanotechnology is the science of manipulating matter, measured in the billionths of a nanometer, roughly the size of two or three atoms.
- Use of nanotechnology in medicine and dentistry resulted in emergence of nanomedicine and nanodentistry. Manipulation of materials at nanoscale can improve each field.
- Freitas defined nanodentistry as the science and technology that will make possible the maintenance of comprehensive oral health by employing the use of nanomaterials, biotechnology including tissue engineering and dental nanorobotics.
- Use of this technology in Orthodontics can bring about a lot of advantages in the form of efficient and effective treatment results.

Application in orthodontics

- **Nano adhesives** Nano adhesives with filler particle sizes of ≤ 100nm used for bonding orthodontic appliances. Nanocomposites have better bond strength. Introduction of Eu3+ - doped ZnO nanoparticles into orthodontic adhesives can make them visible for safer and complete removal after orthodontic treatment. Adding ZrO2-TiO2 nanoparticles to orthodontic adhesives showed increased compressive strength and shear bond strength.
- **Antimicrobial agents** to avoid enamel demineralization, antimicrobial agents like ZnO, chitosan, silver and Titanium dioxide may be used in composites. Metal nanoparticles

show high bactericidal activity. Coating of orthodontic brackets with a thin film of nitrogen doped Titanium dioxide nanoparticles shows antimicrobial properties.

- **Nanocoated archwires** To reduce friction by coating the wire with nanoparticles allowing efficient tooth movement and easy sliding of wire on bracket. Coating of ZnO nanoparticles on orthodontic wire made of stainless steel reduced friction. Self-lubricating coating containing Fullerene like tungsten disulfide nanoparticle on orthodontic wire can be used. Carbone Nitride coatings, inorganic fullerene like Molybdenum Disulfide nanoparticles, diamond like carbon coating and nitrocarburizing have also been used.
- **Smart brackets with nanomechanical sensors** New brackets with integrated microelectronic chip equipped with multiple piezo resistive stress sensors for 3D force and moment measurement has been introduced. Bracket incorporated a microelectromechanical system with 32 stress sensors distributed over the chip area.
- **NanoLIPUS device** To reduce root resorption during orthodontic treatment LIPUS (low intensity pulse ultrasound) can be used. It can be made with a system on a chip design and the device can be easily mounted on a bracket or a plastic removable crown to act on the targeted teeth root.
- **Nanorobots** To enable nanorobotic movements biosensors and nano-kinetic device are used and attach to cells for movement of teeth in fast and painless way.
- **Nanoelectromechanical systems(NEMS)** It can be used for orthodontic tooth movement and maxillary expansion. They are micromachined device integrating electrical and mechanical functionality on the nanoscale level for application to biological systems. Orthodontic tooth movement can be enhanced by supplementing the mechanical forces with electricity.
- **Temporary anchorage devices** Biocompatible coating like Titanium nanotubes should be evaluated to enhance initial osseointegration and serves as an interfacial layer between the bone and temporary anchorage device.
- **Shape memory polymers** They have the ability to memorize equilibrium shape and then manipulated to a temporary shape under specific conditions of temperature and stress. Relaxation to original shape is accompanied by forces causing tooth movement. Carbon nanotubes or organic exfoliated Nano clay are used as fillers. Shape memory

nanocomposite polymers to fabricate orthodontic wires provide light continuous force over long range so less pain, fewer visits, esthetically pleasing and stain resistant.

- **Nanoparticle delivery from orthodontic elastomeric ligatures** elastomeric ligatures can serve as a carrier scaffold for delivery of Nano particles that can be anticariogenic, anti-inflammatory and antibiotic drug molecules embedded in elastomeric matrix.
- **Nano indentation tests** used to evaluate the mechanical properties of materials used during orthodontic treatment

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FACING SHEET OF ARTICLE

12. Stream	Dental
13. Speciality	Conservative Dentistry and Endodontics
14. Date	08-02-2020
15. Title	Antimicrobial nanoparticles for root canal disinfection
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ANTIMICROBIAL NANOPARTICLES FOR ROOT CANAL DISINFECTION

Source: Book and original articles
Contributor: Dr Subija K Narayanan Kutty
Relevance:

Despite the fact that the past two decades have seen remarkable developments in the field of dental technology in general and Endodontics in particular, several factors still adversely affect treatment outcomes. Though success rates of modern endodontic therapy are high, challenges persist in the ability to cure apical periodontitis. Root canal disinfection cannot be predictably achieved using current irrigants, materials and disinfection protocols. Therefore, novel approaches for canal disinfection, filling and tooth restoration have to be explored. Antimicrobial nanoparticles offer promising advancements in the field of endodontics.

- Nanotechnology is finding widespread application in medicine: in diagnostics, treatment and monitoring of progression of disease: cancer treatment, vaccine delivery, scaffold for tissue engineering and immunotherapy. Nanotechnology has current and potential applications in cure of dental diseases as well.
- Endodontic disease is a bacterial biofilm-mediated disease. The current treatment protocols focus on mechanical removal of the biofilm, along the use of antimicrobial agents as irrigants and intracanal medicaments. Conventional drug delivery systems have limitations in treatment of root canal infection and apical periodontitis due to the following factors:
  - Root canal infection and apical periodontitis are caused by bacteria, however, systemic treatment is ineffective and may lead to drug resistance.
  - Localized delivery is critical.
  - Sustained release is required over weeks with a single application; dosing must be above the minimum effective (or inhibitory) concentration.
  - Access of the antimicrobial agents to the bacteria and biofims in various areas and anatomical complexities of root canal system is critical.
- Suppression of micro-organisms and biofilm is challenging due to:
  - Ability of micro-organisms to adapt to adverse conditions including nutrient-deprived environment
  - Resistance to antimicrobials

- Protection offered by the self-generated barrier of extracellular polymer matrix

- Persistent infection after treatment and re-infection affect success of the treatment.
- Nanoparticles have one or more dimensions in the range of 1-100 nm. Nanoparticles with antibacterial properties are termed 'antibacterial nanoparticles'. They have a broad spectrum of anti-bacterial activity. The advantage over antibiotics is that they have lesser propensity to induce microbial resistance.
- Nanoparticles may prevent biofilm formation as well as penetrate already formed biofilms. Thus nanoparticle drug delivery may have promising applications in root canal disinfection.
- Various nanoparticles, nanoparticle-modified materials and techniques that may have potential applications in root canal disinfection are:
    - Chitosan nanoparticles: They have broad range of antimicrobial activity: antibacterial, antiviral and antifungal. Though the exact mechanism of antibacterial activity is not clear, it has been proposed that contact-mediated killing is the possible mechanism. Electrostatic attraction between the positively charged chitosan and negatively charged bacterial membrane leads to altered cell wall permeability, which in turn leads to rupture of cells and leakage of intracellular components.
    - Bioactive glass nanoparticles: The antibacterial activity may be attributed to high pH, osmotic effects and Ca/P precipitation-induced mineralization on the bacterial surface.
    - Silver nanoparticles: The antibacterial potential of silver has been explored in the treatment of caries, root canal disinfection and in restorative materials. Silver exerts its antibacterial action by interaction with sulphydryl groups of proteins and DNA, unwinding of DNA, altering the hydrogen bonding /respiratory chain, and interference with cell division or cell wall synthesis.
    - Nanoparticle-incorporated root canal sealers: Addition of chitosan, zinc oxide and quartenary ammonium polyethylenimine nanoparticles have been found to improve antibacterial effects of root canal sealers.

- Nanoparticle modification for Photodynamic Therapy: Nanoparticle-based photosensitizers potentiate the antibacterial efficacy of Photodynamic Therapy.

- Challenges: Most of the nanotechnology-based advanced therapeutic interventions are yet to be made available in the clinical settings. Toxicology of nanomaterials is different from the toxicology of its constituent chemical entity or bulk material. Therefore, concerns regarding its safety and toxicity to humans and environment must be addressed.

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FACING SHEET OF ARTICLE

1. Stream	Modern Medicine
2. Speciality	Pathology
3. Date	1-3-2020
4. Title	Machine Learning :Its Importance In Pathology And Medicine
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MACHINE LEARNING: ITS IMPORTANCE IN PATHOLOGY AND MEDICINE

SOURCE: original articles

RELEVANCE:

Now we are living in an era of humans and machines/ robots. Future of these machines is beyond our scope of imagination. In today's world, machines and robots have to be programmed before they start to work. But what if they start learning by their own from their own experiences and examples, what if they work like humans, feel like humans and do things more accurately than humans. This is the importance of knowing about machine learning. It is a part of artificial intelligence and it is very important in digital pathology also. This has provided a new field for healthcare researches as well.

Principle

- Machine learning is a subset of artificial intelligence which allows machines to learn from data, experience and examples.
- It makes computers and other machines to make decisions by their own rather than being programmed for carrying out certain task.
- **Types of machine learning**
    - Supervised Learning-Dataset will train the machine and once trained the machine itself makes decisions and predictions
    - Unsupervised learning -Machines learn by themselves by observations and add to their previous dataset
    - Reinforcement learning – machines will interact with environment to find out what is the best
- **Applications in medicine**
    - Predicting drug response- eg: to predict response of patients with inflammatory bowel disease to thiopurines. Studies prove that laboratory values and algorithms outperform metabolite tests for finding out this drug response and this method is less costly also
    - Cancer metastasis detection in lymph node- Deep learning algorithms were compared with pathologists in certain studies for detection of lymph node

metastasis for certain malignancies. Some deep learning algorithms achieved better diagnostic performance than pathologists' panel

- For molecular subtyping of cancer-Many machine learning algorithms are designed to analyse and interpret the data regarding molecular changes during development and progression of cancer. These databases are generated by PCR, tissue microarray, Nano String and RNA sequencing. Proper analysis of these data by machines will help in stratified cancer treatment.
- For predicting susceptibility to certain infections- eg: certain machine learning models based on gut microbiome predicted vibrio cholera infection.
- Blood pressure estimation using ECG signals-machine learning methods were applied to ECG database and Systolic, diastolic and mean arterial BP was predicted which came out to be so close to the results made by certified medical devices
- Recently, Blue Dot, a Canadian firm for infectious disease surveillance claims that they **predicted an impending outbreak of corona virus** using machine learning technology on December 31, 2019 and they warned their clients to avoid travel to danger zones like Wuhan.

- Machine learning is being applied in many areas in healthcare industry like diagnosis, prognosis, epidemiology, drug development, to predict complications, etc. Machine learning algorithms can be trained to interpret complicated medical imaging data and genetic profiles.
- **Major limitations of machine learning are**
  - Lots of algorithms are needed for machine learning for which special training are required for all
  - Human oversight is necessary in all works
  - This model is not useful for high level planning and accuracy

  But all these limitations can be overcome by deep learning technology which will not require so much training and human over sight. Thus deep learning is a perfect filling for this gap.

- Besides healthcare industry, the machine learning has its applications in image and voice recognition, stock marketing, language translation, email spam filtering, traffic prediction, video recommendation system and many others.

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‘Happenings’: A Publication from KUHS on Recent Advances

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1. Stream	Modern Medicine
2. Speciality	Plastic & Reconstructive surgery
3. Date	5.5.2020
4. Title	Do you really know what a Plastic Surgeon does?
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DO YOU REALLY KNOW WHAT A PLASTIC SURGEON DOES?

Relevance:

Plastic surgery is a unique specialty which has a public profile much popular than any other specialty. Sadly, this specialty is the most wrongly portrayed and poorly understood one too. This situation is much akin to the old parable of the "Blind Men and an Elephant". It is the story of a group of blind men who conceptualize what an elephant is like by each touching a different part and because of their limited exposure, how their descriptions of the elephant (aka Plastic surgery) vary from each other. Surveys have shown that not only the public but also the medical students, junior doctors and even our senior colleagues from other specialties do not have a clear understanding of the scope of this surgical specialisation. This article is therefore a humble effort to open the doors to the fascinating world of Plastic surgery.

- **What is in a name?**

Perhaps the absence in clarity of the definition influences the misconceptions about the specialty. Unlike Urology or Thoracic surgery, it does not pertain to surgery of an organ system. Unlike Pediatric surgery or Gynaecology, the scope of Plastic surgery is not confined to a particular age or gender. The name is derived from the Greek word "***Plastikos***" which means "to mould". To Plastic surgeons the whole body is like clay that can be moulded into desired shapes!

- **Why the misconceptions about the specialty?**

Public perceptions about Plastic surgery is strongly influenced by the media. Calle & Evans[1] in their review on how screenwriters present our profession in cinemas have found anecdotal portrayals of Plastic surgeries in Hollywood movies as early as 1917. Sitcoms like Nip-Tuck, Extreme makeover, Dr 90210 glamorise Plastic surgeries. The "Angelina Jolie effect' popularised the issue of Breast reconstruction after cancer surgery. In 1988 the popular Hindi movie *'Khoon bhari maang'* has a vivid portrayal of Plastic surgery on vindictive heroine Rekha who pleads for a "new face" and gets a new persona as a bonus! This was wishful thinking by the film makers because in 2005, Plastic surgeons achieved the first successful 'Face transplant' surgery. Again, many Plastic surgery procedures are truly life-changing to patients, by bringing about psychological well-being.

- **How did Plastic Surgery evolve?**

Plastic surgery originated in India and spread to Europe via Arab trade routes. In fact, many techniques we follow today are seen depicted in Sushruta Samhita. The technique of nose reconstruction using forehead tissue is still called the "Indian method of Rhinoplasty". Unfortunately, the knowledge remained un-disseminated in India and we had to seek our surgical know-how from the Western world. Plastic surgery found its glory after World wars I & II when mutilated soldiers had to be rehabilitated into society. Sir Harold Delf Gillies who gave significant contributions to this is known as, father of modern Plastic surgery. Modern Plastic surgery is evolving very fast today with new techniques being added from all corners of the world.

- **What does Plastic surgery deal with?**

Surveys by David k et al[2] on 1123 patients, medical students and primary care physicians showed that knowledge about this specialty is grossly under estimated. Rogers AD et al[3] also expressed concern regarding limited knowledge of junior doctors about the specialty, which stems from the fact that they lack exposure to Plastic surgery during their medical training. Perhaps, the versatility of Plastic surgery, which is its greatest asset may also be its undoing. It can be broadly divided into two branches - Reconstructive surgery & Cosmetic surgery. This specialty has contributed to reconstruction of 'form and function' of the body in many heterogenous disciplines like trauma, burns, cancer, birth defects and craniomaxillofacial surgery. Basically, reconstructive surgeries are indicated for repair of the "5 Ds"- Defect, Deformity, Dysfunction, Disability and Disfigurement, irrespective of their causes[4]. At our institution we are fortunate to have a good collaboration for reconstructive surgeries with other departments like Orthopaedics (limb trauma, hand surgery including brachial plexus repairs), General surgery (burns, cancer, difficult wound healing), Dermatology (skin cancers), ENT (ear, nose or other head and neck defects), Maxillofacial surgery (trauma, jaw tumours and craniofacial anomalies) , Nephrology (arteriovenous fistula creation), Gynecology (rectovaginal fistula), Pediatrics (various congenital anomalies), PMR (pressure ulcers) and occasionally even General medicine (diabetic foot, nerve biopsies). Such is the scope and versatility of Plastic surgery.

- **Is Plastic surgery the same as Cosmetic surgery?**

No. Cosmetic or Aesthetic surgery is only a glamorous subdivision of Plastic surgery. India is now making its mark in the health tourism sector, as a popular hotspot for Cosmetic surgeries. This branch deals with surgical expertise to correct bodily imperfections on request of the 'clientele' rather than 'patients'. Technically Cosmetic surgery tries to surpass the normal features of a person and is mostly desired to revert the ravaging effects of aging on the body. Cosmetic surgeries include procedures from head to toe like - Hair transplantation for baldness, blepharoplasty for droopy eyelids, face lift for saggy face, rhinoplasty for nose, otoplasty for ear, Breast augmentation or reductions, abdominoplasty or tummy tuck, liposuction for removing excess fat deposits, gynecomastia surgery, arm lifts, thigh lifts etc. We can collectively call cosmetic surgery as 'surgery of the soul' because it gives the person considerable psychological well- being[5]. Sometimes Cosmetic surgery and reconstructive surgery are not mutually exclusive like when aesthetic dimensions cannot be ignored in reconstructive surgeries of a burned face or a cleft lip child, if they have to be made socially presentable, along with correction of their facial defects.

- **What are the technical advances in Plastic surgery?**

Plastic surgery is a fascinating and challenging field of specialisation. The scope of this specialty is evermore on the rise after introduction of 'microsurgery' which is surgery under magnification whereby even arteries, veins and nerves less than 0.5mm can now be repaired and restored by Plastic surgeons. From the pioneering work of Nobel Laureate Alexis Carrel, this field has now progressed to 'super microsurgery' wherein even lymphatic tissue can be sutured. This has opened up broad avenues for the Plastic surgeon who can transport any tissues or organs from one part of body to another part of the same individual or a different individual. Thus cut fingers or hand or arms or faces can be replanted or transplanted.

- **Summary**

Plastic surgery is a problem solving specialty. It is not about beautification, burn care or cleft lip surgeries alone. Knowledge about this field and collaboration with different specialities is the key to ensuring better outcome in health care. The aim of this article is to heighten the awareness among medical fraternity about Plastic surgery and its diversity.

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DATA SCIENCE AND DEEP LEARNING –APPLICATION IN HEALTHCARE

SOURCE: Original articles

RELEVANCE:

Data Science is rapidly growing to occupy all the fields in world, it is also transforming the healthcare sector. Medicine and healthcare are two of the most important part of our human lives, with the advancements in computers and by use of Data Science, it is now possible to obtain accurate diagnostic measures. There are several fields in healthcare such as medical imaging, drug discovery, genetics, predictive diagnosis and several others that make use of data science. It will improve the performance and reduce the cost of healthcare which is a great concern and a huge challenge for healthcare organizations and governments

Application in Healthcare

- Data science is an interdisciplinary field that uses scientific methods to extract meaningful insights from large and complex sets of data (big data).
- It uses various tools, algorithms and machine learning principles to discover hidden pattern from raw data and it is primarily used for decision making, predictive analysisand in developing artificial intelligence.
- Traditionally the data we had were mostly structured and small in size and simple tools could be used to analyse them. But modern digital worlddeals with of structured and unstructured data everyday. Simple tools are not capable of processing this huge volume and variety of data., that is why we need complex and advanced analytical tools and algorithms for processing, analysing and drawing meaningful insights out of it.
- Data mining is a process by which data is a gathered, analysed and stored in order to produce useful and high quality information and knowledge. It also includes preparation of the data for use and finally the processing of data to support data analytics and predictive modelling.
- There are various technology applications in data science, the main and emerging ones are machine learning and artificial intelligence. Currently it is used in various applications in healthcare.

- Using a given set of data at a given time, a computer can simulate huge amount of possible outcome of a situation and then look into the past data and its respective outcome to narrow down the simulation. This process of looking into past data and learning from its known outcome is called machine learning, a more recent and advanced version is to make the computer learn with more features extracted from a given data through a deep layer network is called deep learning.
- Deep learning is very pivotal in the future of healthcare and its applications are
  - ❖ Imaging & Diagnostics aremost effective uses of data science in healthcare. Computers can learn to interpret MRIs, X-rays, mammography, and other types of images, identify patterns in the data, and detect tumours, artery stenosis, organ anomalies, and more.
  - ❖ Big data allows scientists to simulate the reaction of a drug with body proteins and different types of cells and conditionsand thus aids in drug development.
  - ❖ Data science is also helping with the emerging field of gene therapy, which involves inserting genetic material and thus it plays important role in genomics.
  - ❖ Hospitals are cost-sensitive and face complex operational problems. It helps staff to maximize their efficiency, to meet patient demand, and to enhance utilization in the operating room. Predictive analytics can optimize scheduling and can help hospital staff to anticipate problematic situations. Analytics software can streamline emergency room operations, ensuring that each admitted patient goes through the most efficient order of operations.
  - ❖ One major use is in Remote Monitoring of patient after any type of surgery or treatment and to help doctors to stay in touch with patients in real time while freeing limited and costly hospital resources to identify risk of complications and recurring pain, which can be difficult to manage once the patient leaves the hospital.
  - ❖ Quantified health" is a relatively new movement that integrates data directly from consumer wearables, blood pressure cuffs, glucometers, and scales into EMRs through smartphones and it can pick up on warning signs faster by tracking changes in behaviour and vital signs.
  - ❖ Other application - helps as a virtual Assistant, Clinical Trials, Nutrition and Fitness, Compliance and Mental Health assessment.

- The medicine and healthcare industry has heavily utilized Data Science for the improving lifestyle of patients and many players are participating in this change, including large biotech and pharmaceutical companies, payers and providers, hospitals, university research centres and venture backed start-ups.
- Data science can save lives by predicting the probability that patients will suffer from certain diseases, providing artificial intelligence powered medical advice in rural and remote areas in underserved communities, customising therapies for different patient profiles and finding cures to cancer, infections and other terminal diseases.
- There are also concerns about the use of data science in healthcare. As data often lives in disparate states, hospitals, and administrative units and it is challenging to integrate it into one cohesive system. Although data science can solve the shortage of doctors in many countries, there is some concern about outsourcing the important doctor-patient relationship to computer algorithms and machines

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NURSING CARE SWITCH TO ERA OF TECHNOLOGY

Technology is ever-changing and constantly evolving in to new and better methods that can make the life of nurse easier. Nurse must stay up-to-date on these methods as well as willing to invest in technological advance. By keeping up with the trends a nurse who is well versed in these new technologies will maintain their creative edge and be eligible for career advancement.

Explaining Complicated Medical Language with 3D Printing

Nurses who are responsible for explaining medical procedures and critical after care to patients may find that 3D printers give them access to tools that significantly improves the process.an exact model of body parts and organs can serve as an invaluable tool for enhancing communication between patient and care givers.

Smart bed.

Smart Bed Technology can help nurses track movement, weight, and even vitals. Smart beds also play a major role in keeping patients safe and comfortable during a long hospital stay. Smart beds are very important for patient safety too. Smart bed technology gives nurses a constant monitor in a room that provides them with regular updates and communications on a patient's activities. It can also help them identify patterns, which can lead to a new diagnosis or a different understanding of a condition.

Wearable devices

Devices that help track heart rates, exercise, sleep, respiration, and more, are helping people take their health into their own hands. With increased accessibility to iphones, nurses also benefit from apps and devices that help them care for patients. Wearable devices help remove elements of human error for nurses, because the communication of data comes directly from the device itself. It allows for faster record keeping, and helps patients and nurses maintain consistent monitoring of health.

Enhanced communication

Using smart phones and apps nurses can receive text messages and receive alarms from their patients through their phones. So the entire nursing staff is more in touch with their patients and with each other.

Electronic health records

Electronic record connects the nurse with their patients without hours of paper work. With this the nurse can quickly see what medications the patient is taking and which ones they are allergic too. Nurses can see the test results and ale to take early initiative to prevent complications.

Drug delivery

Numerous hospitals initiated and implemented drug delivery systems that come in an implantable device form. These devices release medication in to the correct dosing at the required times. Nurse can schedule the dosing and make sure that their patient gets medications they need in the correct dosing at the appropriate time. This reduces the chance of a patient error and allows them to focus on other areas that need their attention.

Automated Intravenous Pumps

Automated Intravenous Pumps control the dosages and drips given to patients. Software and medical tech allows nurses to change the drip amounts and medication doses so patients aren't waiting for changes. Automated iv pumps help speed up nursing processes, and can be crucial if there is a need for immediate adjustment. Changing medication through an automated process also removes elements of human error that could present issues for clinical patients and hospitals. Automated iv kits give nurses opportunities to focus on other areas of work, instead of having to measure and give medication or food.

Portable Monitor

Portable monitor equipment allows nursing professionals to check up on patients even if they are on the move, or busy helping someone else. Portable devices monitor vital signs like ECG, respiratory rates, and oxygen saturations while transmitting the information back to a central monitor. This means that nurses will get an alarm notification if there is any emergency. Monitor small condition changes, and can give them information immediately as alerts or reminders. Real-time health updates impact the speed and accuracy of medical care. Nurses learn how to use software systems on the job, but their education and training will help them quickly understand what different indications on medical records mean, and what their course of action should be; to ensure improved patient outcomes.

Simulation Based Training

Simulation integrated in to a number of nursing programs as well as training for fresh graduate nurses. For example, simulated patients presenting with mental health disorders reduces the anxiety and aids in achieving therapeutic communication skills

Telehealth

Patient can access nurse and get concerns addressed from the comfort of home. Home health nurses use telehealth to help patients log critical data for immediate review by nursing staff.

Nursing care innovations are arising that will further alter the course of nursing's future. So it is vital to include and train the nurses and nursing students to update with the technological advancement too.

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BEST TEACHER AWARD WINNER'S WRITE-UPS

BEST TEACHER AWARD WINNER'S – WRITEUP

FACING SHEET OF ARTICLE

1. Stream	Allied Health Science
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A PARADIGM SHIFT FROM PRODUCT CENTRED TO PATIENT CENTRED PHARMACEUTICAL CARE- CLINICAL PHARMACY SEGMENT- A PROMISE OF THE FUTURE

INTRODUCTION

Doctor is a doctor wherever they are trained.

A Pharmacist?

A question of concern and this question remained unanswered over a century in India and such type of concerns can be overcome largely by setting up ideal practice sites and cultivating real practice skills in every clinical pharmacist with proper mission, vision and strategic planning

A decade ago, Pharmacist involvement was only in the dispensing section. Times have changed and the professional role of pharmacists has expanded significantly in recent years. Plethora of pharmacy and clinical pharmacy programs have been launched in India under Pharmacy council of India (PCI), with a mission to produce qualified pharmacists to cater the demands of ever increasing population of our country. In 2008, there is a new paradigm shift for pharmacy practice where the preferences have been shifted from product focus to the patient focus and patient centered care there by giving pharmaceutical care a new dimension. A patient centered care is a professional obligation to take responsibility for and provide care targeted to, the individual patients need. Pharmacy practice involves the idea of pharmacists being fully available to patient care in every aspect and clinical pharmacy is a health specialty which describes the activities and services of the clinical pharmacist.

Evidence from many countries now demonstrates that success is already being achieved in preventing and treatment of various diseases by safe drug use. Pharmacists in developed countries like USA, Australia and Europe are highly recognized and appreciated in the health care sector as they provide drug information to physicians and pharmaceutical care to the patients. They are also involved in framing various health related policies and protocols for treating different clinical conditions in day to day practice. Back in India, the role of clinical pharmacist assisting physician while making decisions in drug therapy is largely underestimated. The Government authorities must get involved to standardize the pharmacy

practice and accept the changes taking place globally in the field of pharmacy and should frame necessary regulatory guidelines for having qualified clinical practitioners in every hospital across the state.

Today, the pharmacists are involved in many number of roles including the research and innovation, manufacture of quality medicines, providing primary and community health care, supporting and educating fellow pharmacists etc.; which indicates the prominence of pharmacists and highlights the progress between yesterdays and today's pharmacist. Every Pharmacist should continuously strive to improve and uplift the profession of pharmacy, thereby making a conducive environment to work with in the ever-increasing complex health care delivery sector. Pharmacists are dedicated to the preservation and advancement of the public health. Their efforts enhance the quality of our lives by helping us to live as free as possible from disease pain and suffering.

Pharmacist is playing a vital role in the society in protecting the patient from any kind of disease by educating them on the use of prescriptions and over-the-counter medications and also by keeping them alert about the possible drug interactions. The Health Ministry is bringing in gazette notification shortly wherein doctors will be demanded to write the names of medicines and related information in capital letters. Medical Council of India has circulated a standard format of prescription for all the doctors to all Medical Council across the State. Doctors across the country have responded positively to this new move. All this was possible due to the relentless effort of the Pharmacists like, Mr.Chilkuri Paramatha from Telengana, Andhrapradesh, who had made hue and cry to implement the same. As trusted medication experts, it is high time a pharmacist/clinical pharmacist must be actively involved/participating in advising physicians, nurses and other health care professionals on medication therapy decisions. This will ensure positive outcomes from the use of medication, which improves patient's quality of life with minimum risk.

Creating a better future for pharmacist is a requirement that needs to be met and the responsibility solely rely on the hands of budding pharmacists across India who are considered as the torch bearers and working force of the future. This article provides a brief insight about the Prospects of clinical pharmacy services and clinical pharmacy education in India.

BRIEF HISTORY AND OVERVIEW OF CLINICAL PHARMACY EDUCATION

Pharmacy education and practice is almost similar in all cities across the world though not identical. Founded in 1905, USC School of Pharmacy is the oldest and foremost pharmacy school in Southern California and is a national leader for its progressive curriculum and research excellence. The very first Doctor of Pharmacy program- Pharm D was started in 1950. In 1968, the School of Pharmacy launched the nation's First Clinical Pharmacy training program and some of the facilities for training included: Los Angeles country USC medical centre; USC keck medical center; USC Norris Cancer Center and in addition to that, USC have four campus Pharmacies owned and operated by the School of Pharmacy.

In India, Pharm D (short form for Doctor of Pharmacy) was first started in 2008, introduced as a 6-year program, which includes 5-year academic study and 1 year of internship. The Indian Gazette introduced the course in 2008 through a publication, and subsequently, in 2010 it was introduced in Kerala. The very first batch of Pharm.D (2010-2016) graduated in the year 2016 from Kerala University of health sciences. The service of Pharm.D professionals/ clinical pharmacist is now available in few multi-specialty hospitals throughout Kerala. Anyone interested can take the exam after high school and join the Pharm D and start their journey towards becoming a Pharmacist. In USA, it is slightly different. A student who wishes to join Pharm.D has to meet certain prerequisites. They have to undergo 3-4 years of undergraduate studies. It can be mathematics, physical science, biological sciences (biology, physiology, microbiology etc.) English, communications, psychology, Sociology, economics, social and behavioral sciences, humanities etc. Once all prerequisites are met, the student is eligible to enroll in Pharm D program. In USA, Pharm.D is a 4 year Program that is broadly divided into non clinical and clinical, also known as IPPE and APPE. IPPE stands for Introductory Pharmacy Practice and APPE stands for Advance Pharmacy Practice (externship). During initial years of study, students focus on learning basic skills required for pharmacy practice, like taking B.P, doing Pulse check, giving injections and exposure to the community setting. As the course progresses, there will be less and less of basic sciences and more of clinical pharmacy practice. Before completion of the program, student has to accumulate 900 hours of experience in clerkship (APPE) and 600 hours in voluntary work/internship in any pharmacy related area. Clerkship is more like patient care/clinical activity, but internship is a paid position where the higher proportion of distribution of drugs and preparation of prescription. By the

time of completion of the graduation, a student has to accumulate 1500 hours total. Pharmacy industry is the only profession grown by 10 percent in the previous year. To add on, PCI has approved the proposed amendments in the pharmacy practice regulation, 2015, for inclusion of the post of clinical pharmacist with the qualified duties and responsibilities. In developed countries pharmacy graduates work as clinical pharmacist in the hospital settings. As per the latest decision taken by the PCI, now the Pharm D graduates can boldly take up similar work pattern in Indian hospital settings to have better patient care. In 2019 pharmacy council has also approved the creation of Drug information centers (DIC) in hospitals. The concept of having Drug information Centre in hospitals is relatively new concept in India and this further opens up new vistas for aspirant Pharm.D and M.Pharm graduates. The purpose of establishing DIC is to provide accurate and unbiased information to promote rational drug therapy.

1) CLINICAL PHARMACY SERVICES AND ITS BENEFITS IN PUBLIC HEALTH SECTOR AND RURAL AREAS.

The health sector in developed countries benefits clinical pharmacy services by providing various pharmaceutical services like Pharmacotherapeutics, Clinical Research, Pharmacology, Pharmacoepidemiology, Pharmacovigilance and Pharmacoeconomics. - Clinical Pharmacists are committed in ensuring that ordinary people are provided with these services in our state. Today, the pharmacists are involved in surplus amount of activities including the research and innovation, manufacture of quality medicines, providing primary and community health care, supporting and educating fellow pharmacists etc; which indicates the prominence of pharmacists and highlights the progress between yesterdays and today's pharmacist.

A) PRESCRIPTION ADALAT

The Clinical Pharmacy services in our country are now available only to a few percentages of financially sound individuals. Clinical pharmacy services or services from Pharmacists can ensure that ordinary people receive the most modern medical facilities, in all public sector hospitals. Pharmacist is playing a vital role in the society in protecting the patient from any kind of disease by educating them on the use of prescriptions and over-the-counter medications and also by keeping them alert about the possible drug interactions. Novel concepts like "PRESCRIPTION ADALAT programs", can be implemented by pharmacist in rural areas of our country wherein Pharmacists move towards the patient rather than patient

moving towards the Pharmacist. It roughly means “patient’s court”, where the disputes are solved

regarding their medication, life style, knowledge about disease and drugs are governed by clinical pharmacist. The basic concept is to implement a direct face to face interaction between Clinical Pharmacist and the patient. The first “Prescription Adalat" was conducted at Perinthalmanna, Kerala on May 23rd, 2015. Response was tremendous and more than 50 patients from various walks of life turned up along with their prescriptions for the camp and got all their doubts clarified with our pharmacist on a one to one meet. The ‘Prescription Adalat' camp was a huge success in terms of settlement of prescription assessment, review of patient medication history, assessment of ADRs, assessing the prevalence of disease etc. The introduction of Prescription Adalath added a new chapter to the health dispensation system of our country and succeeded in providing a supplementary forum to the victims of unsatisfactory settlement of patient health dispute. This system merges the western clinical applications like medication chart review, history interview, DUE, with the doctrines of Mohandas karam Chand Gandhi, there by expanding the clinical and community services to the rural areas. Any Clinical Pharmacist in India can experiment this in their own localities to educate and empower the people of rural community. Kerala is known for its labor immigration as flocks of laborers from other states like Tamilnadu, Orissa and Bengal come to Kerala to make a living. The concern here is the hiring companies/labour contractors does not take care of the health or living condition/working environment of the laborers. This is one of another area where Pharmacist can get involved and make a difference.

B) MEDICATION WASTE MANAGEMENT

Kerala, the southern state of India, is an ever expanding hub for the healthcare sector, booming with a number of multi-specialty tertiary care hospitals with stellar achievements and track record. The state is also fertile for the mushrooming of various facilities associated with healthcare provision including nursing homes, clinics, diagnostic centres, pharmacies. A highly diverse and intricate network of healthcare professionals work day in and day out for the functioning of the system. The people in and around the state reap the benefits of this system to an extent that it translates to a luxury. This leads to an imprudent use of pharmaceutical products. As with all resources, incessant use of which conclusively leads to

wastage, medical resources also pose the same issue. The population are divided within the two extremities of the spectrum on affordability - few have access to pharmaceuticals whereas others struggled to meet their basic medical requirement. Therefore, the pharmacists can devise new schemes in collaboration with the local governing body Municipality or panchayat) for the effective disposal and reuse of unused medicines from the household and provide awareness on the same. The positive attitude of the population towards such pharmaceutical donation, lead to the realization of a scheme similar to the drug drop off programmes in the developed countries. The unused drugs are collected and are screened based on their reusability. This helps to salvage as much precious, quality medical resource and be redistributed to poor and the destitute patients under professional supervision. Such programmes attempts to tip the scale of socioeconomic inequalities to balance ideally. It inculcates the next generation with the value of perseverance to attain sustainability; forging sensible and responsible young citizens. The unused medicines can be reused once they have been subjected to careful inspection.

At the end of the day, the only thing that matters are the beneficence of the public. We have to, yet again witness the phrase- 'Education is the most powerful weapon which one can use to change the world'- come to fruition. The magnitude of unused medicine- the sheer bulk and total cost incurred - can be considered as a social marker for the progressively deteriorating scenario. It is evident that the initiative identifies the tip of the iceberg of the many problems in the present public health scene of the Malabar region. The huge void created due to the absence of a proper drug disposal system and awareness on the same cannot be left unattended and the project can be implemented in global level especially the third world countries. Each Pharmacist must use their education to improve the health of the patients and the public health by organizing various educative programs. Society needs a gatekeeper who manages and overlook the usage of drugs for the public safety.

C) SAHELI

A novel approach on healthcare management by pharmacists for rural women named "SAHELI" (Scheme to Aware Help and Empower Ladies in India) was introduced recently with the aim of uplifting the lives of rural women by educating them regarding the modern family planning techniques, maternal care and child care. Under this scheme the pharmacists, provided education regarding family planning, child health, maternal health and reproductive

health to rural women by conducting open counseling. The scheme has got a great acceptance by the rural women and they showed great enthusiasm and interest in acquiring more knowledge This program aimed to help, educate, and empower rural women in areas of family planning, child care and maternal care. The program involved group counseling sessions and classes led by pharmacists. Women in rural areas are known to experience health disparities with regard to sexual and reproductive health services, and many other key primary care areas on a larger scale when compared to urban areas. Reproductive morbidities are quite common among rural women. But due to the inhibition to share their sexual health concerns with a doctor, these problems remain untreated and finally leads to several complicated diseases which might even take their lives in certain severe cases. SAHELI", a Scheme to Aware Help and Empower Ladies in India was introduced in this context. It offers rural women, a complete assistance in: learning modern Family Planning techniques and practicing proper reproductive or sexual health care. SAHELI had a great impact on the rural women. This helped them to improve their quality of living in terms of reproductive health and thus helped them in empowerment. From the feedback received, it was clear that SAHELI was able to change the attitude and knowledge of rural women regarding the modern family planning techniques and importance of maternal care and child care.

SAHELI should be drawn out to a wider canvas so as to provide its services to more people especially in discrete and rural areas. This can help in creating collaboration between general public, pharmacists with the help of local health centers.

2.CLINICAL PHARMACIST IN PRIVATE HOSPITALS AND POSSIBILITIES OF CLINICAL PHARMACIST IN GOVERNMENT HOSPITALS.

With the launch of Pharm.D program in 2008, India witnessed another milestone in the history of pharmacy education. Despite the introduction of Pharm.D in the line of pharmacy education, the presence of clinical pharmacist is negligible to nonexistent in the complex health care delivery sector. Kerala being best in terms of health and literacy have whole-heartedly accepted the clinical pharmacists. It is noteworthy to say that many multi-specialty hospitals in Kerala has absorbed clinical pharmacist to a great extent, but many are still vehement and the apprehension is still in the air. The plight of clinical pharmacy services in other states is still worse and needs attention. The scope of practice changes have been

moving at a fast pace and at this juncture, clinical pharmacist should be vibrant at his activities, provided he should be capable of identifying the potential problems, explore and prioritize potential strategies and design ,implement and evaluate a viable solution in developed countries, Clinical Pharmacists plays a significant role in various pharmaceutical health services like helping a doctor prescribe medicine, avoiding unnecessary consumption of medicines, controlling side-effects, monitoring the use of antibiotics, educating the patient about the prescribed medicine and also monitoring the consumption of medicines by the masses. Few of the private hospitals and Hi-Tech super specialty hospitals in Kerala have been able to elevate the standard and quality of clinical pharmacy to the level mentioned above. Clinical pharmacists are instrumental in setting up similar services to ordinary people at government hospitals. Pharmaceutical care is still in its infancy in India, despite India being a hub of hospitals. Clinical pharmacist across India should set up an ideal practice sites in their respective territory and every clinical practice setting should have work force which is flexible, capable, demonstrable and adaptable to all kind of practice activities. Change is inevitable in a progressive society and we need to embrace the change since change is occurring in every sphere of pharmacy

3. THE STRUCTURE AND SYLLABUS OF THE CLINICAL PHARMACY COURSES ARE ESSENTIAL FOR RESEARCH WHICH WOULD BE USEFUL FOR THE PEOPLE.

Despite India being the hub of hospitals, patient care is still in its infancy in our country. There is a strong need to inculcate the habit of vibrant research in the mind of each and every health care professional. Pharmacist should strengthen research by bridging the gap between Doctors, Nurses and other health care professionals to reach the common goal of patient care in foreign countries, clinical pharmacy completely stands close with the general medical science and it works alongside the Research & Development department in pharmaceutical industries. Studies on various topics related to the advanced and ongoing community help departments and continuing education programme are a part of the six year course of Pharm.D and Two year M.Pharm Pharmacy practice. The course offers one-year practice in clerkship and internship that provides the students to excel research methodology and clinical research during the study period. Additionally, the students are exposed to numerous opportunities in research and publications within their study tenure. Thus Pharm.D and M

Pharm students continue their professional attitude in the respective department they handle. For instance, Pharm.D and

M.Pharm professionals have around hundreds of research papers in community and clinical sectors to their need. Thus, the intellectual and excellent performance of the former are useful in the public health sector.

4. PHARMACOVIGILANCE: A FIELD OF ADVANCED SCIENCE.

In most of the developed countries like USA, the mortality rate due to drugs accounts to four times that of accidents. The unfair use of medicines and its side effects is likely to cause death. Our country has not yet gained strength either to find appropriate reasons for the former cause or methods for their surveillance; hence such figures are not available to us. Teaching of pharmacovigilance is one of those essential activities that are required, if we are to move forward with the objective of detection, evaluation and prevention of adverse drug reactions on patients and populations. Pharmacovigilance insists for the safe and rational therapy making an essential check point for regulatory utilization and movement of drugs. Clinical pharmacy professionals with their improved clinical knowledge and skills, have an extended role in reporting spontaneous adverse drug reactions (ADR) and thus hinder medicine related errors. National coordination center, PVPI (New Delhi) has decided to collaborate with Pharm.D institutions for collection of ADR related information, which would be a turning point for the pharmacovigilance sector in India. Currently there are around 270 Adverse drug reaction monitoring (AMC) centers across India. With this decision, the Pharm.D and M Pharm pharmacy practice students can report ADR to AMC or PVPI directly which is yet another milestone for the clinical pharmacy segment in India. In the era of globalization, there is a great demand for pharmacist, and pharmacists across the country should strive hard to achieve more respect in the years to come.

5. THE PHARMACEUTICAL SECTOR ALSO RENDERS INCREMENTAL CHANCES FOR THE EFFECTIVENESS OF CLINICAL PHARMACIST.

The six year Pharm.D course and two year Pharm, course makes the students proficient in various subjects- Pharmacovigilance which outlines the drug use and its side effects, pharmacoeconomics which help to choose the appropriate drugs economically and pharmacoepedemiology, which deals with the prevalence and extend of drug use in addition

to clinical research, manufacturing, procurement and rational use of drugs. Clinical pharmacy services can be ensured in the handling of medical matters in the field of public drug policies, Essential Drug List, Drug Formulary and Health Insurance transparently. It would be beneficial for the public if these services are made available in the government hospitals.

6. CLINICAL PHARMACY SERVICES CAN BE AVAILED IN THE IMPLEMENTATION OF PHARMACEUTICAL DRUG POLICIES.

In this era of various diseases and the increasing number of medicines for treating them, it is essential in Kerala to improve the public health and to develop a flawless and loft policy for the use of drugs, which can be achieved through inclusive participation of pharmacy sector educators. Thus Kerala will be the first state to formulate the pharmaceutical drug policies in India with the objective to curb unwanted drug use. Additionally, clinical pharmacy services can be assured in central government schemes such as generic sales outlet (Prime ministers Janoushadhi yojana), Pharmapark etc.

7. CLINICAL PHARMACY SERVICES CAN BE APPLICABLE IN THE ADVANCED AND INNOVATIVE COMMUNITY PHARMACIES.

The introduction of different schemes on clinical pharmacy, similar to that of most of the developed foreign nation's services, in the expanding community pharmacies in our country seems to be helpful for the general public. This includes **Drug Information Centers-** to help and assist the general public and health care professionals with information on drug and its use, provide them with right quality drugs and **Patient Counselling Centers –**where the patients or the care takers would receive advice and assistance on the disease, drug use and lifestyle modifications. Community involvement is important for pharmacist and the overall goal of the community based health services is to provide service learning opportunity for pharmacist to improve the quality of life and health education in the surrounding community. Also such services build relationships, trust and encourage continuity of care. The importance of a pharmacist as an integral member of the community and a reliable guide for maintaining the health status of the community is conveyed through such services. All these services will be overseen by the competent and efficient clinical pharmacist, thus raising the health care system in our country to international standards.

8) SERVICES OF CLINICAL PHARMACIST CAN BE UTILIZED IN PRIMARY HEALTH CARE (PHC) AND PAIN & PALLIATIVE PHARMACEUTICAL CARE

Clinical pharmacist finds their immense role to be played in public healthcare especially in aspects of vaccination and rational use of drugs at Primary health centers (PHC). It is certain that clinical pharmacists' role extents from clearance of uncertainties related to drugs in hospitals/home care to effective patient counselling, DIC services, ADR reporting etc. Clinical pharmacists can also be enrolled in the newly revised pain and palliative policy wherein their help and empathetic attitude would add to the betterment of the society and medical profession. Clinical pharmacist has got an eminent role to be played in palliative care wherein they can help not only the patients but also the entire medical profession. Optimistic hope, dedication and hard work are the key morals of palliative care. Adding to these, morals, the act of mental support, patient care, team work would pave a new pathway for Ideal patient care thus it will bring a change from disease centered palliative care to patient centered palliative service. cost and time effective integrated palliative care concept would be soon reality when the advancement of the field is included with the vicinity of practice, education and research. The role of pharmacist extends from clearance of uncertainties related to drugs in ward, OP, home care etc to effective patient counselling and provide more focused care to field of drug related matters like ADR (adverse drug reaction), drug information service, patient counselling. Its certain that these roles stand as an added skill which would surely pave new pathway for a comprehensive assessment and helps in treatment of physical, psychosocial and emotional concern experienced by patient.

The novel field of palliative pharmacy practice should be highly encouraged and promoted so that the patients would get better care. Numerous researches associated with pharmaceutical care and palliative care can be initiated through such programs.

9) CLINICAL PHARMACISTS CAN BE ADVANTAGEOUS IN PROVIDING CONTINUING MEDICAL EDUCATION.

It should be taken into account that pharmacy professionals have got an eminent role in bestowing continuing medical education concerning medication safety, medication management, medicinal utilization methods among health and drug inspectors, Asha workers and other health care professionals. Pharmacy professionals play an inevitable role in the

health care system and maintain an attitude of integrity and dignity with other health care professionals. The health care team is deficient without the clinical pharmacist. /Pharmacist

10) EXCELLENT HEALTH FOR ALL, AT LOW COST, FLAWLESSLY

The cost of the medicine prescribed is the main expenditure for an ordinary man during a health situation. A majority of these expenses can be controlled with help of the pharmacist. Pharmacy professionals will help to ensure that the patients are treated at adequate expenses. Clinical pharmacist should also be held accountable, along with doctors for the medicines prescribed to a patient. As a result of this, the monopoly of pharmaceutical companies can be chained. Pharmacist would enable the ordinary men in our nation to follow an inspirational culture of medicine.

Conclusion

Touching the life of needy will ultimately lead to the progress of a Nation. A better society and better living conditions can be shaped, if every individual start taking such social initiatives. For the betterment of the community we live in, a health care Pharmacist has a greater role to play. Each Clinical Pharmacist must use their education to improve the health of the patients and the public health by organizing various educative programs. Society needs a gatekeeper who manages and overlook the usage of drugs for the public safety.

With our subject knowledge base, relentless efforts and perseverance towards the goal, we hope we can bring in a difference in the society we are a part of. One should feel the pulse of pharmacist in every sphere of his life. Upliftment of the Pharmacy profession in India is the need of the hour and exerting good leadership to bring the pharmacy profession to greater levels will improve the standards of Pharmacists.

Dreaming is what keeps us moving forward and we urge all the fellow pharmacists to work hard to achieve their dreams in the chosen career thereby uplifting the professional standards of pharmacy.

‘Happenings’: A Publication from KUHS on Recent Advances

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TECHNOLOGIES IN DIABETES CARE

Relevance:

There is an increasing burden of non-communicable diseases across the world and especially in India. The focus on care is also getting more importance. The cost and constraints are always a challenge in management of our patients. The technological advances in diabetes happened in last decade and going to come is amazing and it is going to change our practice in this field.

Diabetes is a very challenging problem because of its increasing prevalence.

Prevention is possible even at primordial and primary levels in diabetes and CVD[1] .

We never believed that our practice will be incorporated with such sophistications ever but it is happening or will happen soon in all stages of care from medication, Insulin, monitoring and delivery.

The technological innovations in diabetes can be divided into:

- Technologies in drug delivery systems
- Technologies for monitoring
- Technologies for communication and education.

Technologies in drug delivery systems:

- Better options from syringes, pens, pumps to needleless or inhaled ones
- Needles became shorter and thinner to reduce the pain of injections.
- Continuous Subcutaneous Insulin Infusion Pumps. This will offer a better option in situations where we require better smooth control, in type 1 Diabetes, situations of brittle diabetes, hypoglycaemia unawareness and nocturnal or serious hypoglycaemic episodes. This comes with more commitment, closer monitoring and at an exorbitant cost too for our patients. And for this reason though insulin pumps have been available for over 40 years, they are not yet widely available for use in our patients. There are revolutionary advancements happening in insulin pumps too like smart pumps, and tubeless pumps.

Technologies for monitoring

- Self-Monitoring of Blood Glucose (SMBG) is proven to be beneficial in type 1 diabetes and in situations requiring tight glycemic control for avoiding hypoglycaemic episodes.
- We must also be aware of the glucometers patients are using and the accuracy of the data[2] . Of late we have seen the development of new devices and also integration with consumer electronics and cloud-based data systems like Bluetooth-enabled glucose metres that link to the iPhone and Apple Watch.
- From SMBG slowly we are moving to Continuous Glucose Monitoring (CGM) to avoid hypo and hyper glycemic episode in patients on Insulin specifically on intensive regimen or on insulin pumps. Most CGMs provide real time huge data and gives a window of opportunity for the provider and patient to optimize control. CGM measures interstitial glucose and in most of the time this correlates well with plasma glucose.
- Sensor-augmented pump therapy with automatic low-glucose suspend will help to predict and avoid hypoglycaemic episodes and will improve quality of life in high risk patients.
- 14-day Flash Glucose Monitoring systems help to avoid finger stick calibrations and gives ambulatory glucose profile of 14 days' data.
- Long-term CGM system to use a fully implantable sensor which can be worn up to 90 days is already introduced to international market.

Telemedicine in diabetes care.

- Incorporating telemedicine in diabetes care through telephones, internet or similar platforms is definitely helpful in bettering the patient care through communication, interaction, education[3] .
- There are smart insulin pens that works through Bluetooth technology and comes with a companion smartphone app and a bolus advisor.

Challenges

- Technological advancements will be welcome by a young energetic techno savvy but definitely will be very challenging for a senior citizen.
- Cost and accessibility of these technologies is a challenge but the clinicians' attitude to these technological advancements also decides a lot in its acceptability of these in practice.

Future

- Patients are really hoping a day without injections, painful pricks for drug administration and monitoring. The days are not far off where our patients are also using inhaled insulin or the much awaited oral insulin where it comes as a pill and not an injection. Researchers are working on to develop Sweat Sensor for diabetes monitoring through a wearable device.

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BEST TEACHER AWARD WINNER'S – WRITEUP

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FUTURE DIRECTIONS IN DENTAL HEALTH SCIENCE EDUCATION

INTRODUCTION

It is said that the children of today are the citizens of tomorrow. Obviously, the medical students of today will become the doctors of tomorrow. The knowledge, skills and values imparted to these students will be carried over to the future professionals. Hence medical education represents the future of medicine itself. It is important that these future doctors are well prepared to meet the demands and needs of the future generation. The field of dentistry is also fast evolving with drastic changes in almost all its branches. It is important that such changes are incorporated, and information disseminated amongst the coming generation of specialists.

The first dental school in India was established in 1920 by Dr. R. Ahmed at Calcutta, West Bengal. The Dental Council of India (DCI) was incorporated under the Dentists Act-1948, to regulate dental education and the profession throughout India. Regulations and syllabus for the MDS degree was laid down in 1959 by the DCI. It was in 1993 that the DCI passed a resolution for the MDS course duration to be 3 years throughout India. Now there are 25 dental colleges in Kerala, within which 5 are in the Government Sector. There are many challenges being faced by the profession. Escalation in cost of dental treatment is a major concern. This is a great burden on the patients and population in general. It is important to control health care costs. Another challenge is that life expectancy has increased today yielding a large proportion of aged patients. Dental health awareness has also increased, leading to more and more younger patients seeking treatment at an early age. This is commendable, as preventive measures can then be under taken.

Technological advances are transforming the dental profession in many ways – newer equipments, materials, methodologies. Infact it is really overwhelming. One needs to constantly update oneself to keep pace with the rapid changes. The dictum “update or outdate” assumes great relevance.

DENTISTRY – YESTERDAY, TODAY, TOMORROW

Team approach

In the older days and even today, dental surgeons were/are trained with the requisite knowledge, skills and attitudes to treat individual patients. However, the scenario has now changed drastically. Now we need to work in teams. Interdisciplinary and multidisciplinary treatments are gaining more acceptance as they deliver better health care. This means that the current system of students being posted in individual departments has to be replaced by a more holistic approach.

The Holistic Approach

When posted to a specific department, he or she gets trained in techniques pertaining to that specialty alone. Most patients invariably have more problems than one. When treating the person as a whole, students get a wider perspective. There are many universities which follow a different method of clinical training, where each student has to look into all the treatment needs of a patient allotted to their care. Obviously this is under the supervision of a team of expert teachers. This collaborative approach takes care of the psychological aspects as well.

Communication skills

The doctor-patient relationship has undergone a sea change. In the old world, it was paternalistic; now there is more patient autonomy. Treatment is based more on partnership. Every student has to be trained regarding informed consent, assent and dissemination of accurate information. The importance of good communication skills cannot be overemphasized. Training for effective communication skills, body language and attire, public speaking, presentation skills etc. should form part of the curriculum. Behavior that shows empathy, concern and compassion should be encouraged.

Evidence based knowledge

Previously, the practice of medicine and dentistry was based on expert opinion; it is now based on systematic reviews and evidence. Students therefore need to be trained to have an inquiring mind and not take anything at face value. More research facilities and tie-ups with bio-engineering Institutions, setting up of animal laboratories etc. will be helpful.

Regular faculty performance appraisal by the University is also necessary to motivate faculty to undertake faculty improvement programs on a regular basis.

Highly qualified, eminent personalities in the concerned specialties, both national and international maybe invited to the Institutions to share their knowledge on a routine basis. A panel of eminent personalities maybe identified for the same, so that students get good exposure.

Exchange programs for post-graduate students between highly reputed institutions at national and international levels should be incorporated. Introduction of credit hour system will provide better evaluation of each candidate. Group discussions and symposiums should be made part of the U.G. curriculum. This will improve evidence based knowledge as well as faculty- student relationships.

New arenas

Geriatric dentistry should be made part of curriculum considering the increased percentage of older generation. Another field is Dental Jurisprudence. The heightened awareness among the general public, knowledge dissemination in social media and changing patient attitudes necessitates the future professionals to be well informed and well prepared.

Technical skills

The field of dentistry involves working with a number of equipments on a regular basis; dental chair, lights, compressors, ultrasonic scalers, composite light curing units, welders, lathes, trimmers, micro motors, aerators, air compressors, headpieces etc. have to be handled by each practitioner. At present, the dental surgeon is dependent on technicians for even minor problems. The undergraduate training program should include technical know-how of these regularly used equipment. This will go a long way in improving the smooth working of any department or clinic. This is a totally neglected area in dentistry.

Patient management during medical emergencies

Effective management of medical emergencies in a dental office is ultimately the dentist's responsibility. Every student should have a basic knowledge to recognize, access and manage a potentially life-threatening situation until the patient can be transported to a medical facility. An accurate medical history is extremely important for the dentist to identify

any predisposing factors that could give rise to an unforeseen event. Preparation for emergencies include: training all students in recognizing and managing life-threatening situations, developing a team approach with individual responsibilities, conducting simulated emergency events, availability of emergency drugs in dental office, and most importantly the knowledge regarding those drugs with the mode of administration. Fundamental training in basic life support measures like cardiopulmonary resuscitation (CPR), Heimlich maneuver, intubation and other airway techniques, intravenous access and recognition of cardiac dysrhythmias should also be included in the curriculum along with postings in emergency medicine department.

Examination process

The present examination system involves working and doing specified procedures on the patients allotted to the students during the examination. Students are assessed based on the procedure undertaken on the patient and their performance. Many a time, this creates a lot of strain for the patient as well as the student. Being subjected to a procedure during an examination is unfair to the patient. This needs to be replaced with Objective Structural Clinical Examinations (OSCE), case discussions, role play to test communication skills etc.

The field of dentistry has many branches. Future holds bright prospects in each specialty as evidenced by the quantum leap in technological advances in each one of them.

Future directions in Oral Surgery

In the specialty of maxillofacial surgery, more course time is required to increase the training and posting to other super-speciality departments. Surgical skill labs for simulated cadaver surgeries and animal labs to undertake surgical training and research is highly essential. Collaboration with bio-medical and bio-technology institutions for in-vitro researches should be made available. Modern teaching aids should be incorporated like webinars and tele-conferencing to discuss live surgical techniques and discussion should be provided. Latest modern surgical techniques like minimally invasive procedures, nanotechnology, tissue engineering and robotic surgeries etc. should be introduced.

Future directions in Oral Medicine

Early detection of potentially malignant diseases can be done with novel diagnostic modalities like optical coherence tomography (OCT). Salivary proteomics can be used for evaluating the status of oral health and detection of metabolic diseases. Use of LASERs in treatment of chronic mucosal lesions that are recalcitrant to conventional oral medications can prove to be beneficial. Other future trends involve diagnosis and interventions in obstructive sleep apnoea (Dental Sleep Medicine), advancements in vital staining using spectrophotometry and the use of local drug delivery system in treatment of chronic pain.

Future directions in Oral Radiology

Filmless digital system, automated tracing of cephalometric radiographs, 3D printing for in-office guides for implants and bio-models, dental Magnetic Resonance Imaging, Portable dental X-ray generators in forensic odontology, artificial intelligence and neural networking in diagnosis of oral and maxillofacial lesions have emerged as better alternatives to conventional approaches.

Future directions in Prosthodontics

Prosthodontics is the branch of dentistry dealing with the replacement of missing teeth and orofacial structures. It encompasses removable, fixed, implant and maxillofacial prosthetics.

Advances in removable prosthodontics include implant supported titanium milled prosthesis, zirconia milled prosthesis, bar attachment dentures, magnetic overdentures etc.

Also, optical and digital surveyors have replaced conventional ones to a great extent.

Advances in fixed prosthodontics include implant supported fixed dental prosthesis which are screw retained or cement retained., fabricated out of newer materials like zirconia, PEEK, reinforced composites etc. the use of CAD-CAM technology allows for a computer model to be converted into a physical reality in the form of veneers and full crowns being done in a single appointment. CBCT along with 3D printers are being used to fabricate maxillofacial prostheses. Craniofacial implants, newer silicone materials, skin colour matched facial prosthetic elastomers, spectrophotometers, implant prosthodontics with on-screen computer guidance, T-scanners for analysis of occlusion, jaw trackers and jaw vibrator

analyzers for treatment of TMJ disorders are the other advances. It can be seen that Prosthodontics is well positioned to meet the expectations of the aged population.

Future directions in Oral Pathology

Standardized application of several imaging methods such as image analysis (with a set of rules), computer assisted diagnosis and 3 –D imaging are not identified or are underutilized in pathology labs across the country. A standardized method of obtaining, storing and sharing digital images is needed and can lead to better diagnostic techniques, teaching and research activities. The application of genomics / proteomics in diagnostic tests and preventive measures requires that the students receive necessary knowledge related to microbial/ human genetics and current principles of molecular medicine. Currently there is lack of genetic instruction in dental education. A significant restructuring of dental curriculum and faculty development programme is the need of the hour. Since pathology is a visual science, the inclusion of quality dental images into lectures, teaching hand-outs and electronic documents is crucial. Tele pathology -telecommunication technology should be installed to facilitate transfer of image rich pathology data between different locations for the purpose of diagnosis, education and research. More practical exposure to other diagnostic modalities such as routine hematology, serology, biochemistry, microbiology and molecular techniques should be incorporated in the UG and PG curriculum so that the student will develop practical skills to acquire competence in the subject. Decompress the curriculum by eliminating outdated and irrelevant topics. The educational collaboration between dentistry and other health professional is to be increased, with emphasis on the curricular interaction between dental and medical professional.

Future directions in Pediatric and Preventive dentistry

Pediatric dentistry is an age defined speciality in dentistry which deals with the oral health care needs of children from birth to adolescence and those with special health care needs. Education in Pediatric health field depend upon 3 domains; Cognitive domain involving learning and memorizing the basics of the subject, Psychomotor domain emphasizing on preclinical exercises on typhodont teeth, doing clinical procedures on real patients and Affective domain involving behavior management, interpersonal and communication skills.

E-learning (online learning) has huge potential in medical education especially in cognitive domain. Students can get exposures from expert faculty across various colleges, universities and other countries. Currently simulators (Psychomotor domain) used in dentistry in India are low fidelity typhodonts fitted on phantom head which are used in cavity preparation. This needs to be improved, so that students can practice the procedures on simulators than on patients. Other advancements that need to be incorporated are High fidelity (realistic) haptic simulators with saliva, blood, sensitivity etc. to get a realistic feel along with virtual reality (VR) simulators. Advances in post-graduate education can include facilities for conscious sedation with nitrous oxide, facilities for doing procedures under General anesthesia and separate training to treat differently abled children.

Future directions in Conservative dentistry and endodontics

Contemporary Endodontics over the past couple of decades has witnessed one of the most rapid and extensive technological evolutions pertinent to endodontic imaging (CBCT and real time echo tomography), root canal preparation, root canal disinfection (Photodynamic Therapy, Laser Assisted Irrigation System), obturation(3D obturation techniques) and regenerative endodontic procedures (e.g. Nanocrystals, bio nanocomposite and 3D bio printing etc.). Recent advances in Conservative dentistry in terms of improved and smart filling materials, minimally invasive dentistry, nanotechnology, LASERS, improved and minimally invasive diagnostic aids for caries detection (e.g. FOTI, DIFOTI, Diagnodent etc.) have also shown good prospects for the future. The undergraduate curriculum should be frequently revised to keep the students updated with the most recent technology.

Future directions in Periodontology

Over the decades, oral health care has seen many advances that has significantly impacted the practice of Periodontics. Periodontics continues to evolve and readjust its focus on the basis of contemporary research spanning a vast array of scientific endeavor. Topics that are currently under investigation include genetic, epigenetic and genomic studies, host modulation, targeted antibiotic therapy, periodontal regenerative medicine and personalized (precision) periodontics. Newer technologies like nanotechnology, CAD-CAM, 3-D bio printing, cell based tissue engineering as well as natural therapies holds a promising future.

Future directions in Orthodontics and Dentofacial Orthopedics

The world of Orthodontics is rapidly transitioning from traditional wire retainers and appliances to clear aligners fabricated with the use of CAD/CAM technologies. To provide convenience and save patients time, tele-orthodontics use intra oral scanners, aligner and 3 - D printing, and CAD-CAM along with other newer software helps in clinical diagnosis. CAD-CAM technology can also be used to fabricate surgical splints, for fabricating trays for indirect bonding and fabrication of custom made brackets. Application of lingual orthodontic appliances is becoming easier with new technologies such as virtual positioning of the brackets and indirect bonding systems which utilize virtual setup models. Automated patient tracking and management software can also help in simplifying workload and provide digital database for patient records.

Nanoparticle coated archwires reduce friction and thus improve the efficacy of tooth movement. The material characteristics of nanoparticle incorporated adhesives is shown to be improved compared to the conventional adhesives. Artificial intelligence which is an emerging concept can be used in orthodontics to simulate the tooth movement and provide final treatment outcomes using algorithms and statistical analysis.

Introduction of Self Ligating Brackets(SLBs) created a buzz in this field as it helps in passive engagement of archwires with reduced friction and better oral hygiene compared to the conventional brackets. With the introduction of Temporary Anchorage Devices (TAD) and Skeletal Anchorage System (SAS) in orthodontic armamentarium, Orthodontics has entered new era in the management of complex malocclusion and adult orthodontics. The TADS and SAS have significantly enhanced the treatment outcome by offering absolute control of anchorage in addition to the versatility and minimal invasiveness when compared to other invasive Osseo-integrated procedures for skeletal anchorage. Fixed functional appliances anchored to Mini Screws Implants (MIS)/Skeletal Anchorage Systems (SAS) have shown faster and improved skeletal adaptations without dental adverse effects. Micro implant-assisted rapid palatal expansion (MARPE) has been considered an alternative to avoid extensive surgical procedures. Three-Dimensional Imaging, such as cone beam CT (CBCT) is fast becoming popular and at times, also being overused. Other modalities of 3D scanning in orthodontics include non-radiation 3D imaging of face, which need to be promoted and used

for research on facial growth and treatment planning and outcome. The current imaging software should be updated to minimize distortion, reduce the magnification and overlapping of craniofacial structures.

Future directions in Public Health Dentistry:

Department of public health dentistry should include quota for students during internship for attending camps, doing treatment in camps as well as in the department, providing health education to the community, and also motivate students to take lecture classes to improve their teaching skills. Simple treatments should be made available to the community through community outreach programs and camps. Doing research work like cross-sectional studies, attending conferences, presenting posters and papers should be included in the UG curriculum. Communities within a specified area of a dental college can be demarcated by the university. Basic treatments must be done along with periodic screening, in addition to spreading awareness on oral health and disease in these specified areas.

CONCLUSION

Thus it can be seen that there are many advances in each branch of dentistry. Incorporation of these advances at various levels of UG/PG training will augment a bright future for tomorrow's generation. It is upto the medical / dental education of today to sow the seeds of a bright future for the upcoming professionals of tomorrow.

BEST TEACHER AWARD WINNER'S– WRITEUP

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FUTURE DIRECTIONS OF HEALTH SCIENCE EDUCATION

The science of Ayurveda originated in India more than 5000 years ago. It is a system of healthcare that is native to India and is considered as a heritage of India, utilized by millions of people to cater their day to day health needs. Moreover, Kerala is hailed as the land of Ayurveda or the cradle of Ayurveda. In the current era where Ayurveda is receiving global acceptance and attention largely, there is also growing concerns in the recent years regarding the current status of Ayurveda education in colleges and its future prospects.

In ancient India, the method of learning Ayurveda was through Gurukula system of education. In Gurukula system, physicians had to undergo training for a period of approximately twelve to fifteen years during the course of which they gained thorough knowledge of the classical medical texts and participated in all aspects of medical practice, including diagnosis and preparation of medicine and formulations. By the end of course, when the student was deemed to have achieved the level of profound knowledge, he had to spend an additional period in meditation, and recitation and memorization of the Ashtangahridayam. Only then the young physician having been developed an analytical mind and well versed in the science was considered to be competent to embark on his career as a physician.

During the medieval and colonial periods of Indian history, the Gurukula system of education was set back and in 19th century, medical education in the European fashion began to be experimented within India and in Kerala and some of the merits of such an ancient system of education seem to have been compromised. Unlike the Gurukula learning, in institutional learning, students benefit from learning with teachers of different specializations. The colleges turn out large numbers of Ayurvedic physicians every year whose services are widely available to the community. Also Ayurveda medical education is now accessible to all students unlike in the past when caste and creed distinctions limited access to the study of Ayurveda. While the current system of training has advantages, the modern curricula diminishes the in depth knowledge of the fundamental principles of Ayurveda. Current system isolates disease as a condition affecting a part of the body, as biomedicine does, while in Ayurveda disease is perceived to be multifaceted.

Today, there are more than 250 Ayurveda colleges in India and 18 Ayurveda colleges in Kerala providing the graduate level course- Ayurveda Acharya / Bachelor of Ayurveda Medicine and Surgery (BAMS). India has about 25,000 undergraduate seats and 3500 post graduate seats for Ayurveda. Even though the Central Council of Indian Medicine has imposed various educational norms and regulations, the standard of Ayurvedic education has been a cause of great concern in recent years and may be on the verge of collapse.

There are many factors that are held responsible for the degradation of the educational standards. The most important factor is the mushrooming of Ayurvedic colleges as a part of privatisation of educational systems due to the liberal policies of the State Governments and the loopholes in the existing acts. As to say in Kerala, there are only three Ayurveda colleges in the government sector, 2 aided and the rest 13 colleges have private ownership. Most of these private institutions suffer from a variety of infrastructural constraints in terms of equipped lecture theatres, laboratories, libraries, operation theatres, Panchakarma facilities and adequate number of qualified teaching and non-teaching staff leading to dilution in the quality of clinical training. Other factors that have led to the erosion in the standard of education includes degradation of merit in admissions, increasing management fees, admission of suboptimal quality of students with poor motivation, shortage of competent teachers, gross shortage of patients in many institutions, poorly motivated faculty not interested in patient admissions and risk taking, poor evaluation system concentrating on mere mugging up of matter and poor internship supervision. Also, the curriculum is out dated, insensitive to modern concepts of the process of teaching–learning and lacks innovation.

Health science education of Ayurveda is sliding downwards and unless quick and strong measures are taken, backed by strong political will; it would be difficult to reverse the direction later. Following are the suggestions that I have regarding the future directions of Ayurveda health science education.

Role of the Government

The Central Council of Indian Medicine in 2012 amended the Minimum Standard Requirements of Ayurveda colleges and attached hospitals with the following reforms- the land area required to open an Ayurveda college was reduced from 10 acres to three, the ratio

of students with number of beds was reduced from 1:1 as against 1:2 earlier, the requirements of teachers were reduced to 30, with 14 higher faculties against the earlier norm of 35 teachers with 20 higher faculties. The regulation also overturned the rule that made 100-bed hospital mandatory for every Ayurveda college. These reforms made opening up an Ayurveda college simpler with minimum benefits to the community.

No Objection Certificates should be issued only after careful appraisal of the healthcare needs of the community, whereas currently they seem to be issued randomly without reference to the ground situation. The problem of high management fees charges by the private institutions is now almost overcome by the reservation of 50 per cent seats to government nominees ranked by common entrance examination. Since the current trend in common entrance examination is to opt for Ayurveda only after MBBS and BDS courses, there is again degradation in the quality of students opting Ayurveda course. Increasing the minimum qualifying marks would not help the situation since there are a number of colleges and in such a case, seats within colleges remain vacant; another ill effect of exploding number of private colleges. Hence, the government should not increase the number of educational institutions, but to give priority for quality institutions with running hospitals.

The government should strictly ensure that the minimum standards prescribed by the regulatory agency for admissions to colleges are maintained and no relaxation in these norms should be allowed. Inspections should be made more stringent. Inspecting teams from the Central Council of Indian Medicine often find existing facilities in government colleges as inadequate and incomplete whereas they blindly give affiliations to the private colleges with no functioning hospitals. Both government and private institutions are guilty in this regard and laws should be enforced to prevent such malpractices. There is a need for implementing the provisions already present in the statutes and regulations to curb these corrupt practices.

The acquisition of clinical skill requires constant and continuous availability of patients for examination. In the private sector, the patient-load is poor with bed occupancy being far less than 50%. This deficiency is not obvious during inspections, since the private institutions try to obtain patient load from neighbouring villages or from other sources at the time of inspections. The only method to monitor this would be by conducting sudden and unannounced inspections, which do not appear logically feasible for so many colleges. Many colleges are so ill-equipped that they thrive only because of the widespread corruption that prevails in the system.

To some extent, the deficiency in patient material can be overcome by having good clinical laboratories equipped with modern teaching–learning aids and manikins. The government should also ensure that 50% of the beds in the hospitals attached to colleges are available for free or at a subsidized rate for the treatment for the poor which will result in patient inflow in these hospitals.

Curricular reforms

Curriculums should become more learner and learning focused. The existing system is not completely successful in producing confidence among Ayurveda graduates for practicing pure Ayurveda. There may be several reasons attributing towards this, including student's inability to understand principles of Ayurveda practice, improper infra-structure in Ayurveda institutions, unskilled teachers, etc. Curricular reforms should not be mere changing of the duration and introducing modern medical subjects; rather it should include the core Ayurveda philosophy with essential technical adaptations for global need. The theoretical and textbook based teaching needs to be transformed into more practical bedside training on par with developments in medicine. The current Ayurveda education system needs to reinforce its classical base on one side while keeping pace with the developments in modern science and technology and ensuring a strong link between research and teaching. Since there is a strong need for an Ayurveda medical system to prove its relevance as a complete scientific system in the current world, it needs to adopt recent scientific advancements in Ayurveda education. Curriculum based standard textbooks should be prepared with recent advances included in them.

Examination reforms should be introduced, the present examination system is focused on mere subject wise notes and classical references being mugged up, and perhaps it has no scope for evaluation of individual understanding of the subject. The examination pattern should be capable of assessing the student’s understanding of the subject in the purview of Ayurveda principles and should be prioritized. The questions appearing in examination should be capable of assessing analytical and reasoning skills of students for existing clinical problem. There should be very intensive and highly practical oriented rotatory compulsory internships to be designed, and there should be minimal eligibility practical tests after each departmental posting. Ayurveda students need to be prepared for the ever-expanding and changing healthcare environment that they will step into. Using

performance-based assessments, such as multisource feedback, clinical evaluation exercise, and direct observation of procedural skills to assess the competence of medical trainees and practicing clinicians to ensure their on-going competence may be helpful. Curriculums that can be adjusted to measure he skill, knowledge and professionalism on a more accurate and effective scale must be encouraged.

Research

Research activities are necessary to ensure progress in the quality of healthcare. It is difficult to determine exactly the quality and quantity of research done by Ayurveda colleges for want of adequate information. There are no innovations in education and the contribution to research is practically nil. Research should be promoted by motivation and provision of facilities and by recruiting people who have research degrees such as PhD. The CCIM should insist that colleges ensure a minimum number of papers published annually and indexed in Scopus/ PubMed or other databases to maintain recognition. The number of publications that emerge out of these educational institutions when compared to the number of theses/dissertations they produce is very few.

Lack of exposure to and training of methodical research trials of various kinds, at institutional level are responsible for lack of research rigor in colleges. Good training during postgraduate programmes and efficient teacher training programmes can play a key role in elevating the research standards. Exposure to current trends in research methods, innovative teaching methods, examination and evaluation skills during such programmes need to be inculcated. Even today postgraduate research is the main research source for Ayurveda in educational institutions. Industry-driven research does not exist much in Ayurveda sector, which has boosted modern medicine. The trend of applying for external funding agencies for research purpose has not yet percolated into this sector.

Centres of excellence in Ayurveda Education must be recognized and they must be entrusted with the responsibility of training the teachers from all parts of the country in effective methods of imparting, and, conducting research in Ayurveda. Ayurveda physicians need to be educated both as clinicians and as scientists where traditional and modern pedagogies are balanced.

The scope of recently introduced AYUSH-National Eligibility Test is to be widened and at least 200 eligible doctoral candidates interested to work in thrust areas are to be supported with scholarship and separate research fund every year. Though AYUSH- National Eligibility Test was enthusiastically conducted in the year 2018, only a few eligible candidates entered in to research showing lack of research inclination of young Ayurveda scholars and it was not conducted in the succeeding year- 2019. The standards of PhD are to be elevated by subjecting research proposals to external peer-review and to research audit. National Symposium on Creating Conducive Environment for Ayurveda Research organized by AYUSH suggested compulsory provision for real time research data entry (non-modifiable) to avoid data fabrication, a mechanism for auditing the research review committees and ethics committees is to be put in place and identifying national pool of experts in research methodology for periodic online guidance.

Faculty development

There is shortage of teachers in Ayurveda colleges across India, leading to unhealthy practices at the time of CCIM inspections to fulfil the prescribed norms. Majority of the colleges adopt the practice of on paper teachers or fake teachers to gain affiliation at the time of inspection and to merely comply with the Minimum Standard Regulations of the CCIM. Mere submission of one's certificate at the institution is sufficient to get the recognition as a teacher of that institution. Such teachers show their presence only at the time of CCIM inspections and are never involved in the process of teaching and learning leading to inadequate exposure of students to basic clinical skills. To bring transparency in the education system and fix the accountability of teachers, the CCIM implemented Aadhaar enabled GPS tagged Bio-metric Attendance System (AGBAS) from January 2018 but it has not yet been incorporated in the majority of colleges across the country.

These institutes also do not pay the teachers standard salaries as instituted by the UGC. No regulatory authority is there to monitor the pay packages of teachers. A uniform pay package to all the teachers of Ayurveda colleges should be made mandatory by the government.

Clinicians with good practice should be inducted in to the education system. At present, there is no provision for including good clinicians who are established clinical practitioners as teachers in the colleges. Innovative short-term programs must be planned

where successful clinicians may be invited to train the students in sharpening their clinical acumen. Recognizing a few clinics and hospitals as Centres of Excellence and inviting them to teach Ayurveda students/teachers is another possibility to improve the quality.

Technology supporting health education

Technology has become an important part of our daily life, deciding the manner in which we acquire and process information. As such, teaching methods have also evolved. Technology should be utilized to become efficient, more productive without losing the heart of clinical care and doctor-patient relationship.

Simulation training is a form of advanced technology which can be introduced in colleges. Simulation training gives the students practical, hands-on experience in a safe and realistic manner. Students will also have access to virtual anatomy, as a new, additional mode of learning anatomy and it gives a very vivid three dimensional perspective of anatomy. Technological advances will allow students to learn and practice first-hand, but in controlled environments.

Adoption of an integrated approach

The policy model of parallel approach is followed in India where traditional systems of medicine and modern system of biomedicine are segregated within the national health system. Each system of medicine has its own regulatory mechanisms independent of other systems. Currently the legislature differs a lot from state to state when it comes to the use of essential allopathic drugs by Ayurveda practitioners. A uniform legislature applicable all over India is needed to address this issue. A list of essential and emergency drugs needs to be prepared and approved for the use by Ayurveda practitioners.

The adaptation of the policy model of integrated approach, where, all streams of medicine are integrated at all the levels of medical education and practice, is the need of the hour. In order to do that in a productive and cooperative manner, there has to be openness on both sides, and in particular, biomedical practitioners need to have a depth of awareness about Ayurveda's views on disease, health and healing. More research works needs to be done on possible adverse cross reactions between Ayurvedic formulations and biomedical drugs which requires exchange of knowledge and closer collaborations between physicians with in-depth knowledge of each system. Bilateral education model can be the other

alternative, where, students from one tradition are cross-taught by the experts from the other tradition, imparting knowledge and values in concurrence.

Team approach to care

Previously, doctors practiced as individuals; more emphasis will be given to teamwork in future. Previously, practice was based on expert opinion; it is now based on systematic reviews and evidence. Many physicians are increasingly functioning as part of a patient care team. Often, a physician may act as a leader of a patient care team whose other members might include nurses, physician assistants, medical educators and health aids. Ayurveda medical students must be trained through team training, developing their skills in communications, teamwork, patient safety and professionalism. They must practice working in teams with a strong focus on the need for inter-professional education, referring to the common foundation that all healthcare workers need: patient safety, responsibility, and respect for persons.

Conclusion

Education is empowerment and the medical students whom we teach today will become the doctors of tomorrow, carrying our values, skills and our hopes for the profession into the future. Medical education represents the future of medicine. There is a need of more and more dynamism and activism in this field to update Ayurveda and to develop it further in tune with the changing needs of the society today. Hence, education should always visualize and reflect its desired goal and outcome.

The focus of health science education should be to empower the students with knowledge, information, and skill besides overall personality development so that they may stand on their own feet and function efficiently and optimally in their life at personal, social, and professional settings. Future doctors should be molded in to an independent and critical thinker; able to adapt to new knowledge, interventions, therapeutics, and changing patterns of illness and health systems. A comprehensive consideration of the issues degrading Ayurveda medical education should be considered by reputed academicians and suitable solutions should be implemented. The future is bright and exciting, but it will not be easy. The challenges facing our healthcare system are great, and the key to overcoming these challenges lies in medical education and how we prepare our next generation of doctors.

BEST TEACHER AWARD WINNER'S – WRITEUP

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FUTURE DIRECTIONS OF NURSING EDUCATION

Nursing is a competency based, skill oriented profession which is based on the holistic concept of health care. It is directed towards identifying the health needs of the people, planning and providing quality care in collaboration with other health professionals and community health groups. Nursing practice encompasses provision of preventive, promotive, curative and rehabilitative aspects of care to people across their life span in a variety of health care settings.

Various factors like changing health needs of the society, advancement in Medical Science and Technology, increasing demand from the public for quality care etc demand major changes in nursing education. Over all aim of Nursing Education in India is to develop a high quality nursing workforce that can meet the health care demands of an increasingly modern industrialized country in addition to contributing towards meeting the millennium development goals. At present the nursing profession faces lot of issues/ problems.

ISSUES/ PROBLEMS

1. **Quantitative expansion:** It is required to meet the increasing nursing manpower demand of the country. But huge quantitative expansion in an irrational manner is taking place all over the country.
2. **Quality deterioration**: There is mushrooming of Nursing educational institutions without adequate infrastructure or qualified and experienced faculty as per norms. As a result, quality deterioration is taking place in a frightening way. Quality deterioration is questioning the very purpose of nursing profession. The era in which the society looks for best quality products, the nurses trained in the institutions without adequate faculty and clinical facilities is a threat to the society. This alarming situation needs to be tackled urgently. A side effect of rapid quantitative expansion is quality dilution.
3. **Inadequate skill development:** Nurses need skill in carrying out nursing procedures. In the present situation because of poor student patient ratio and lack of permission to students to perform nursing procedures in the clinical setting, student nurses are not getting adequate chance to develop competency. Even though the INC syllabus

specifies the areas of skill development, in most of the private institutions, students are assigned to provide only basic care. It is also pathetic to note that in some institutions they are assigned with only non-nursing activities. The previous student patient ratio of 1: 5 is reduced to 1:3 by INC. But in most of the institutions even 1:3 ratios are not maintained. To start with, as per norms the institution will be having only one programme with 40 students and 120 beds. With the same bed strength, the institution will start new course and may enhance seats. Another reason is that even in a 500 bedded hospital many colleges and schools will take affiliation for clinical experience, as a result students' clinical posting will become a useless exercise and skill development will not happen. This aspect needs special attention of the regulatory bodies and urgent action.

4. **Lack of specialists**: The community health need is changing and there is an increase in demand for need based standard care. Because of rapid changes in the medical science and technology specialization in nursing is becoming inevitable. But now nurses are being prepared as generalists and they are expected to function in a wide variety of specialty settings which affect patient safety and lead to stress and burnout among nurses. Even though many institutions have started specialty courses, there is less interest among nurses to specialize since it is not mandatory to have specialization to work even in specialty areas. Nurses need to pursue advanced and specialty courses in order to keep pace with the need of present situation. Specialization is to be made mandatory to work in specialty areas.
5. **Poor quality and inadequate faculty in educational institutions**: Quality of students depends to a large extent on the quality of teachers. Because of mushrooming of institutions, lack of facility and faculty, graduates/ postgraduates are not prepared appropriately to become educators.
6. **Lack of update of knowledge and competence**: There is very less opportunity for faculty to update their knowledge and skills so as to help students to meet the challenges of clinical demand.
7. **Lack of academic environment in educational institutions**: Many new institutions lack an academic environment. Some of the institutions are constructed on top of shopping complexes, hospitals or in very narrow buildings. Technology supported

class rooms, use of multiple learning strategies, adequate space and good teacher student relationship is essential in each institution.

CHALLENGES

The profession of nursing is influenced by a complex myriad of political, economic, social, technological, environmental, and legal factors. It is in this dynamic and complex environment that nursing operates; an environment that demands professional responsiveness to factors, seemingly distanced from the profession of nursing and nursing education. So much is clear; nursing and nursing education faces considerable challenges in light of the influence of political, economic, social, technological, environmental, and legal factors both now and in coming decades.

1. **Produce adequate Nursing manpower without quality dilution**: To meet the need of maintaining nurse population ratio more manpower generation is needed, at the same time quality of nurses has to be preserved. It is a tough challenge for the regulatory bodies

2. Improve quality of nursing education and patient safety: Curriculum reform is advocated which call for greater relevance of the curriculum to the need of the society. Advancement in medical science and technology, health needs of the community make it imperative to change the curriculum of today, specially the strategies used for teaching, learning and assessment. Nursing education to be more competency and value based. Nursing councils, Universities and Educational institutions should strive for the same by incorporating all the new and emergent domains of knowledge in the existing curriculum.

Institutional challenge is on appropriate selection of faculty, proper student selection, providing technology supported class rooms, use of multiple learning strategies, forum for individualized feedback and providing good laboratory and clinical facilities. Focus on holistic approach, value based education, critical thinking, problem based learning are also important. Development of positive attitude among students is also essential in improving quality of education.

3. Prepare nurses capable of handling extended and expanded roles in health care setting: One of the major challenges in Nursing education in India is the identification of extended and expanded roles of nurses in the present scenario and preparation of competent nurses to meet the existing health demands of society. To prepare nurses to meet the societal health

demand in a cost effective manner, professional bodies should identify different roles that can be performed by nurses to be identified in a safe and effective manner. Preparation of nurses as Nurse Clinicians, Nurse Practitioner seems to be more cost effective in the present scenario of increasing health care cost. Steps are already initiated in India to start practitioner courses and specialty courses.

4.Improve competency of nurses to meet the demands of 21st century and globalization: Periodic knowledge and skill update among nurses is very much lacking leading to poor performance of nurses. This aspect needs great attention and effort from government and professional bodies so as to safeguard patient safety.

5. Erosion of clinical environment and teaching: In the face of eroding clinical environment, how can we preserve the best qualities of nursing profession? Make sure that there is faculty who can take care of students/ patients and be role models for students. Nursing is based on values of caring and necessitates development of compassion and understanding of human behavior among its practitioners to provide care with respect and dignity and protect the rights of individuals and families. Preserving best qualities of clinical education should be one of prime concern.

6. Incorporating new and emerging knowledge in to the existing curricula and making curriculum more meaningful and relevant to the need of the time.

Another challenge is how to incorporate all the different subjects, new domains of knowledge and emergent discipline in to curriculum in order to produce a more competent nurse - one that meet needs of the individuals and population and to prepare nurses capable of meeting global health needs/ demands. The curriculum is already packed and it is not practical to simply add a bunch of new courses and several additional hours of instruction. There is no easy solution to this challenge. Best method is getting all stakeholders together to think collectively about possible solutions.

7. Incorporation of Information Technology- Incorporation of technological advancement in teaching and clinical practice is a big challenge that demands its own solution. The technology constantly changes, improve, get faster and wireless. Nursing institutions do not use all the educational possibilities of information technology in the class rooms. Use of IT can have a big impact on the area of self-directed learning.

8. Effective implementation of the curricula –Even though steps are being taken for curriculum revision/ modification, one should examine whether it is being properly implemented.

9. Focus on wellness promotion and disease prevention –Now nursing care is mainly focused on nursing management of persons with disease. It is high time to focus our attention to disease prevention and wellness promotion.

10. Evidence based practice– It is another important aspect which needs attention of professional bodies, institutions and nursing professionals.

11. Preparation of students about ideal practice – How to prepare students with the appropriate skill to be proficient in an ideal environment? How should we prepare our students so as to know what the ideal nurse patient relationship should be? There is a clear need to train students in setting beyond the hospital wards.

12. Minimize theory practice gap and improving clinical skill – Theory practice gap is so wide in India due to various reasons. A lot of what the students learn in theory, they are not able to practice in the clinical settings. This gap needs to be reduced so that the best nurses produced in India will have an opportunity to demonstrate their capabilities in the practice settings. Reduction of theory practice gap is possible by providing good clinical exposure and through collaboration between nursing education and service. The practicing nurses need to contribute to the learning of students and the nursing faculty need to contribute to the service delivery in a collaborative role. This will improve the nursing education as well as practice and image of the nursing profession will be enhanced in the eyes of the public. How to improve collaboration between nursing education and service?

13. Curtail unethical practices existing in the field of nursing education- Many unethical practices exist in the field of nursing education. Keen interest, collective thinking and strict action by regulatory body are essential. At individual level professional nurses are responsible to inform this to the regulatory body when it comes to their notice and they should not be a party in such activities. Great effort is needed from individual level, from the level of regulatory bodies and professional organization to safe guard the profession and public health.

Collective and constant effort of nursing fraternity is needed to address the existing problems and meet the challenges.

FUTURE DIRECTIONS OF NURSING PROFESSION

The nursing profession along with other professions also helps to shape our health services. The report of the Expert Committee on Nursing of the World Health Organization stated that Nurses are the final agents in health service determine in large measure the quality of the care which reaches people. It is interesting to note that the nations with the finest health records possess both medical and nursing personnel of high quality. A recent British report states that the nurse with her disciplined training and many- sided humanity has a contribution to policy - making on questions of health and welfare and in the wider field of public affairs.

According to WHO, Nursing encompasses autonomous and collaborative care of individuals of all ages, families, groups and communities, sick or well and in all settings. It includes the promotion of health, the prevention of illness, and the care of ill, disabled and dying people.

The Modern nursing is the art of using the latest technology and science to promote quality of life as defined by patients and families throughout their life experiences from birth to the end of life. It istle time for nursing to question and redefine its role within system and take steps to bring about the future that the nursing profession is to achieve.

The two aspects of futuristic nursing are Nursing education and Nursing services.

NURSING EDUCATION

The important causes of changes in nursing education are changing demographics, technological explosion, globalization, changing era, shift to population based care, increasing complexity of patient care, cost of health care and challenge of managed care, impact of health policy, collaborative practice, nursing shortage and significant advances in nursing science and research.

In 1993, three major organizations issued statements and reports about nursing education for the twenty first century. Their reports addressed the new directions of nursing education needed to take in the future.

Areas of emphasis:

1. Schools/ Colleges should recruit diverse students and facilities that reflect the multicultural nature of society.
2. Curricula and learning activities should develop students' critical thinking skills.
3. Curricula should emphasize students' abilities.
4. Curricula should emphasize health promotion and health maintenance.
5. Emphasis should be placed on community – based care.
6. Faculty should develop programme that facilitate articulation
7. Development activities should support excellence in practice, teaching and research.
8. Cost effectiveness of care should be focused in nursing curricula.

FUTURE DIRECTIONS FOR STUDENTS' EDUCATION

Student centered learning

Harden highlighted that the importance of student centered learning as being pivotal to learning and teaching, suggested that Nursing institutions include a bank of learning objects (X- ray images, videos etc).

Adaptive curriculum

Harden explained that concepts of "just for me learning" and "just in time learning" are accommodated by technology. When the learner is ready the teacher will appear via technology.

Teaching innovations

Innovations in nursing education extend to curriculum technology assessment and professionalism.

System approach

Nursing education programmes prepare graduates who are responsible to both for the health system in which they will function and the needs of patients in the community. Nursing students spend most of their time in hospitals but they will eventually work in the community too.

Nursing education research

In order to validate the effectiveness of new teaching approaches education research must emphasis appropriate methodology.

NURSING SERVICES

A study from occupational health and safety administration predict that by the year 2020 the need for registered nurses in nursing homes will increase 66%, licensed practical and vocational nurses72%, certified nursing assistants 69% and nurses work in home care setting 250%.

According to Dr. Peter Buerhaus in Austrelia, shortage of RNs by 2025 is as high as 500000 and demand of RNs is expected to grow by 2% or 3% each year.

Effects of nursing shortage in future

Hospitals will be reserved only for the sickest. Nurses will do much more population based care or community health care, increase nurses' patients load, increases the risk for error and increase risk of spreading infection to patients and staffs, increase risk for occupational injury, increased deaths, increase in nursing turnover, increase perception of unsafe working conditions, and increased stress.

Solution to nursing shortage in future

In April 2001, New York State Board of Regents named Blue Ribbon Task Force on Future of the Nursing, chaired by Regent Dianere commends the following solutions to nursing shortage as recruitment, education and information about laws and regulations, use of technology and data collection, clarify existing laws and regulations and technological advancement.

Telemedicine: Telemedicine is defined as the removal of time and distance barriers for the delivery of health care services and related health care activities through telecommunication technology.

Impact of telehealth nursing

Telehealth is direct communication between the patient and the provider. It integrates information and technology to facilitate health care delivery. Telehealth removes time and distance barriers via videophones, video camera. The telehealth contributes to positive outcomes in terms of self-management and compliance.

Nano technology: Nanotechnology is the use of atomic and molecular structure as core building to create new products and devices. These new products and devices collectively called as nanomaterials.

Nanotechnology and nursing

This includes three fields: New pharmaceuticals and drug delivery mechanism, Patient monitoring devices and Regenerative sciences. Nanotechnology provides significant ways of diagnosing, treating prime position to influence and advocate for safe use of these new technologies.

Robot nursing: Robot-Nurse helps nurses in hospitals. Her body is developed by Samsung, her brain by Robot-Hosting.com. The University of Auckland are creating her nurse knowledge base. She has face recognition (Camera), voice recognition (Microphone), arms and hands. She talks (Speaker) with the patients, doctors and nurses in 8 human languages. Another responsibility is talking with those patients who do not have any visitor. Therefore, they will not feel lonely.

Futuristic cyber nursing: Patient's bio chemistry and hematology report will be there with a small hand held device. Nurses will verbalize order into the hand held device which goes directly to pharmacy and fills the orders automatically. Most diagnosis will have a system for auto care plans upon patient admission. Nurses getting laptops and using intranet to do their jobs. In future when you arrive at work, your ID tag is automatically detected and you are clocked in as you walk through the door. The patient is being monitored by automatic vital signs. The paper file of yesterday will be a computer disk or chip. Nurses will do assessment verbally into hand held device that converts it to readable notes. Nurses will carry pocket computers on their uniforms belts to record data. Patients have a bedside computer to access educational tools and progress of their recovery or stay.

Future and health care system

Length of stay in hospital will be shorter, preparing the client for recovery will be the major aspect of the nurse's role. To provide effective care, nurses need to increase their knowledge, physiologic and psychological functioning, technologic monitoring system, client care and computer.

Seriously ill patients confined to a hospital bed will require intensive care by professionals. Nurses will administer medicine using computer driven equipment. The hospital beds of tomorrow will be designed to rotate the occupant periodically. The professional nurse will assign dressing changes and other treatments to the multi skilled workers.

Nurses will focus on wellness and prevention. They will also have to keep abreast of the most recent research. Nurses will also need to take an active role in preparing healthy citizens for the future. Nurses will teach children about exercise, nutrition, safety and other habits.

ROLE OF NURSE EDUCATOR IN THE 21ST CENTURY

The Institute of Medicine (IOM, 2001) acknowledges that the education of health professionals is in need of major change and asserts that the clinical education of health professionals is outdated and not responsive to the present or future needs in health care. IOM (2003) recommends that health professionals should be educated to deliver patient – centered care within an interdisciplinary team that emphasizes evidence- based practice, quality improvement approaches, and informatics. Emphasis on student learning, promotion of evidence- based practice, and development of authentic student – teacher relationships are those attributes that are foundational to effective teaching.

Emphasis on student learning

Understanding and facilitating student learning must be a priority for the nurse educator of the 21st century. In a world where information increases exponentially, covering content needs to be replaced with teaching students how to learn both effectively and efficiently. In order to facilitate learning, nurse educators must be cognizant of a variety of factors that students bring to the learning setting. Individual characteristics, such as culture, age, gender, previous educational or life experiences, and socio economic factors, influence how they learn. Demographic changes in the student population also require that educators fully understand generational differences in teaching and learning. Skillful assessment of student learning outcomes is also needed in order to evaluate how students learn and the degree to which teaching strategies encourage meaningful learning.

Nursing education offers many opportunities for individuals to use their creativity and innovative thinking as they design curricula that prepare nursing students for the complexities of the contemporary health care environment. A recent survey of nursing students suggests that the content demands of the nursing curricula are so great that little time is left for students to assimilate that content into useful clinical knowledge (Norman, Buerhaus, Donelan, McClosky&Dittus, 2005). Nurse educators will be challenged to develop newer

models of teaching if students are to learn how to be thoughtful, reflective practitioners. This is an area of much needed research in nursing education.

Promotion of evidence- based practice

The primary focus of health care institutions today is on the provision of quality care within a cost effective frame work. The movement towards evidence- based practice requires that educators and practitioners engage in collaborative research. The nurse educator of the future must form collaborative relationships not only with practicing nurses but also with other members of the health care team. With patient –centered care as its focus, nursing and medicine, need to collaborate in clinical studies in order to improve outcomes of care.

Emphasis on Authentic Student – Teacher Relationships

Historically, teachers derive much satisfaction from working with students. Nurse educators often have a passion for teaching students and are privileged to be able to influence the professional and personal development of students. A move from a behaviorist approach to the humanistic approach in nursing education began in the late 1980s. The traditional behaviorist model viewed students as empty vessels who were eager to receive knowledge transmitted from the teacher. The humanistic approach recognizes that students have their own experiences that enrich learning and view the student as a participant in learning. Gillespie (2002) found that a connected student- teacher relationship allowed students to focus on learning, the development of clinical judgment, communication and organizational abilities, the ability to synthesize and use nursing knowledge, and foster the development of students' professional identity. The nurse educator of the future will need to establish authentic relationships with students grounded in mutual trust and respect so that students gain the self-confidence to achieve their potential.

TRASFORMING NURSING EDUCATION

There are a number of initiatives at work to transform nursing education. They are promoting excellence, innovation; evidence based nursing education and technology in nursing education.

Promoting Excellence

The National League for Nursing has developed Excellence in Nursing Education Model that depicts the many elements that must be in place to achieve excellence. Excellence in Nursing Education will be attained by clear programme standards and hallmarks that raise expectations, well –qualified faculty, administrators who create healthful work environments for faculty, interactive learning, and innovative curricula.

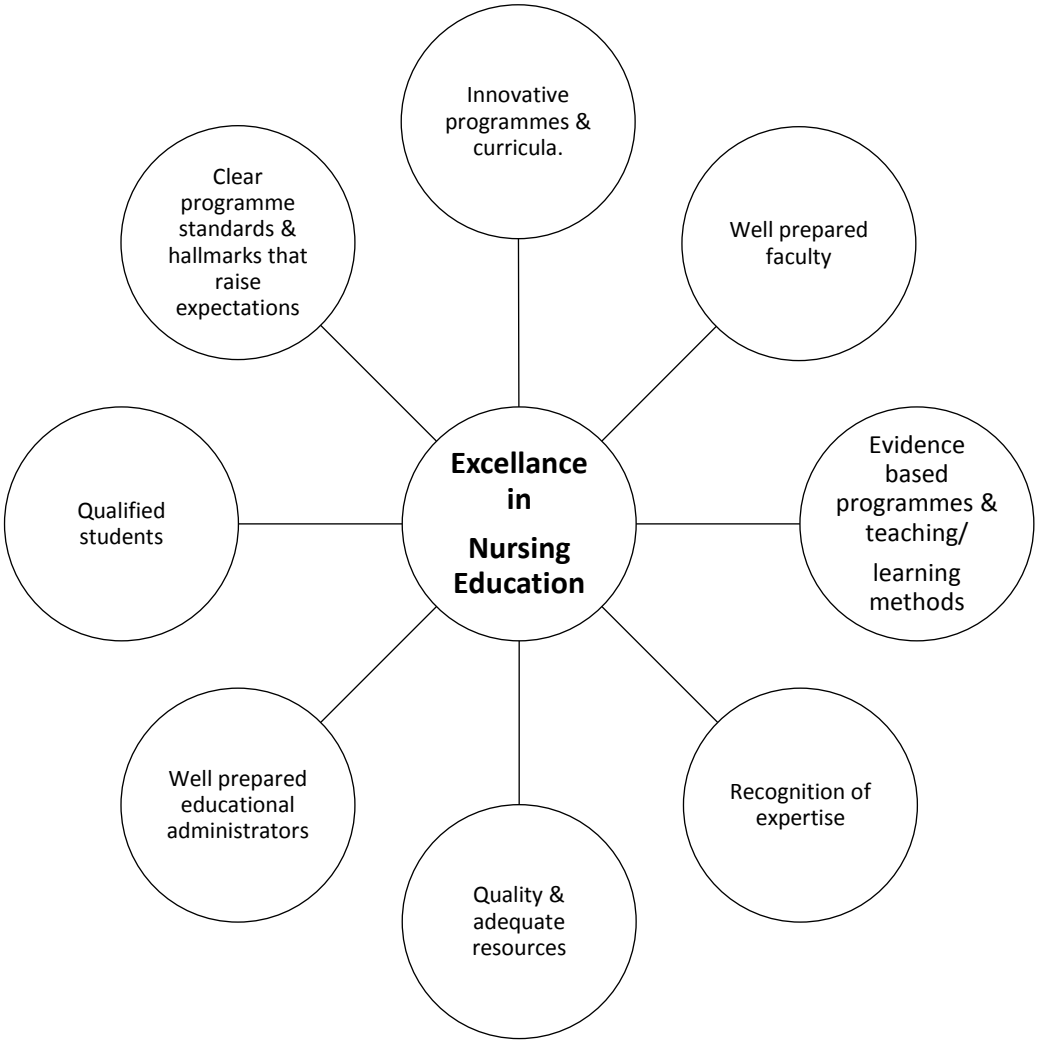

Fig 1: Excellence in Nursing Education Model; Copyright, National League for Nursing cited in Moyer BA and Price Ruth AW. Nursing Education: Foundations for Practice Excellence, p286.

Innovation

New pedagogies are required that are research –based, responsive to the rapidly changing health care system, and reflective of new partnerships between and among

students, teachers and clinicians. If nurse educators are to meet this challenge, they must be creative in their approaches to teaching learning, evaluation of learning, and programme design.

Evidence- based Nursing Education

The National League for Nursing asserts that nurse educators must become more knowledgeable about the concept of evidence –based teaching and base their teaching practices and curriculum designs on research. Institute of Medicine (IOM) and Robert Wood Johnson Foundation, have emphasized the need for Evidence based teaching (EBT) and nurse educators who have the skills and abilities to teach in nursing education today and in the future to meet the demands for a well-prepared health care workforce.

Technology in Nursing Education

Now we have patient simulators that can speak and display physiological parameters appropriate for specific conditions, and at an affordable cost. It is now possible to move a learner through a simulation, with the degree of complexity and fidelity increasing as the learner's knowledge and skills increase. Once students have achieved proficiency with one dynamic, evolving patient simulation, they can be challenged to manage the care of two patients, and then an entire group of patients, for whom they must prioritize, delegate responsibility to others on the team, and assess progress.

Conclusion

Nursing is the pivotal health care profession, highly valued for its specialized knowledge, skill and caring in improving the status of the public and ensuring safe, effective, quality care. The profession mirrors the diverse population it serves and provides leadership to create positive changes in health policy and delivery systems. Individuals choose nursing as a career and remain in the profession because of the opportunities for personal and professional growth, supportive work environments and compensation commensurate with roles and responsibilities (ANA, 2002).

Ralph, Birks, Chapman, and Francis conducted a study on future- proofing nursing education to identify significant current and future priorities in Australian healthcare. They conducted a review of the curriculum content of current Australian undergraduate pre-registration nursing curricula. The data were analysed to determine how nursing curricula were aligned with the priorities identified in the PESTEL (Politics, Economics, Society, Technology, Environment, and Law) analysis. Findings suggested that preparation–practice

gaps were evident in nursing curricula as the broad priorities identified were poorly reflected in undergraduate pre-registration programs. The study recommended (a) the establishment of a nationally consistent mechanism to identify current and emerging trends in healthcare and higher education and (b) an evidence-based framework that enhances forward planning in the design of undergraduate pre-registration nursing curricula.

Future of nursing is of great scope. The nurses can make use of the great scope for their professional advancements and to safeguard their lives. The future holds more change that will lead to new possibilities and the nurse has the responsibility to participate actively in the profession and as an advocate for the patients.

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KUHS UPDATE SERIES – REPORTS

KUHS UPDATE PROGRAM ON DENTAL SCIENCES -REPORT - 1

Venue: GOVERNMENT DENTAL COLLEGE, KOTTAYAM

Date : 05.07.2019

The Dental Update programme was held on 05-07-2019 at Govt Dental College, Kottayam. The programme was held in Auditorium of Government Dental College, Kottayam. The programme started at 2.00 PM with invocation and University anthem followed by an inaugural address by Dr M.K.C Nair Honorable Vice Chancellor, Kerala University of Health Sciences. Three eminent faculties from colleges within KUHS handled the classes.

The deliberations started around 2.30 PM with a lecture on **Recent advances in Dental Implant Surgery** by *Dr Ajay Kumar Haridas, Professor and Head, Department of Oral and Maxillofacial Surgery, Educare Institute of Dental Sciences, Malappuram* followed by *Prof. Dr K George Varghese, Principal and Head, Department of Oral and Maxillofacial Surgery, Pushpagiri College of Dental Sciences, Thiruvalla* who lectured on **Rational use of antibiotics**. The third lecture was on **Advances in CBCT imaging** by *Dr Sreela L S, Head of Department, Oral Medicine and Radiology, Govt Dental College, Kottayam.*

A total of 241 delegates attended the proceedings which include 60 faculties, 131 post graduate students and 50 interns. Besides Govt Dental College, Kottayam participation from various nearby Dental colleges including, Pushpagiri college of Dental Sciences, Thiruvalla, Mar Baselios Dental College, Kothamangalam and Indira Gandhi institute of Dental Sciences, Kothamangalam was commendable. Light refreshments were served in between the programme.

The Dental update culminated with National Anthem at 5.30 PM.

KUHS UPDATE PROGRAM ON DENTAL SCIENCES - REPORT – 2

Venue: GOVERNMENT DENTAL COLLEGE, Thiruvananthapuram

Date : 30-8-2018

The latest program in the prestigious KUHS Updates Series, was conducted in collaboration with Govt. Dental College, Thiruvananthapuram in the Pierre Fauchard Mini Auditorium, GDC, TVM on 30-8-2018 (Monday) from 2-5 pm. The inaugural function began with the KUHS Anthem and after the Welcome address by the Vice Principal, Dr. K. Harshakumar and the Presidential address by the Principal, Dr. Anita Balan, the Hon'ble Vice Chancellor; Prof [Dr] MKC Nair sir had inaugurated the function by lighting the lamp and by delivering the inaugural address. Dr. Harikuamaran Nair, Research Dean, KUHS had felicitated the gathering and Dr. Suchithra M. S, Chairperson, Academic Forum, GDC, TVM had offered the Vote of Thanks. Respected Vice Chancellor had appreciated the speakers of the day by giving away flowers.

The topics and the speakers of the day were as follows:

Update on Sterilisation, asepsis and infection control in Dental Health Care settings-
Dr. George Skariah P, Asst Professor, Dept. of Oral & Maxillofacial Surgery, GDC, TVM

Recent trends and advances in Prosthodontics and Crown & Bridge an overview-
Dr. R.Ravichandran, Professor, Dept. of Prosthodontics, GDC, TVM

Recent Advances in Periodontics-
Dr. Suchithra M. S, Additional Professor, Dept. of Pedodontics, GDC, TVM

There was a great response from the faculty, with faculty from GDC, Thrissur, Govt. Medical College, Alappuzha and GDC, TVM along with Senior & Junior Residents from GDC, TVM participating in the programme with great enthusiasm. There were a total of 75 participants. Prof [Dr] Rajamohanan, Director, School of Health Policy, KUHS had also graced the occasion with his presence throughout the programme. Each of the session was followed by active discussions and on the whole, the programme was well appreciated by all.

KUHS UPDATE PROGRAM ON PAEDIATRIC NEUROLOGY - REPORT

Venue: Govt. Medical College, Thiruvananthapuram

Date: 09-6-2018

Seminar Was organized on 9 June 2018 at Child development Centre Auditorium S A T Hospital medical College Trivandrum. The program started at 2 PM. Inaugurated by honourable Vice Chancellor Dr MKC Nair presided by principal Dr Thomas Matthew. there are around 75 delegates. Dr Babu George director CDC welcomed the gathering and Dr P a Mohammad Kunju introduced the theme of the seminar and Dr Harikumaran Nair Dean research KUHS expressed vote of thanks. The topics discussed were:

1.the recent advances in epilepsy management by Dr Thomas Iype. In a 40 minutes talk he highlighted the Newer anti convulsants, the need for sticking to the first line anticonvulsants and other modes of treatment like epilepsy surgery and ketogenic diet.

2.The second topic was by Dr P a Mohammed Kunju on encephalitis including Napa. He presented a detailed account of the Nipah containment done at Kozhikode and an approach to patient with altered sensorium. JE a common cause of ARBO virus encephalitis was narrated in detail. Need for preventive measures by environmental sanitation mosquito control and vaccination was emphasised.

3.Dr George Zacharia presented the methods of rehabilitation in cerebral palsy patients. He emphasised the need for play therapy in children with cerebral palsy. He also emphasised the need for teaching the mother about the physical and occupational therapy techniques.

4.Final talk was by Dr Arun B Nair. He introduced the concept of memory and the role of working memory impairment in the genesis of attention deficit hyperactivity disorder. He also discussed various learning disorders and memory disturbances in children. Meeting concluded at 5 PM. Participants were provided light refreshments. The KUHS certificates were issued to 50 delegates.

Seminar was appreciated by all and there were good positive feedbacks from the participants

KUHS UPDATE PROGRAM ON PULMONOLOGY – REPORT

Venue: Govt. Medical College, Thrissur

Date: 02-06-2018

KUHS monthly updates in the field of Pulmonary Medicine was held on 2nd of July 2018 at 2.00 pm at Indraneelam Hall of Thrissur Medical College Alumni Academic Complex. It was inaugurated by Prof. Dr. M. K. C. Nair, Hon. Vice Chancellor of KUHS.

The meeting was Presided by Dr. M. A. Andrews, Principal, Govt. Medical College, Thrissur. Both of them actively participated in the discussions that followed. There were other prominent figured including KUHS Research Dean Prof Dr. Harikumaran Nair and faculty from various departments and specialities participated in the discussions.

The sessions were preceded by KUHS prayer song. The scientific session was Chaired by Dr. Prof. Thomas George P. Professor and HOD of Pulmonology, Govt. Medical College, Thrissur. There were four sessions – updates on Ultrasound examination of the Chest – a new weapon in the artillery of pulmonologist by Dr. Kiran Vishnu Narayan, Assistant Professor pulmonology Govt. Medical College Kottayam, what is new in COPD and Asthma by Dr. O. K. Mani Assistant Professor Pulmonology, Govt. Medical College Thrissur, Updates in Tuberculosis by Dr. Sanjeev Nair, Associate Professor, Pulmonary medicine, Govt. Medical College, Thiruvananthapuram, and Updates in Sleep Medicine by Dr. Paulo Varghese Akkara, Assistant Professor Pulmonology, Govt. Medical College Kozhikode.

All the sessions were followed by active discussions among the audience. The speakers were introduced before each session by Dr. Thomas George, Head of Department, Pulmonary Medicine. The speakers were felicitated after the sessions.

Vote of thanks was given by Dr. Muraly. C. P (Program Coordinator). The programme was concluded with the National Anthem. All the participants were given certificates as a token for the same.

KUHS UPDATE PROGRAM ON RADIOLOGY – REPORT

Venue: Govt. Medical College, Thiruvananthapuram

The opening session of the update was conducted but the Professor and Head of Department of Radio diagnosis, Dr. N. Roy. Two topics were covered in the session. First topic was The Role of 4DCT in Imaging of Parathyroid adenoma. The discussion covered the relevant embryology, imaging techniques, diagnostic imaging findings of parathyroid adenoma and its differential diagnosis. Second topic of discussion on the role of the radiologist in accurately delineation the internal target volume in radiation planning, with the latest 4DCT techniques enabling 4D radiotherapy. The role of functional imaging modalities like FDG PET/CT, Diffusion weighted MRI was discussed in identifying the tumour biology. The role of radiologist in defining the metabolomics, genomics and proteomics of a tumour were enumerated, which will help the radiotherapist in selectively targeting various regions of the tumour with different doses using intensity modulated radiation therapy. Radiologist will be able to image volumes with different tumour biology with respect to hypoxia, angiogenesis, proliferation, or apoptosis. Dr. Roy also discussed the recent advances in MR imagine of the lung and he was of the of the opinion that in future MRI will be the investigation of choice for carcinoma lung. He also predicted that MR-based simulation and planning will become a reality in the near future. There was active discussion of the topic with experts in endocrinology and radiotherapy. The updates were highly appreciated by the audience.

The second session was based on pelvic imaging and was conducted by Dr. Shikha. S. Pillai, Assistant Professor, Department of Radio diagnosis. The topic of discussion was Current Imaging concepts in Endometriosis and its mimics. The session was a case based review and dealt with the diagnostic imaging features of endometriosis in ultrasound, CT and MRI and its close differential diagnosis with emphasis on the importance of fat suppressed sequence and inversion recovery sequences (STIR) on MRI for arriving at the correct diagnosis. The message given to the radiologist and gynaecologist was appreciated by the audience.

The final session of the update was conducted by Dr. Praveen V, Assistant Professor, and Department of Radio diagnosis and in charge of the interventional radiology division of the department. The topic of discussion was Imaging and Endovascular Intervention in the Management of Acute Stroke. Relevant statistical information regarding the current scenario of stroke in the state and country was discussed. The historical aspects and the milestones in

neuro radiology and interventions with respect to stroke were refreshed. The management protocol and the role of non-contrast CT, CT angiography for the early diagnosis and quantification of the region affected were discussed. Role of CT and MR perfusion, angiographic studies like TOF angiogram and contrast enhanced angiogram and advanced MRI techniques including Diffusion weighted imaging in diagnosis of stroke were emphasised. The discussion concluded with interventional techniques for the management of acute stroke, including intra-arterial and intravenous thrombolysis mechanical throm bectomy and stent implantation. The important advances in interventional radiology of stroke were very impressive.

Basic Tenets of KUHS

- Always Go by Rule Book
- Observe Sanctity of Examinations
- Be Student Friendly at all times
- Acknowledge the Right to be Heard
- Always Give Respect and Take Respect