THE IMPACT OF IMPLEMENTING ALBUMIN GUIDELINES ON UTILIZATION

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إن شح مادة الزلال وارتفاع قيمتها المالية يجعل منها سلعة نفيسة في أي دليل للأدوية في المستشفى. قمنا بإعداد دراسة مراقبية من أجل تقويم تأثير الإلتزام بالتعليمات الخاصة بالزلال على كل من تكلفته واستعمالاته. تم تقويم استعمالات الزلال خلال فترة مقدارها ستة أشهر قبل وبعد تطبيق استعمال هذه التعليمات. أظهرت نتائج هده الدراسة أن استعمال الزلال قد انخفض بنسبة 9.6٪ وهما نسبة يمكن اعتبارها نوعية. ومع ذلك فإن طموحاتنا في الوصول إلى خفض مقداره 30٪ خلال السنة الأولى قد واجه بعض المعوقات التي تعزى إلى عوامل متعددة. أوضحت هده الدراسة الدور الهام للصيدلاني الإكلينيكي في خفض نفقات المواد الصيدلية من خلال تدخلات مختلفة ومنها توعية الممارسين والمرضين على أهمية ممارسة الطب المعتمد على الدليل أو البينة.

Albumin shortage and high cost makes it a prized commodity on any hospital formulary. We conducted this observational study to evaluate the effect of albumin guidelines on albumin cost and utilization. Albumin utilization, six months before and six months after implementing the guidelines, was evaluated. Result of this study showed that albumin use declined by 9.6%, which is considered to be significant. However, our objective to attain a 30% reduction during the first year was hindered due to several factors. This study also demonstrated the important role of the clinical pharmacist in reducing pharmaceutical expenditure through various interventions. Among these interventions are educating physicians and nurses the importance of practicing evidence-based medicine.

Key Words: Albumin guidelines, clinical pharmacist

Introduction

There are three types of fluid replacement therapy: oxygen transporting fluids (whole blood), crystalloid solutions, and colloidal solutions. Usually, whole blood administration is indicated only in severe hemorrhagic shock. The other type of fluid replacement is crystalloid solutions; such as 0.9% sodium chloride and lactated ringer are used to maintain osmotic pressure by supplying water and sodium. They distribute faster into interstitial and cellular compartments and considered inexpensive when compared with other plasma expanders. Colloidal solutions are plasma expanders, which act by moving fluids from the interstitial compartment into intravascular compartment. They are classified into non-protein colloids such as hetastrach and pentastarch and protein colloids such as albumin. Hetastarch and pentastarch are synthetic colloids derived from starch. Pentastarch has lower molecular weight than hetastrach and has the advantage of having minimal effect on the coagulation process. Both agents are effective to the same degree as albumin with the advantage of being cheaper and almost free of biological contaminations. On other hand, albumin is a plasma protein, which is obtained by fractionating blood plasma. It is available in concentrations of 5%, 20%, and 25%, respectively. Since the development of albumin in 1940s, large numbers of clinical trials have been conducted and published regarding albumin use in clinical practice (1,2). Albumin cost is the most often discussed issue especially when it is compared with other cheaper alternatives. Albumin alternatives include crystalloid solutions and non-protein colloids (3). In addition to the cost, albumin availability is subject to shortage because of the biological source of it. Because of these discussion and debates, the National Health Institute (NHI) sponsored a conference in 1975 to discuss the development of recommendation on the clinical use of albumin. This conference resulted in issuing a set of recommendations that was published in 1977. The continuous advance in the field of medicine and the growing number of published

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clinical trials led to the development of albumin guidelines. One of the major reasons behind the development of albumin guidelines is its high cost and to ensure safe and appropriate use of it. University Hospital Consortium (UHC) played a very crucial role in the development of these guidelines. UHC is a non-profit alliance of US academic centers, whose goal is to support and benefit its members in the area of health technology. To develop these guidelines, UHC used several step processes; starting from reviewing and evaluating the published literature, and ending with development of guidelines (4,5). Since these guidelines were developed and structured in a very credible manner, large numbers of hospitals have adapted these guidelines. One of these hospitals is King Fahad Hospital National Guard Hospital (KFNGH). KFNGH is a tertiary health care institution with 600 beds, a trauma center, and renal and liver transplant services. Because of the major cost impact of albumin on the Pharmaceutical care department budget, the department took the initiative and came up with plans to adapt and implement these guidelines.

Methods

The study was conducted by forming a task force, which consisted of five clinical pharmacists covering the following areas: Intensive Care Units (ICU's), renal transplant & dialysis, liver transplant, cardiology, and pediatrics. The clinical pharmacist, who coordinated the task force, was to report the final guidelines to the Pharmacy and Therapeutic (P&T) committee within one month for approval. Literature review was conducted to evaluate the clinical use of albumin, and non-protein colloids (6-13). After gathering the necessary information, the task force evaluated the published guidelines (4,5) and its applicability to KFNGH. Albumin consumption was reviewed by generating a computer report of albumin utilization over a six-month period; starting from 1/7/1999 to 31/12/1999. The task force adapted the UHC guidelines with some modification to suit our hospital needs. The first draft of the guidelines was developed and sent to the heads of all medical and surgical departments for review and feedback. However, after one month of sending the guidelines, no feedback was received from any of the medical departments. A final draft was prepared and presented to the P&T committee for approval. The P&T decided to send the proposed guidelines to all medical departments again for review with a one month deadline. In the next P&T meeting, feedback was received from nephrology, gastroenterolgy, and pediatric departments, all of which were consistent with the proposed guidelines. Therefore, the albumin guidelines were approved and the clinical pharmacists were asked to follow up on the implementation. The guidelines were sent to all physicians emphasizing on strict adherence to them. Six months after implementation, the task force reviewed the pattern of albumin utilization to assess the impact of the guidelines on albumin cost and utilization. The impact was measured by generating a second computer report and comparing it to the previous report before implementing the guidelines. The impact of the guidelines was measured from two perspectives, the utilization and the cost impact.

Results

The total consumption of albumin before implementing the guidelines (table 1) for both concentrations 5% and 20% was 4142 orders. Albumin 20% was utilized more frequently than 5% with 2846 orders vs. 1296 orders respectively. Liver transplant care unit ranked first with a total of 1060 orders, followed by adult ICU with 422 orders. With 337 orders the burn unit came in third followed by the cardiac care unit with 318 orders. The total orders of albumin for these four care units were 2137 orders, which represented 51.5 % of all total orders. For the fiscal year of 1999, the total cost of albumin was 1,908,260 Saudi Riyals; which put it on the top ten list of pharmaceutical care department expenditure for that year. Six months after the implementation of the guidelines, the task force reviewed the albumin utilization from the period 1/7/2000 to 31/12/2000 as shown in (table 2). It was found that the total albumin utilization declined by 9.6 % (from 4142 to 3744) as shown in (table3). Although there was a reduction in the total orders dispensed from albumin 20% (from 2846 to 2123); there was an increase in the total number of orders dispensed from albumin 5% (from 1296 to 1621). However, concerning utilization based on to patient care units there were mixed results. The task force found that the liver transplant unit continued to rank first with 882 orders, with a reduction of 16.8%. Additionally, the CCU consumption increased to 644 orders that is a 65% increase, which placed it in the

second place. However, adult ICU utilization did not change much with utilization of 430 orders (1.8% increase). Regardless of the drop to 290 orders (8.8% reduction), the cardiology care unit continued to be in the fourth place. The greatest reduction was in burn unit by 207 orders (61.4%), followed by liver transplant care unit with 178 orders (16.8%), and 89 orders (42.5%) for transplant & dialysis unit. There was 100% reduction in the liver transplant ICU. In addition, there was a 100% reduction in obstetrics and gynecology (ob/gyn) care unit and on long term care unit. On the other hand, the greatest increase was in the chemo clinic with an increase of 70 orders reflecting a 368% increase. Furthermore, orders from the CCU increased by 419 representing 186% increase. Another notable increase was in pediatrics care units with 60 orders (101% increase).

Discussion

Based on the pattern of practice and previous experience with similar process, the pharmaceutical care department and P&T set a 30% reduction in albumin utilization as a target for the first year of implementation. Although we were able to achieve 9.6% reduction in albumin use, both P&T and pharmaceutical care department considered this reduction acceptable. The reduction in utilization reflected more on the reduction of the cost with 132,511 SR (14%) drop in the total cost over six months. Although there was a decline in utilization of the 20% concentration, there was an increase in use of 5% albumin. This trend can be explained by a period of shortage of the 20% during which 5% albumin was used instead. If there wasn't a compensation of albumin 20% by using albumin 5%, the drop in the cost would have been greater than 14%. The clear reduction in some of the patient care units demonstrates how effective the clinical pharmacist can be in implementing the guidelines. For instance, the reduction in burn unit 61.4% (207 orders), gasterenerology and liver transplant unit was 16.8% (178 orders), and 42.5% (89 orders) in renal transplant and dialysis unit. The 100% reduction in the liver ICU was because no surgery was performed during that time and not because the guidelines were being followed. However, the 100% reduction in obstetrics & gynecology couldn't be attributed to the shortage but rather to the effective implementation of the guidelines in addition to treating patients in the chemo clinic. The clear effect of albumin guidelines can be seen in 207orders (61.4%) reduction in the burn unit. In contrast, the large increase in albumin utilization in the chemo clinic 386% (70 orders) may be due to various reasons. The major reason is that there was no clinical pharmacist covering that area at the time of the study. Additionally, this increase explains the reduction on other oncology units meaning that a large number of patients were being treated as out patients. Besides looking into albumin usage the task force evaluated the use of non-protein colloids. The task force was unable to evaluate crystalloids solutions because of its usage in indications other than for plasma expander. For non-protein colloids we only had hetastrach at the time of the study. Although we anticipated an increase in hetastrach utilization during that period, hetastarch usage declined by 90 % from (182 to 17 orders), this reduction could be attributed to the unavailability of pentastarch (now available since 2000), which has better coagulopathy profile. There are several factors that may hindered our effort to reach the 30% reduction target. One of the major reasons is the way the guidelines were approved. They were approved as recommend-dations rather than protocol. If they were approved as protocol, physicians would have been obligated to explore the possibility of using other alternatives before considering albumin. Another reason was the lack of physician's education by the clinical pharmacist. Finally, cooperation from physicians, which was crucial to reach the 30% reduction target, was not optimal. The 9.6% reduction demonstrates the important is the role of the clinical pharmacist in reducing the cost without affecting the quality of care. For effective implementation of the guidelines the task force recommend the following: 1) physicians involvement and active participation in the implementation process is crucial; 2) the clinical pharmacist should continuously educate physicians, nurses, and other pharmacists through in-services and seminars; 3) there should be regular Drug Usage Evaluation (DUE) for albumin and alternatives especially for areas where albumin utilization is high.

Table 1. Albumin Utilization for six Month from 1/7/99 to 31/12/99

Patient Care Unit	Albumin 5%	Albumin 20%	Total
Ob/Gyn Oncology	3	18	21
Surgery (female)	9	85	94
Surgery (male)	16	118	134
General Pediatrics	27	32	59
Pediatrics (surgery &nephrology)	0	29	29
Pediatric oncology	4	59	63
Oncology/Hematology/ Renal transplant unit	22	187	209
Gastroenterology /Liver transplant unit	317	743	1060
Cardiology	145	173	318
Multi specialty services	43	96	139
Short stay	0	18	18
Long term	4	0	4
Medicine (female)	48	133	181
Medicine (male)	86	72	158
Pre admission	28	106	134
NICU	52	82	134
ICU2	144	278	422
Burn Unit	59	278	337
CCU	66	159	225
PICU	166	130	296
Liver ICU	40	45	85
ICU	3	0	3
Chemo Clinics	14	5	19
Total (Orders)	1296	2846	4142

NICU= Neonatal Intensive Care Unit, **ICU**= Intensive Care Unit, **CCU**= Cardiac Critical Care Unit
PICU= Pediatric Intensive Care Units

Table 2. Albumin Utilization for six Month from 1/7/00 to 31/ 12/00

Patient Care Unit	Albumin 5%	Albumin 20%	Total
Ob/Gyn Oncology	0	0	0
Surgery (female)	3	50	53
Surgery (male)	0	74	74
General Pediatrics	57	62	119
Pediatrics (surgery &nephrology)	2	20	22
Pediatric oncology	6	30	36
Oncology/Hematology/ Renal transplant unit	22	98	120
Gastroenterology /Liver transplant unit	249	633	882
Cardiology	148	142	290
Multi specialty services	85	14	99
Short stay	6	18	24
Long term	0	0	0
Medicine (female)	36	94	130
Medicine (male)	63	111	174
Pre admission	0	107	107
NICU	57	13	70
ICU2	219	211	430
Burn Unit	31	99	130
CCU	454	190	644
PICU	183	68	251
Liver ICU	0	0	0
ICU	0	0	0
Chemo Clinics	0	89	89
Total (Doses)	1621	2123	3744

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Table 3. Difference In Albumin Utilization Before And After Guidelines Implementation

	1999	**2000**		**1999**	**2000**		**1999**	**2000**	
Name/Specialty of the ward	Albumin 5%	Albumin 5%	Difference	Albumin 20%	Albumin 20%	Difference	Total	Total	Difference
Ob/Gyn Oncology	3	0	-3	18	0	-18	21	0	-21
Surgery (female)	9	3	-6	85	50	-35	94	53	-41
Surgery (male)	16	0	-16	118	74	-44	134	74	-60
General Pediatrics	27	57	30	32	62	30	59	119	60
Pediatrics (surgery &nephrology)	0	2	2	29	20	-9	29	22	-7
Pediatrics oncology	4	6	2	59	30	-29	63	36	-27
Oncology/ Hematology Renal transplant unit	22	22	0	187	98	-89	209	120	-89
Gastroenterology Liver transplant unit	317	249	-68	743	633	-110	1060	882	-178
Cardiology	145	148	3	173	142	-31	318	290	-28
Multi Specialty services	43	85	42	96	14	-82	139	99	-40
Short stay	0	6	6	18	18	0	18	24	6
Long term	4	0	-4	0	0	0	4	0	-4
Medicine (female)	48	36	-12	133	94	-39	181	130	-51
Medicine (male)	86	63	-23	72	111	39	158	174	16
Pre admission	28	0	-28	106	107	1	134	107	-27
NICU	52	57	5	82	13	-69	134	70	-64
ICU2	144	219	75	278	211	-67	422	430	8
Burn Unit	59	31	-28	278	99	-179	337	130	-207
CCU	66	454	388	159	190	31	225	644	419
PICU	166	183	17	130	68	-62	296	251	-45
Liver ICU	40	0	-40	45	0	-45	85	0	-85
ICU	3	0	-3	0	0	0	3	0	-3
Chemo Clinics	14	0	-14	5	89	84	19	89	70
Total (Doses)	**1296**	**1621**	**325**	**2846**	**2123**	**-723**	**4142**	**3744**	**-398**

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PICU= Pediatrics Intensive Care Unit

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