The Need for Clinical Pharmacy Services in Sri Lanka; a Study Based on the Prevalence of Drug Related Problems in Two Hospitals.

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Abstract- Clinical pharmacy is a discipline utilized in most countries to rationalize medication use. The key functions of a Clinical Pharmacist include the identification, prevention and solution of Drug Related Problems (DRPs).

The objectives of this study were to assess the need for clinical pharmacists in Sri Lankan hospital inpatient care focusing on the prevalence of DRPs to understand the perception of doctors and nurses on introducing this service to Sri Lanka.

This prospective observational study included 100 adult patients from government and private hospitals (50 from each). Their drug charts were reviewed to identify DRPs. Separate questionnaires were administered on 50 doctors and nurses respectively for the survey.

Prevalence of DRPs was high in both groups. 92% of the government hospital patients and 80% of the private hospital patients included in this study had at least one or more DRPs. A total of 86 and 83 DRPswere identified in the government and private hospital patient samples respectively. The most prevailing DRP identified in both hospitals is the "Drug Choice Problem". According to the survey study results, 60% of the doctors believe the addition of clinical pharmacists will increase support for them in rationalizing drug therapy, but, only 10% of the nurses think there will be an increase in support.

This study demonstrated that DRPs occur frequently in the hospital inpatient care;hence, there is a need for further studies in the intervention of the clinical pharmacists that can result I preventing these problems.

Index Terms- Clinical pharmacy, Drug related problems (DRPs), Medication review

I. INTRODUCTION

A drug can easily be the cause of a serious injury to health or even death. Therefore safety, appropriateness and effectiveness of drug therapy should be confirmed in patient care. In most of the countries clinical pharmacists share this responsibility with other healthcare professionals.

Clinical pharmacy is not currently practiced in Sri Lanka. Does that mean drug therapy in Sri Lanka is perfect and there is no need for clinical pharmacists? Or, are there drug related issues/ problems occurring, but the health care professionals are unaware of these because there is no professional (a clinical pharmacist) to monitor drug therapies and to give feed back to them? Even if there is a need, will the doctors and nurses welcome a pharmacist in the ward?

This study was carried out with the purpose of clarifying these questions.

I.I. Clinical Pharmacy

Clinical pharmacy is a health discipline in which pharmacists work in collaboration with other health care professionals to promote rational medication use, which is the safe, appropriate and cost-effective use of medications [1, 2]. It is defined by the American College of Clinical Pharmacy as "the area of pharmacy concerned with the science and practice of rational medication use" [2].

The responsibility of clinical pharmacy practice is aimed at optimizing the drug therapy outcomes while correcting detected problems in drug use. Clinical pharmacists work closely with the physicians and nurses monitoring drugs, dosage regimes, side effects, interactions and drug administration to confirm the appropriateness, safety and the effectiveness of therapy. [3] The technical term for this monitoring is "Medication Review". It is a systematic assessment of the patient's drugs to optimize the therapy outcomes and to identify the potential drug related issues. Other functions of a clinical pharmacist include medication history taking, patient counseling, providing drug information and research. [1, 3, 4]

The addition of this service has demonstrated significant improvements in patient care by reducing drug-related mortality and morbidity and by enhancing the quality of care in other countries [5]. Though no studies have been done in Sri Lanka to identify the significance of this service, a number of studies have been done in other countries. These studies have proved that the intervention of pharmacists on patient care through medication history taking, participating in ward rounds, medication review and patient counseling with feedback to the physicians result in improved care, improved patient safety and satisfaction while giving considerable economic benefits. [6, 7, 8] It is demonstrated that pharmacist-conducted medication history taking is more efficient and saves time and cost in comparison with doctors and nurses [9, 10].

I.II. Drug Related Problems (DRPs)

The core processes of clinical pharmacy services are the identification, prevention and solution of Drug Related Problems(DRPs) [11]. DRPs can be defined as "any event or circumstance involving drug therapy that actually or potentially interferes with desired health outcomes" [12]. A pharmacist in

the health care team contributes to improving therapy outcomes by addressing the actual and potential DRPs including inappropriate drug choices, untreated indications, interactions, cost-ineffective therapies etc. [13, 14].

Classifying DRPs is important in documentation by clinical pharmacists in practice and in research. There are a number of classifications used in the world. An optimum classification should be based on clear definitions, structured in a hierarchical manner clearly separating the causes from problems, validated and easy to use. But because of the complexity of the problems and causes, there is no such optimum classification at present. But the DRP classification of the Pharmaceutical Care Network Europe (PCNE) has most of the features above. It is based on clear definitions, structured in a hierarchical manner and some forms of validation are published. And it is used in a number of published research studies. [11]

The PCNE classification for DRPs is validated and adapted regularly and there are different versions released. The previous major release of the classification, referred to as the PCNE classification V.5.01, is used for this study. [12]

The problems are categorized into six domains in the PCNE V 5.01 classification system.

I.III. Study design

Clinical pharmacy is a new concept for the Sri Lankan health sector. The scope of pharmacy practice in Sri Lanka includes only the more traditional roles such as compounding and dispensing drugs. No studies have been done to assess the need for clinical pharmacy services.

We think the addition of clinical pharmacy service to the Sri Lankan hospital setting is very much in need. The main reason for that is the increased work pressure on doctors and nurses. According to the medical statistics unit, population per medical officer in 2007 is 1815 and population per a nurse in the same year is 636 [15]. This clearly indicates the limitation of time a doctor or a nurse has to spend for a patient. The possibility of medication errorsoccurring in a busy work environment cannot be neglected. Increased use of medications and availability of new drug therapies also increase the risk of irrational drug use and even patient harm [16].

A controlled study is best fitting for this concern where the impact of their intervention can be assessed against a group of patients having no intervention. With the limitations to carry out such a study, we directed our study towards the prevalence of DRPs. With no clinical pharmacists to identify the DRPs, the doctors and nurses are unaware of these issues and therefore these problems remain unaddressed. Thus, the occurrence of DRPs implies the need for clinical pharmacy services.

It is important to examine how the doctors and nurses will accept this concept. Would they welcome a pharmacist in the ward? Hence, we conducted a survey study as part of this study to look into this matter as well. For this, we were interested in knowing more about their perceived pressure as a doctor/ nurse, their belief on the need for improved support for them and finally in knowing if they would like to have this support offered by a clinical pharmacist.

II. METHODS

This study included a prospective observational study and a survey study.

The observational study was carried out in a Government Base Hospital and in a Private Hospital in Kurunegala district. A convenient sample of 100 patients (50 from each hospital) was taken from the medical wards including in-patients of either sex undergoing treatment for more than three days. Verbal consent was sought from the patients to be included in the study. Patients receiving treatment for less than three days and patients who did not consent were excluded.

Data were collected from the patients and from the Bed Head Tickets (BHT). These data includes patients' demographic data (age and gender), allergies, past medical and medication histories, co-morbidities, current medication chart and laboratory data. Medication review was carried out for these patients to identify the DRPs. The Australian Medicines Handbook (AMH) and the British National Formulary (BNF) were used in this process. The identified DRPs were categorized according to the PCNE V 5.01 classification scheme.

The survey study sample included 50 nurses and 50 doctors. Two questionnaires, one in English for the doctors and another in Sinhala for the nurses, wereadministered. Both questionnaires were short,with a limited number of questions that could be easily answered by busy professionals.

Demographic factors and other characteristics were summarized with counts and analyzed. The government hospital and private hospital data were analyzed separately.

III. RESULTS

III.I. Medication Review Results

As shown in figure I, out of the 50 patients of the government hospital, 46 patients (92%) had DRPs. Of them 24 patients (48%) had more than one DRP and 22 (44%) had only one DRP. Only 4 patients (8%) had no DRPs.

A total of 86 DRPs were identified in the government hospital patients and among those, "drug choice problem" was the most prevailing. It accounted for a 41% of the total DRPs. The identified problems are listed in table I below. And these data are graphically presented in figure II.

Out of the 50 patients of the private hospital, 40 patients (80%) had DRPs. Of them 22 patients (44%) had more than one DRP and 18 (36%) had only one DRP. 10 patients (20%) had no DRPs as shown in figure III.

A total of 83 DRPs were identified in the private hospital patients and similar to the government hospital patients, "drug choice problem" was the most prevailing DRP. This time it accounted for a 60% of the total DRPs. The identified problems are listed in table I and these data are graphically presented in figure IV.

Table I: Types of DRPs Identified. (Government Hospital Patients)

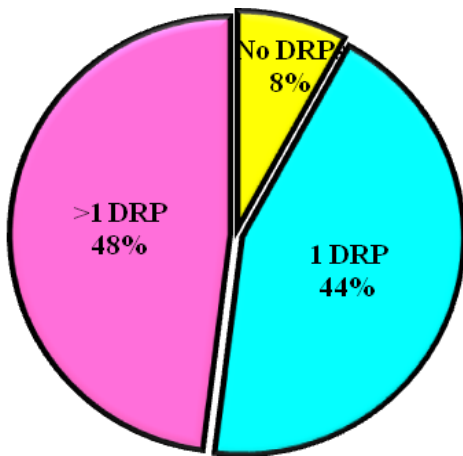| Types of DRPs	Government Hospital		Private Hospital	
	Number of DRPs	As a percentage of the total number of DRPs	Number of DRPs	As a percentage of the total number of DRPs
1. Adverse reactions				
Side effects suffered (non-allergic)	00		01	
Side effects suffered (allergic)	00	0%	00	0%
Toxic effects suffered	00		00	
Total	**00**		**01**	
2. Drug choice problem				
Inappropriate drug (not most appropriate for indication)	03		06	
Inappropriate drug form (not most appropriate for indication)	02		08	
Inappropriate duplication of therapeutic group or active ingredient	08		09	
Contra-indication for drug (including Pregnancy/breast feeding)	03	41%	02	60%
No clear indication for drug use	01		02	
No drug prescribed but clear indication	18		23	
Total	**35**		**50**	
3. Dosing problem				
Drug dose too low or dosage regime not frequent enough	01		01	
Drug dose too high or dosage regime too frequent	15		22	
Duration of treatment too short	00	19%	00	28%
Duration of treatment too long	00		00	
Total	**16**		**23**	
4. Drug use problem				
Drug not taken/ administered at all	00		00	
Wrong drug taken/ administered	00	0%	00	0%
Total	**00**		**00**	
5. Interactions	11	13%	00	(0%)
6. Others				
Patient dissatisfied with therapy despite taking drug(s) correctly	00		01	
Insufficient awareness of health and diseases	23		08	
Unclear complaints; further clarification necessary	00	28%	00	11%
Therapy failure (reason unknown)	01		01	
Total	**24**		**09**	

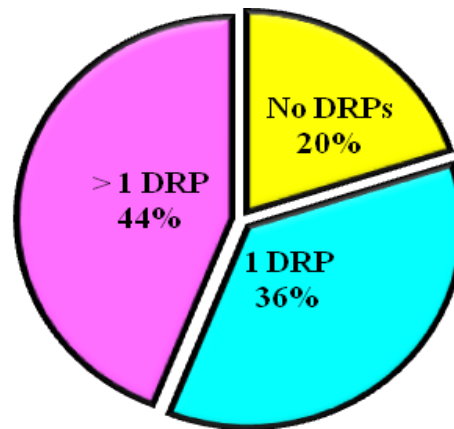**Figure I: Prevalence of DRPs (Government Hospital Patients)**

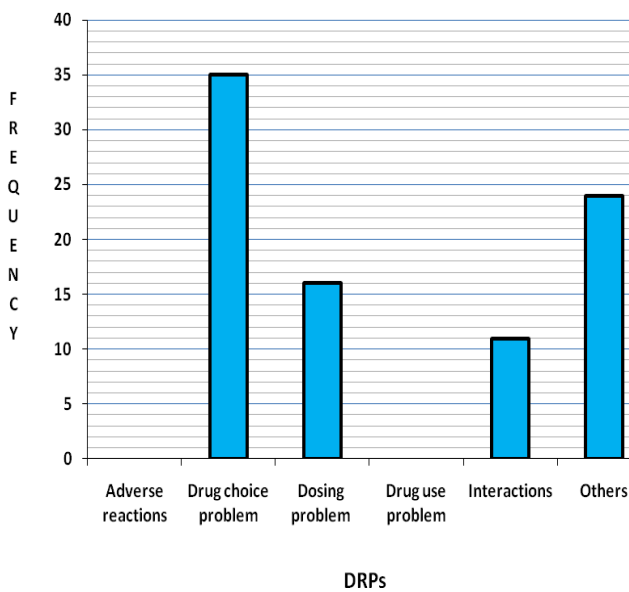**Figure III: Prevalence of DRPs (Private Hospital Patients)**

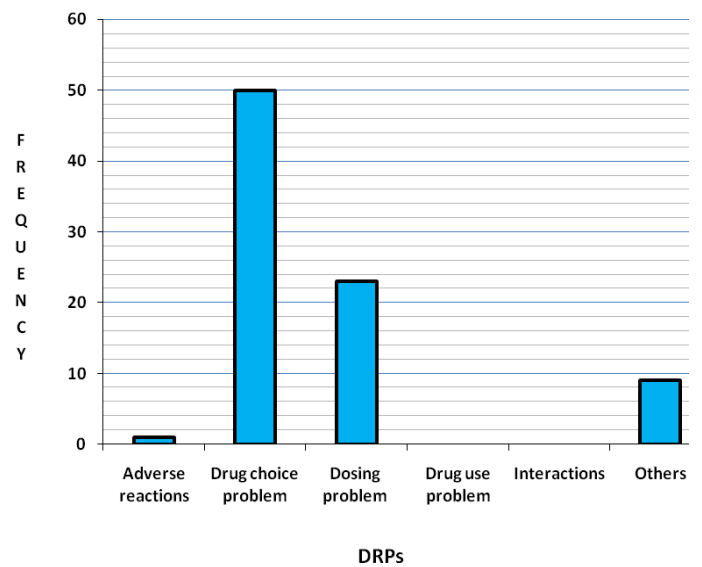**Figure II: Incidence of DRPs (Government Hospital Patients)**

Figure IV: Incidence of DRPs (Private Hospital Patients)

III.II. Survey Study Results

Figures V to VIII below graphically present the results of the survey on the perception of doctors and nurses on introducing clinical pharmacy services.
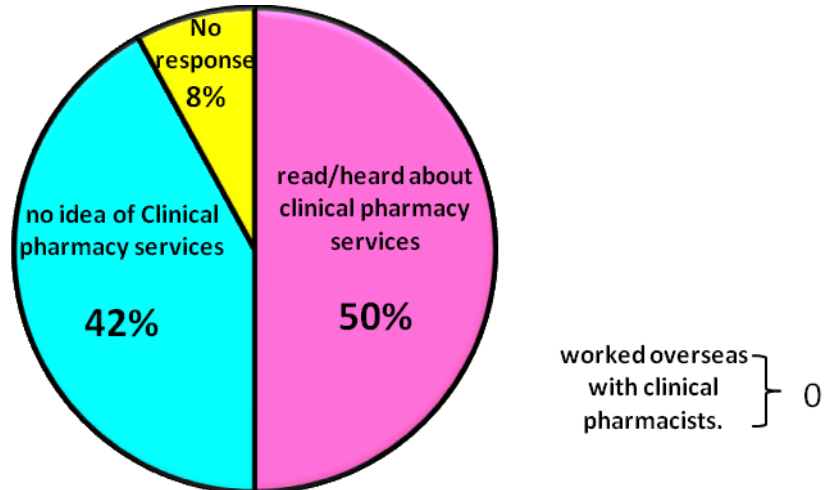

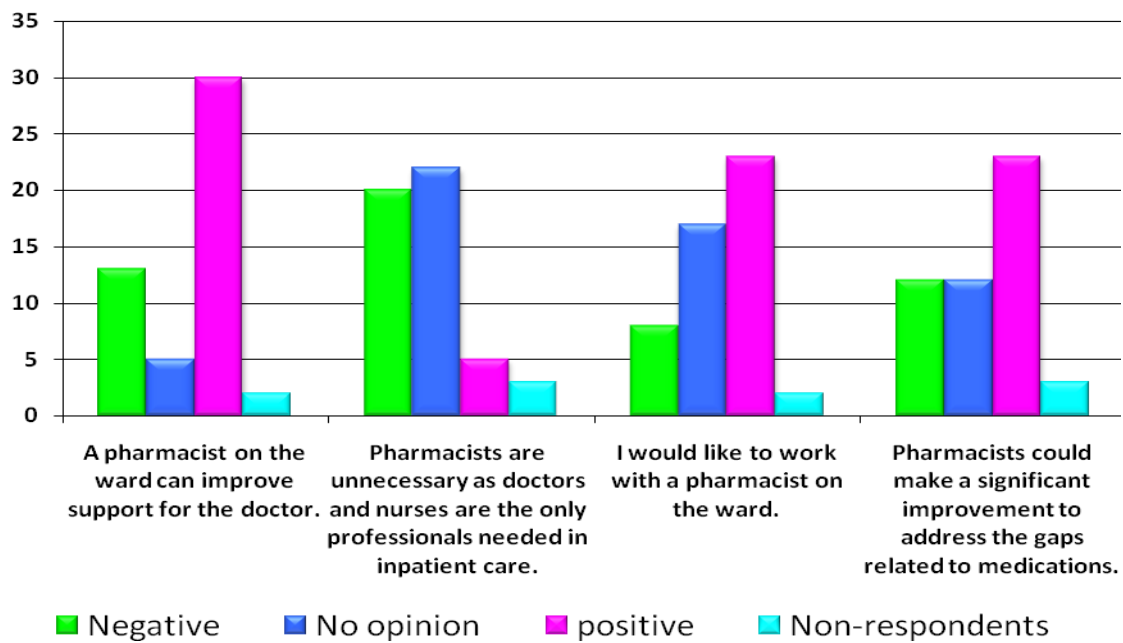**Figure V: Distribution of Awareness/Experience of the Doctors about Clinical Pharmacy Services**

Figure VI: Distribution of Doctors' Opinion on Having a Clinical Pharmacist in the Ward to Support Them
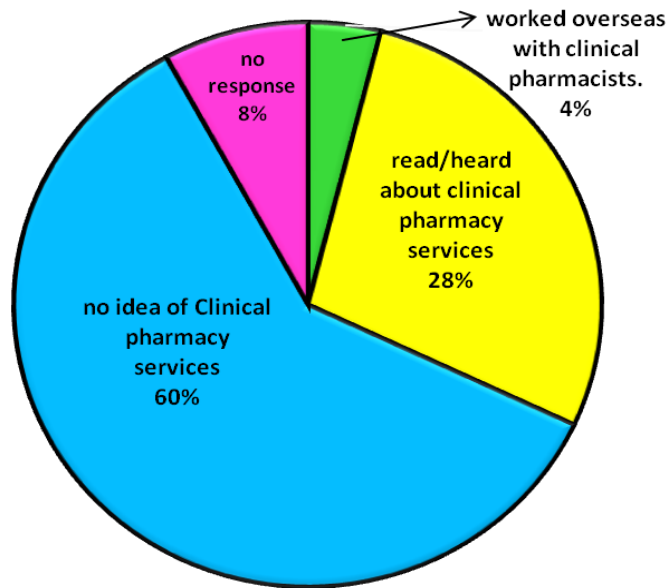
Figure VII: Distribution of Awareness/Experience of the Nurses about Clinical Pharmacy Services
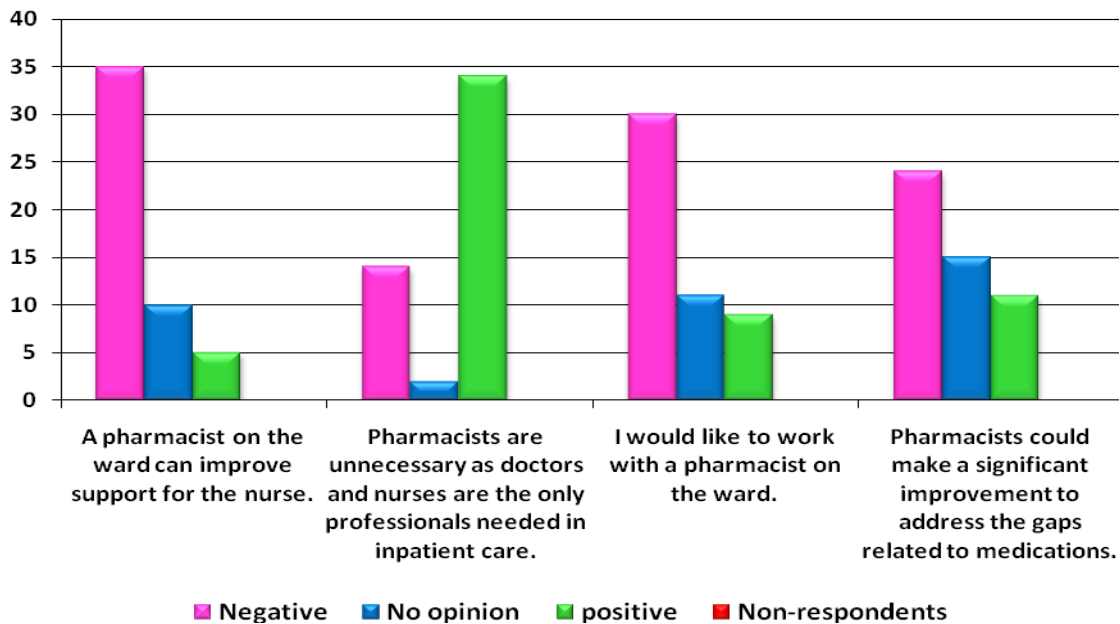

Figure VIII: Distribution of Nurses' Opinion on Having a Clinical Pharmacist in the Ward to Support Them

IV. DISCUSSION

Clinical pharmacy is an emerging discipline in the world. It has been demonstrated that the addition of clinical pharmacy services reduces the DRPs and thus improve the quality use of medicine. [16]

The aim of this study was to assess the need for clinical pharmacy services in the Sri Lankan hospital setting focusing on the prevalence of DRPs in two hospitals. A Government base hospital and a private hospital in Kurunegala district were selected as the study locations. Patient were sampled from the medical wards given a large number of drugs are prescribed in a medical ward and patients present a variety of diseases.

Out of the 50 patients of the government hospital, 46 patients (92%) had at least one DRP and out of the 50 patients of the private hospital, 40 patients (80%) had at least one DRP. When compared to the studies done in the world these numbers are not surprising. It's a proven fact that DRPs occur commonly in the hospitals and that they cause patient morbidity and mortality [16]. In a study conducted by Joanne LaFleur et al to report the prevalence of DRPs and cost saving opportunities, only 8% out of 3750 patients had no DRPs or cost saving opportunities [17]. However in this study we did not consider the economical aspects of drug therapy.

More DRPs were identified in the government hospital compared with the private hospital. This was because there was a higher prevalence of the DRP category "other" in the government hospital. There were only 8 of the sub category "insufficient awareness of health and diseases" under "other" in the private hospital, but 23 classified as "other" were identified in the government hospital. The reason behind this is the inadequate laboratory monitoring in the government hospital which could be due to the inadequacy of laboratory facilities which may not an issue in the private hospital.

The most prevailing DRP identified in this study, in both (government/private) patient samples is the "Drug Choice Problem" which constituted of inappropriate drug and drug form, duplication, contra indication, drug needed – not prescribed and drug prescribed - not needed. This observation is similar to a study carried out by Ganachari M.S. et al in India [16]. However, in a study conducted by Gillespie in 2012 to evaluate the clinical pharmacists' intervention, the most prevailing problem was "Adverse Drug Reactions". "Drug Choice Problem" was the second most prevailing in that study [18]. Among the issues under "Drug Choice Problem", "drug needed-not prescribed" was the most common. Need of additional drug therapy (drug needed-not prescribed) is documented as the second most common problem identified in a study conducted by Gillespie [18]. The second most common problem was the duplication of drugs. Problems of drug choice could be due to poor development and adaptation of protocols and guidelines for drug selection. In a study conducted by Oborne et al, out of 215 elderly patients 40% were given one or more drugs had no indication, and 37% were on one or more inappropriate selections [19]

The second most prevailing problem was different in the government and private hospital. "Dosing Problem" was the second most prevailing problem in the private hospital patient sample. This is in similar to the study carried out by Ganachari M.S. et al [16]. "Dose-too high" was the most common amongst the issues under "Dosing Problem". In the government hospital sample, "Other" was the second most common DRP. This is because of the insufficient laboratory investigations which are necessary for the confirmation of appropriateness of therapy. For instance, dose of some drugs depend on the patient's Glomerular Filtration Rate (GFR). This problem was not significant in the private hospital sample. This could be due to the less availability of laboratory facilities in the government hospital either because of the lack of resources or the large number of patients.

In both hospitals "Drug Use Problems" could not be identified. This could be due to the limitation of not being able to monitor drug administration all the time during the entire hospital stay of the patients.

The prevalence of DRPs in the private hospital (80%) is less than that of the government hospital (92%). But still, the occurrence of DRPs is significant in both hospitals.

Out of the 50 doctors included in the survey study, no one had ever worked with a clinical pharmacist. 50% of them had an idea of what clinical pharmacy is and 42% of them had no idea of it. 60% of the nurses out of the 50 included in the study had no idea of clinical pharmacy services and only 28% knew about it. There were 2 nurses who had worked overseas with clinical pharmacists and they had included comments emphasizing the need of clinical pharmacy services in Sri Lanka.

Sixty percent of the doctors believe the addition of clinical pharmacists will increase support for them in rationalizing drug therapy. The majority of doctors believe there is a need of increased support for them in the wards. The majority had a positive opinion on adding clinical pharmacists to provide this support. Similarly, the study done by Ganachari M.S. et al also demonstrate that the joint work of doctors and pharmacists in wards is possible and that this result in identifying and preventing DRPs. In this study, all clinicians (100%) gave the opinion that this service is would have value as they recognized the possibility of improving the patient care and treatment outcomes by identifying and preventing the DRPs [16].

Nurses' opinion on addition of clinical pharmacists was different from that of doctors. According to this study, only 10% of them think there will be an increase in support by the addition of clinical pharmacists. This could be due to the lack of awareness on this subject and therefore it is very important to provide education on clinical pharmacy services before the addition of pharmacists into the wards.

There were some limitations in this study. Patients were not followed up during their complete hospital stay. This could have been resulted in missing important data. A clinical pharmacist gets involved in patient care from the point of admission to the point of discharge.Identifying DRPs by

studying the Bed Head Ticket and getting patient's details only on one day is not an ideal method. Due to the practical difficulties in patient follow up, this method was adopted.

Another limitation is this study provides information on the occurrence of DRPs but does not necessarily demonstrate whether these can be prevented or minimized by the addition of clinical pharmacy services. An interventional study where the intervention of the clinical pharmacists can be assessed is the ideal in that purpose. Since other studies have demonstrated that their intervention results in preventing DRPs and significant improvement in patient care [20, 21, 22]. We argue that given a significant prevalence of DRPs in hospitals, clinical pharmacy services are needed.

There are some limitations on the use of clinical pharmacists and identification of DRPs. The identification of DRPs is subjective and is based on the judgment of the pharmacist. Therefore a different pharmacist could have come up with different prevalence rates of DRPs for these same cases. The uniformity of pharmacists' judgment is a controversial issue in most of this kind of studies [23].

V. CONCLUSION

The prevalence of Drug Related Problems is significant in the Sri Lankan hospitals as in other countries. Thus, we strongly believe that there should be a clinical pharmacist in the health care team to promote rational use of medications.There is a possibility of building a good professional collaboration between the pharmacists and the doctors. Therefore, how the intervention of the clinical pharmacists may result in preventing these problems should be further studied. If it could be demonstrated that the addition of clinical pharmacy services can reduce the DRPs and improve the patient care, further studies can be carried out to initiate the policy developments to implement Clinical Pharmacy services in Sri Lanka.
 Doctors and nurses should be given a comprehensive understanding of clinical pharmacy services and ensure if this service is implemented, there will be good physician-pharmacist-nurse collaboration.

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