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REVITALIZING RATIONALITY THROUGH PDAA CYCLE-A UNION THERAPY CONCEPT

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ABSTRACT: Medicine has been a noble profession since time immemorial. Many cultures have the view that it is linked with the supernatural deity. The persons were priests in many civilizations. They had high status in Society. They were considered as a medium of communication between the supernatural and were assumed to have powers. In those times, those priests used rituals and follow some religious code of conduct for treatment. This was the primitive stage of ethics as a part of religious ritual. Latter with observations, many folk traditional medicine ethics were created in a teacher-student relationship. Further traditional medicine like Ayurveda, TCM, Korean developed, which had mutual interactions in ideology and philosophy. It was evident with the review of these studies and also had a diverse set of rules entertaining behavioral and professional codes for prescriber health care worker and patient for providing rational and safe delivery of health services. However, with the separation of medical science from religion, the positive philosophical background and the behavioral element lost its ground. Thus rationality becomes behavioral. In addition, previously, all elements of treatment were done by viadys or healers, but with development, different professions arrived, which incensed scope of error, which is a hurdle to the objective of rational drug use in of drug. Hence, a universal approach of PDAA CYCLE and DRIOP methodology concept to optimize teamwork and ensure rational drug use is conceptualized. This approach has taken into consideration of all elements in the drug use process and has been devised to bridge the gaps leading to irrational use in the modern scenario. This would be helpful in the rational use of widely used drugs like antibiotics, low therapeutic index drugs, chronic illness drugs and also help to improve antibiotic resistance and lead to optimum utilization of resources, which is vital for every country but especially for underdeveloped countries and developing countries like India with high load of infections and other diseases.

INTRODUCTION:

Background: The humans emerged about 150,000 years back in eastern African region¹. He started, utilizing nature for his routine life activities like food cloth shelter, and medicine. In this course, he faced trauma injury, which was due to forces of nature.

The wrath caused by nature led to the notion of being perceived as the supernatural power, and primitive people worshipped their ancestors and nature as natural calamities like rain floods storms were referred as the wrath of the supernatural entity with different forms in different societies^{2,3,4}.

The next big advancement in the course of development was the discovery of fire. The latter fire was being viewed as a diety and is still worshiped at present by many religions or is used as an element in many religious practices. In addition, the use of fire for medical practice is known as caturay and is practiced in every society in the world. In fact, many medicinal practices or

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many traditional medicine systems include an element of fire in their treatment module⁵.

Origins: Ancient physicians were priests as in its infirmary stage, medical science was linked with religion. The deity of the particular religion or faith was considered as the supreme healer, which comprises of nature, ancestral spirits, formless energy or any gender-specific deity. The disease was regarded as the wrath of the deity or as a consequence of a committed sin^{3,4}. To cope up any illness, prayers, offerings sacrifices, or rituals were conducted. These prayers included the use of hymns music and chants that collectively form a music used as medicine. This trend has been seen in ancient Indian Greek Egyptian cultures³⁻⁶. Later, with advancement medicine, was separated from religion and developed as a separate entity based on reasons and evidence; since then and till the present has reached heights with rapid developments in modern technology. However, with development, still the medical art couldn't cope up with all aspects of diseases and its associated treatment. The whole process of treatment and management involves patient paramedical staff and doctors and their mutual environment. Thus to achieve maximum benefit of treatment the aspects affecting the patient-doctor nurses and their interlinks with the environment and within themselves should be tailored to trace a rational approach towards treatment. Hence to view the importance of these factors, this review is framed, which explains the correlations and explores the rationality with a broader aspect, and tries to give a mutual framework for setting a rational approach to treatment.

Mythological Links: Every medicine system has a mythological background based on which, along with the course of development⁷. In this course, it has imbibed many characteristics or has common features with another system practiced elsewhere⁸. The foremost system of medicine is Ayurveda, and its contemporary Siddha both are well developed and practiced⁹. However, both had divine origins Ayurveda was given by lord Bharma and Siddha was given by Lord Shiva. In China the TCM has been linked with the yellow emperor, who is regarded as sacred. The Greek medicine is linked with Apollo and Egyptian medicine with Thoth^{3,4,6,10}. Hence from this point, it is satisfied that the

origins of any therapy viewed as per rational today has been developed on the mythological background. With advancement in medicine, religion and supernatural element in medicine was separated and a theory was developed by Hippocrates which supports the view to monitor symptoms to cure disease. However the foundation of this therapy was the Pythagoras philosophy which originally was linked to mythology and believed that nature was created through music. In fact the Hippocrates was the son of physician which was of Asclepiades sect that believed the therapy of Asclepius a deity^{3,4,6,10}.

Hence from this point it is satisfied that origins of any therapy viewed as per rational today has been developed on mythological background^{2,4}. In present scenario This mythological background is evident in use of sign and symbols like Rx Claudius Apollo names for modern health care chains and various amblems worldwide. Even the Rx sign a symbol of eye of horus of ancient Egypt is a major component of prescription and is included in the process of prescription audit where it is known as super inscription and is referred as a prayer to Jupiter¹¹.

Influential Links: Almost in every therapy around the world there has been interactions of knowledge during the course of its development¹². Theory of five elements is advocated in Ayurveda and Siddha⁹. The theory of elements has also been practiced in TCM where there are five elements. The Korean medicine system also shared the conceptual links with TCM. Similarly there is link between Siddha and Ayurveda. Similarly Chinese medicine has links with Siddha medicine^{13,12}. Arabian medicine is an integration of various regional medicine system practiced in South east Asia. Alchemy ancient art of Egypt became the precursor of chemistry on which modern medicinal chemistry is formed. Unani medicine is outcome of amalgamation of of Greek and Arabic medicine concepts and is called Greco-Arabic medicine which is based on the teachings of Buqrat (name of Hippocrates) and Roman physician Jalinoos (Galen) latter evolved into an effective system due to efforts of physicians such as Al Razi (Rhazes), Ibnesina (Avicenna), Al Zahrawi and IbnNafis¹⁴. Documents of unani system referred as al-tibb al-yunānī, or as tibb or hikmat in Pakistan and

Afghanistan were Arabic translations of ancient Greek, Roman, Egyptian, Persian, Indian and Chinese medical texts. The Arabs adopted the basic ideas of Hippocrates (Buqarāt) and Galen (Jālinūs) Plato (Aflātūn), Aristotle (Aristatīl), Dioscorides and Empedocles (Abrāqlīdis) belonging to Arab and Persian decent. Some also supports the view that Unani medicine also had ideological and conceptual interactions with Roman medical science¹⁵.

Ethics in Medical Treatment as Core of Rationality:

In ancient China medical ethics was initiated by physician Sun Szu-miao who was also Taoist and alchemist during AD 581-682), His ethics emphasized on qualities like knowledge discipline "compassion (tz'u)" and "humaneness (len)" mandatory for physicians. His ethics affected the four players with norms for therapy aims, physician role, Practice format, behaviour towards patients. Other similar texts are Kung Hsin's, Ming ijen, Kung Ting-Hsien's. notable norms are Ten rules for physicians and patients both. Five norms and ten needs for physicians in Wai-ko cheng-tsung¹⁶ In Babylonian, King Hammurabi during 1792-1750 BC framed showed 282 laws known as "the Code of Hammurabi". They were legal and administrative in constitution. He was the first to set the responsibility of a manager describes as a modern bureaucratic phenomenon¹⁷. In Charaka Samiharta norms are laid for the physicians for their conduct with patients for their professional life and strict laws were depicted in manu for practitioners doing malpractice even they were referred as prathi-rupakas' or ku-vaidyas and there were punishments for them in Manu Smriti. Similar norms were documented in Yajnyavalkya. Yajnyavalkya-smiriti. Various attributes needed for a physician are efficient, knowledge, skill, and cleanness were made essential. In addition the behavioral components were utmost which included kindness practical experienced and polite. Dedicated, true compassion, donation and modesty. He should worship the divine and respect teacher and other experienced persons and serve elders as a duty towards society¹⁸. In primitive agricultural based civilizations there was no distinct medical system rather it was a part of society organization at village or urban level Few doctors were registered by rulers however other practiced their skills in the society Practice was either a family

tradition or as teacher-student relationship. Lack of society intervention in medical practice norms led to the notion that primitive associations of a physician to an experienced teacher of the profession was the sole identification of his rationality. The essence of which was teacher-student tradition prevalent on those times. Ethical codes were laid down in Ayurveda, which morally abides the physician to maintain conduct that is beneficial for himself, patient and society. Even Vagbhata's Ashtanga samagraha advocates good conduct, friendly gesture, compassion as distinguishing qualities for physician^{18,19}.

Unfortunately, with time progress and change in society medical technology, many loopholes have been created to breach the conscience of the medical practitioner, which disrupts his professional dignity Scenarios like incentives, and monetary or any gain through improper use of medical norms in euthanasia, iatrogenic diseases, medico-legal responsibilities, pregnancy tests, legal responsibility-ties, artificial insemination, organ transplantation, *in-vitro* fertilization, embryo transfer technology, genetic engineering, utilizing patients for their organ, and even transfusion are of prime concern at present times. Thus rational conduct and rational use of drugs or procedure are on a continuous threat¹⁸.

Origin of PDAA CYCLE Concept: Ethics have been existing first within society for norms of living in the form of religion. The religion joins a community having the same faiths and beliefs, and customs. Initially, medicine was linked with priests and was linked with religion there also sacred books or rituals as norms were set to be followed⁴. With advancement there emerged kingdoms which set laws regarding medical practice like code of humbarri,¹⁷ Pythagoras Hippocratic oath Norms in Ayurveda laws made by Charaka Shusruta for a physician as well as patient⁴. Anciently the doctors and pharmacist were a single entity, and the profession was not separated. Hence the laws for physicians and Patient are seen in Ayurveda¹⁸. But During 1850 in London, the dispensing was separated from prescribing, thus creating two different sections of previously one activity, which in turn resulted in the evolution of 2 different professionals, one prescriber and another Pharmacist. Similarly, with the efforts of Florence

Nightingale emerged the noble profession of nursing. Thus these three professionals are key players in the treatment of patient. Similarly, in the modern scenario World Health Organization (WHO) states that rational use of medicines requires that “patients receive medications appropriate to their clinical needs, in doses that meet their own individual requirements, for an adequate period of time, and at the lowest cost to them and their community”^{19, 20}.

However, in real sense, just prescribing electronically or in writing rationally by the prescriber is unworthy unless this prescription reaches from paper to patient through a dedicated team approach involving the elements of the drug use process to its intended intake. Hence, viewing all these the rational drug use is not merely a process of prescribing drug by prescriber rather it’s a process which involves the active participation of nurse pharmacist paramedics and even the patient to assist in ensuring the desired outcome as conceived by the prescriber.

Ideally, rational use will be evident only after its proper use as indented by prescriber with the assistance of the pharmacist nurse paramedics and adequate support of patient. Thus executing the roles of these diverse elements of drug use flow is necessary for ensuring rational drug use and to accomplish the real role of drug utilization^{21, 22}.

To incorporate this in rational use pattern, a systemic approach termed as PDAA is conceptualized under union therapy domain²³, which covers the roles of different elements, namely Prescriber Dispenser Administrator and Patient in the drug use process. This approach covers all aspects of drug use and allows identifying gaps and rectifying them prior to administration to prevent ADRs or before it is taken or given to patient.

It acts as a filter where a prescription gets scrutinized in all the stages PDAA by the respective elements. Thus; roughly, It gets scrutinized at every phase hence increases the safety and decreases the chances of medical error. This cycle is divided into three phases Pre PDAA phase, PDDAA phase, and Post PDAA phase, which are executed in the diverse elements of

PDAA. The different phases and their role in different elements are described as under²³⁻²⁵.

Pre PDAA Phase: Pre PDAA phase is common for all elements of PDAA. It comprises of elements like Right intention Right Receiving Right Communication Right Examination. These elements form the basis of the 4 different stages of PDDAA. In prescribing phase, it helps in making diagnosis and facilitates prescribing. In Dispensing phase it leads to check of prescription and leads to accurate drug dispensing as per patients need. In the Administrative phase this helps to improve safety and minimize errors or adverse outcomes. However, in the fourth Phase, Patient involvement is stressed, which is least targeted in modern times; this improves adherence and decreases in compatibility, and aids to improve patient outcomes^{26, 27}.

PDAA Phase: The Second phase is PDAA phase; here, the decisions regarding the drug at its various levels. In the first level, the prescribing phase, drug decisions pertaining to selection dose duration route regimen and about its administrator and manner is taken by the prescriber itself. In the second phase, the Dispensing process is initiated where the written documents transcend into medicines here; a minor Pre PDAA dispensing cycle helps to check the drugs, and if an interaction occurs, it is reported to the physician, and interventions are included. This is the first scrutiny step where the prescription is scrutinized as per a pharmaceutical basis. A successful Dispensing Phase leads to proper drug administration to patients or nurses in case of admitted patients²⁸⁻³⁴.

The third step is the Administrative Phase in which the drug is actually administered here; before administration, a minor Pre PDDA administrating cycle is initiated to check the drug instructions in case of any disparity, the prescriber is contacted for rectifications, and the drug is administered to patients. This is the second scrutiny where the drug is scrutinized as per nursing basis. The Fourth stage is the Adherence Phase, where the patient or his relative takes charge of his therapy, and there occurs involvement of patient in his therapy; thus, the elements of adherence and compatibility are improved or cultivated. Here too a Pre PDAA administrating cycle is initiated where the patient

scrutinizes the drugs administered to him as per the instructions provided to patient by the prescriber or dispenser.

This is the third scrutiny, and in case of confusion, the patient could call the doctor prior to take medication³⁵⁻³⁷.

Post-PDAA Phase: Post PDAA phase is common for all elements of PDAA. It comprises of elements like Right Documentation Right Monitoring Right Feedback Right Evaluation Right Response Right Replacement and Right Reassessment. These elements form the basis of the 4 different stages of PDDAA. In prescribing phase it helps in document-

ing, monitoring, reviewing, and rectifying diagnosis and facilitates prescribing.

In the Dispensing phase, it leads to monitor drug dispensed. In the Administrative phase, this helps to monitor and document the effects of drug given. However, in the fourth Phase, Patient involvement is stresses, which are least targeted in modern times; this improves adherence and decreases incompatibilities, and aids to improve patient outcomes^{26, 27}.

The diagrammatic representation of the PDAA cycle and its elements is depicted as under

TABLE 1: PDAA ELEMENTS

PDAA	Drug Use Cycle	Targets	Scenario	Requisites
P =Prescribing	Prescribing aspects Prescriber Cantered	Prescriber Behaviour / Trend	All health settings / Homecare	Mutual, two-way interactions between prescriber, Pharmacist, and doctor through patient in general scenario, preferably OPD Scenario Nurse not involved in OPD scenario.
D =Dispensing	Dispensing aspects Pharmacist cantered	Dispenser Behaviour / Trend	All health settings / Community Pharmacy / Home care	
A=Administration	Administration aspects Nurse Cantered	Nurse Behaviour / Trend	All health settings Home care	Mutual, two-way interactions between prescriber Nurse Pharmacist and patient preferably IPD scenario Pharmacy practice / Hospital Pharmacy Clinical pharmacy role active
A= Adherence	Adherence aspects patient-centered	Nurse/HCP/ Patient Behaviour / Trend	Nurse/HCP/Patient collaborate in treatment process	Mutual two-way interactions between patient or HCF preferably prescriber preferably OPD scenario or Post discharge scenario. Patient role with his Involvement increase adherence and compliance improves.

TABLE 2: CHECKING PARAMETERS FOR PDAA CYCLES^{26, 27, 36, 37, 38, 39}

	Prescribing Aspects 7-68	Check-in Dispensing Phase	Dispensing Aspects 2-25%	Check-in Administrative Phase	Administrating Aspects 19-34	Checked by Prescriber Prescribing Phase /HCP
1	Drug-Drug Interactions	Pharmacist involved in checking and use his pharmaceutical knowledge through prescription pattern	Incorrect drug/ wrong medication Overdose	Nurse involved in checking and use his nursing knowledge through prescription pattern	Wrong Rate Wrong time	Prescriber again involved in checking and use his clinical knowledge through prescription pattern chronology
2	Incomplete prescription /Omission		Poor labeling/Omission		Wrong Dose	
3	Monitoring Under dose		Wrong dose Wrong dispensing		Omissions Wrong fluid	
4	In the correct interval		Not prescribed but dispensed		Wrong Drug	
5	Overdose		No drug dispensed / Omission		Wrong Route	
6			Wrong strength		Wrong Patient	
7			Wrong Quantity			

TABLE 3: DRIOP METHEDOLOGY ^{26, 27, 36, 37, 38, 39}

Parameters	Drug	Dose	Route	Patient	Regimen	Instructions	Omission	Monitoring	Aspects	Prevention
Wrong Prescribing	Wrong Drug	Under /Over	<i>PDAA Cycle</i>	<i>PDAA Cycle</i>	Wrong	<i>PDAA Cycle</i>	Incomplete	Monitoring	First level	Managed by PDAA
Wrong Dispensing	Wrong Drug/ formulation	Quantity /strength /Overdose	<i>PDAA Cycle</i>	<i>PDAA Cycle</i>	<i>PDAA Cycle</i>	Labelling	No drug	<i>PDAA Cycle</i>	Second level	
Wrong Administration	Wrong Drug	Wrong dose	Wrong route	Wrong Patient	Wrong rate /Time	<i>PDAA Cycle</i>	Omissions	<i>PDAA Cycle</i>	Third level Treatment required	Requires treatments ADRS/ toxicity Patient harm

*Role of PDAA Cycle depicted in bold and italic

DRIOP Methodology: In this methodology, the parameters like Drug Dose Route Patient Regimen Instructions Omission and Monitoring are assessed for compliance during the drug use process. These are the areas where usual errors occur as evident by the literature. From the assessment of the study by Karthikeyan and colleagues in 2015, it was found out that the errors not committed during prescribing stage and dispensing stage strikingly emerges during the Administration stage. This shows a lack of continuity in the drug use process. Analysis of

other studies in the area of rational use and shrug use or therapy process by researchers like Asenso *et al.*, 2016 Kala *et al.*, 2019; Kala *et al.*, 2020; Elliott *et al.*, 2010 and Edwards *et al.*, 2015 showed common elements in a therapy (union therapy) or drug use process. This resulted in the formulation of the PDAA Cycle, which will help to bridge this gap and help to utilize the roles of different health care professionals in their respective zones and make the entire process of drug use a uniformly inter-connected rational process ^{26, 27, 37, 38, 39}.

TABLE 4: PDAA CYCLE “PRESCRIBING DISPENSING ADMINISTRATION, ADHERENCE“ ¹⁹⁻³⁹

Rationality PDAA CYCLE	Parameters	Prescribing Phase	Dispensing Phase	Administration Phase	Adherence Element	Elements Concerned	Part in Prescription/Therapy Components
PHASES	Rationality Contributors	Prescriber	Pharmacist	Nurse/Prescriber	Patient	Areas Intervened	Prescription Component
Pre PDAA Phase Behavioral Aspect Experience	Right intention	Right intention	Right intention	Right intention	Right intention	Behavioral aspect Time constraint /load	Super-inscription Preparatory phase
Union Therapy Ensured	Right Receiving	Right Receiving	Right Receiving	Right Receiving	Right Receiving	Right Receiving	IEC skills
	Right Communication Examination	Right Communication Examination	Right Communication Examination	Right Communication Examination	Right Communication Examination	Right Communication Examination	/history taking Behavior knowledge expertise
	Right Drug	Prescribe	Dispense	Administer	Take as directed	As per STG/Clinical need	Observation Phase Diagnosis
	Right Dose	Prescribe	Dispense	Administer	Take as directed	As per STG/ Clinical need	Treatment as per PDA
	Right Indication	Prescribe	Dispense	Administer	Take as directed	As per STG/ Clinical need	Prescribing Phase
	Right Duration	Prescribe	Dispense	Administer	Take as directed	As per STG/ Clinical need	Inscription Subscription
	Right Route	Prescribe	Dispense	Administer	Take as directed	As per STG/ Clinical need	
	Right Person	Prescribe	Dispense	Administer	Take as directed	As per STG/ Clinical need	
Right Patient	Prescribe	Dispense	Administer	Take as directed	As per STG/ Clinical need		
Right Manner	Prescribe	Dispense	Administer	Take as directed	As per STG/ Clinical need		
Post PDA	Right	Conduct	Conduct	Conduct	Follow	SOPs/Regimen Legality	Quality/

As per Norms Clinical Knowledge Experience	Documentation	Prescribe	Follow	Follow	Follow	Safety	Signature Safety
	Right Monitoring	Provide	Provide	Provide	Provide	Progress Assessment	Communication
	Right Feedback	Conduct	Conduct	Conduct	Conduct	Scrutiny	Monitoring
	Right Evaluation	Provide	Provide	Provide	Provide	Knowledge and experience	Action Planning
	Right Response	Prescribe	Dispense	Administer	Take as directed	Proper drug utilization evaluation	Execution
	Right Replacement	Monitor	Monitor	Monitor	Monitor	Knowledge and experience	Ensuring Safety
Right Reassessment							
Union Therapy Ensured							

CONCLUSION: This approach towards rationality makes this concept applicable to all the therapies practices as PDAA cycle of rationality includes the factors like intention and behavior which are subconsciously governed and have been a part in holistic approach towards health, which is not assumed a much concern in modern therapy based on modern science. In contrast, this therapy approach gives the patient the same responsibility as given to the prescriber and other associated health professionals. In fact, it makes the treatment a team approach process where each player has to play its role and accept their responsibility and cumulative lead to better treatment outcome.

It will decrease the errors which lead to adverse patient outcome and aid to bring more uniformity and more trust in patient towards therapy as with their involvement they will know their clinical needs and will do better to improve and safeguard their health. It would optimize the utilization of health resources used in drug and prevent drug wastage. In addition; it would help in improving the patient safety culture with a special group of diseases like chronic diseases requiring long-term medicines, low therapeutic index drugs and drugs like antibiotics which have an inevitable tendency to become resistant on use could be managed effectively all through the drug use process.

This would help to rationalize the use of antibiotic and the present emergence of resistance due to widespread in appropriate use. In other aspects, it will decrease wastage and improve the safety economy as well as the efficiency of the treatment. Overall it would widen the scope of drug utilization studies by incorporating monitoring at every stage and lead to the active participation of roles of different professionals involved in the drug use

process. It would be a novel step in enhancing patients involvement in treatment, which is a must for positive outcomes. Lastly, linked through the past, it has a Behavioural element in play that will improve patient prescriber relation and improve adherence and allow access to the intangible nature of health service through indirect positive effects and enhanced patient satisfaction.

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