The Effect of Pill Box Use on Medication Adherence among Critical Care Patients receiving appropriate polypharmacy

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ABSTRACT:
Cardiovascular disease is leading cause of morbidity & mortality worldwide and main cause to improve medication non-adherence. The aim of the study is to increase medical adherence with the use of Pill-box therapy to cardiovascular disease medications in patients with hypertension. IN the other side poor medication adherence may cause unfortunate consequences for example, disease progression leading to death too among the older adults. The purpose is to understand effect of pill box in chronic health condition people to increase medical adherence. Pill box technique helps to manage the medication and to have better have medication adherence than non-users. IN the study inclusion & exclusion criteria will be considered and result will be demonstrated from two group of people control & experimental group. Basically, experimental group will be given with pill box considering their needs and demands of their habits and medication regimen. In other case control group will be people who will be non-users or not availed pill box. Pill box would prove to eb an effective strategy to improve adherence. Improvements in device prescription, training, research and design are needed to understand the mechanisms and size of effects of this intervention.
Key words : Pill box, medication adherence, Cardiovascular disease, chronic health condition etc

I.   INTRODUCTION:
Old age is usually age between 60 to 65 years of age in the developing and developed countries. The higher age population is increasing day by day. Cardiovascular disease includes stroke, heart failure and Kidney disease, main cause is due to rapid urbanisation causing an upsurge of ischaemic heart disease and metabolic disorders.Atleast $2/3^{rd}$ of the total population cardiovascular death occur currently in low and under developing countries with low economic rate which brings a double burden of disease. Hypertension is by far the commonest underlying risk factor for cardiovascular disease. It is affecting due to combination of lack of resources and health care systems,non-existence effective preventive strategies at a population level, lack of sustainable drug therapy and barriers to complete compliance with prescribed medications. The population in India has increased by 1.43 billion by 2023.This contributes to 16.8% of elderly people in India.

As the aging population is progressively growing age-related physiological changes, older people are at high risk of numerous health problems including cardiovascular disease. Nearly, one out of two adults are suffering from cardiovascular disease. Currently, around half of people over 60 suffer from severe coronary artery stenosis and more than 50% of them show no symptom. Cardiovascular disease is associated with high disability and mortality rates, low quality of life, massive costs and social problems. As per estimated data cardiovascular disease is responsible for 56% of the death.

Developing of various disease compels people to have different medication. In a survey older people usually take s 4-8 different pills on a day. The number of tablets an older people administers is correlated with developing adverse effect in the body and thereby indirectly related to medical adherence. In older people poor medicine adherence is reported to be 26-59%, this rate increases in the duration of intake of medication & treatment.

On the other side forgetting to take medication prescribed and failing to take medication on- time is the vital part of medical adherence in older people. In a study result demonstrated that 62% of the older people forget to take prescribed medication or else medication on time. Poor medicine adherence is concerned with numerous problems and complications it may lead to re-hospitalisation, progression of minor disease to major consequences, aggravation of disease. IT is estimated that the 70% hospitalisation cases leading to rehospitalisation are due to poor medication adherence.

In this case making people remember timing and dose to taken is important. Pill box or pill organizer can be used as simple reminders technique, a potential, cost-effective process to

improve medicine adherence in older people by 60-70% in the older people. In systemic review it was found that pill box proved to have a positive impact on medicine adherence whereas in contradictory words pill box can be ineffective in promoting medicine adherence.

Reason for non-compliance of Medication adherence:-
1- People do not take medication due to fear of side effects

2- Cost of the medication
3- Dosing frequency
4- Routes of administration

Pill Box or Pill Organizer is a container use to organize medication dose.Pill case contains compartments where pills can be arranged as per medication required in weekly manner and if required morning or night also.

Image 1:- Example of pill box

Image 2:- Various types of Pill Box

Advantages of Using Pill Box:-
1- Increases medication adherence by taking pills on schedule.
2- Easy Organisation
3- Pill Box serves as a reminder

4- Pill Box has variety of choices :- it comes in wide ranges of shape & sizes
5- Easy management of complicated doses
6- Reduction in wastage of medication
7- Maintains autonomy and independence of elders

8- No need to handle medicine bottles
9- At any time, one can make sure if you have taken the medicines
10- Less chances of taking double dose.

Inclusion Criteria:-
  i. Adult (aged > 18 years) persons with Cardiovascular disease, and
  ii. Attending the NCD Clinics of Community Health Centre (CHC)
  iii. Receiving more than one type of oral drug* which is documented in prescription for any of the following MCCs:
  o Cardiovascular disease
  o Hypertension
  o Coronary artery disease
  o COPD
  o Hypothyroidism
  o Rheumatoid arthritis
  iv. A permanent resident of the area

  Exclusion Criteria:-
  i. Presently taking ACE Inhibitor
  ii. Presently taking the help of pillbox
  iii. Documented malignancy present
  iv. Documented cognitive impairment

- **Number of groups to be studied**: Two groups- One group (intervention arm - IA) receiving pillbox and the other group (control arm – CA) receiving no intervention.
- **Study duration**: We are estimating to recruit the participants within one month and they will be followed for next five months with a total of six visits (including baseline visit).

ii. Sample size: Assuming mean (SD) difference of change in HbA1c levels across both groups from baseline to the follow-up visit after 6 months to be 0.5(1) %, size of cluster as 50, design effect of 1.5, alpha error 5%, power 80%, attrition rate 10%, we plan to recruit a total of 104 participants in two clusters in each arm.[31,33]

- **Sampling technique:** Subcentre area catchment-based clustering will be used to recruit the participants. From the NCD Clinics among the SCs in under PHC, SCs will be selected using computer generated random sampling. Sequential enrolment (consecutive sampling) of patients in NCD Clinics of the selected SCs will be done till sample size is achieved in that cluster.

Intervention: In this study, the eligible individuals will be randomized into intervention and control groups. In the intervention arm, the study participants will receive a pillbox. The pillboxes will be a seven-day square-shaped container with 21 small compartments arranged in 7 rows with 3 columns each (morning, afternoon, and evening dosing) with width 20 mm and height 10 mm. There will be no provision of any bag or pouch or electric alarm. It is waterproof, made of plastic material and by placing the tablets for one month, no damage will be done to the box or plastic. Tabbed compartment doors open easily and snap securely shut. They will be customized with pictorial depictions of the time of the day (morning, afternoon, and night) on each compartment and the name of days written in vernacular language. All the boxes will look similar and will be manufactured by the same company.

In the control group, the study participants will not receive anything.
- **Enrolment:** Individuals attending the clinic and fulfilling the inclusion criteria will be enrolled till the sample size is achieved. A constant supply of drugs for the patients will be ensured by for all the patients two months prior to the monthly visit.

Procedure for control group:
  i. Informed consent will be obtained from the patients. Once the patient is prescribed medicines for a month by the physician, she/he is directed to go to the pharmacist.
  ii. The pharmacist directs the patient on how to take the medication. This is the routine procedure followed in the clinics.
  iii. Step to be followed then are:
  ▪ administers questionnaire, and
  ▪ measures anthropometry and
  ▪ collects 2mL blood, and
  ▪ informs a patient the date exactly when to come next (one month later), and
  ▪ reminds patient to bring the empty medicine blister/strip packs

Procedure for intervention group
1. Informed consent will be obtained from the patients. Once the patient is prescribed medicines for a month by the physician, she/he is directed to go to the pharmacist.

2. The pharmacist directs the patient on how to take the medication. This is the routine procedure followed in the clinics.
3. Steps to be followed then are:
   i. confirms the pills in the box and
   ii. administers questionnaire, and
   iii. measures anthropometry and
   iv. collects 2mL blood, and
   v. informs a patient the date exactly when to come next (one month later), and
   vi. reminds patient to bring the following on the next visit
1. empty medicine blister/strip packs, and
2. pillbox

Note:-
Patients are instructed to show the pills in the box because
1. in case they are not able to understand it when they go home, then they will explain it to them and help them put it in the box.
2. To encourage to actually use it.

Data collection

- **Questionnaire:** Baseline socio-demographic information will be collected using a pre-tested semi-structured interview schedule from all included individuals. We will also ask whether patients think their disease is curable, to evaluate whether there is an association between patients' perceived prognosis and medication adherence. Questionnaire will also be handed over to the participant which can be used as primary source.

- Data will be collected and captured in database and exported to Microsoft excel.Categorical data will be presented as a percentage (%).Normally distributed data will be presented as means and standard deviation. Pearson's Chi-square test will be used to evaluate differences between groups and Student's t-test for independent samples will be used for comparison.

REFERENCES:-

[1]. Global report on diabetes [Internet]. [cited 2022 Jan 9]. Available from: https://www.who.int/publications-detail-redirect/9789241565257

[2]. Maddigan SL, Feeny DH, Johnson JA. Health-related quality of life deficits associated with diabetes and comorbidities in a Canadian National Population Health Survey. Qual Life Res Int J Qual Life Asp Treat Care Rehabil. 2005 Jun;14(5):1311–20.

[3]. WHO package of essential noncommunicable (PEN) disease interventions for primary health care [Internet]. [cited 2022 Jan 8]. Available from: https://www.who.int/publications/i/item/who-package-of-essential-noncommunicable-(pen)-disease-interventions-for-primary-health-care

[4]. World Health Organization. Tackling NCDs: "best buys" and other recommended interventions for the prevention and control of noncommunicable diseases [Internet]. World Health Organization; 2017 [cited 2022 Jan 8]. Report No.: WHO/NMH/NVI/17.9. Available from: https://apps.who.int/iris/handle/10665/259232

[5]. Lim SS, Gaziano TA, Gakidou E, Reddy KS, Farzadfar F, Lozano R, et al. Prevention of cardiovascular disease in high-risk individuals in low-income and middle-income countries: health effects and costs. Lancet Lond Engl. 2007 Dec 15;370(9604):2054–62.

[6]. Olickal JJ, Chinnakali P, Suryanarayana BS, Saya GK, Ganapathy K, Subrahmanyam DKS. Medication adherence and glycemic control status among people with diabetes seeking care from a tertiary care teaching hospital, south India. Clin Epidemiol Glob Health. 2021 Jul 1;11:100742.