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Albumin Utilization in a Teaching Hospital in Tehran: Time to Revise the Prescribing Strategies

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ABSTRACT

Background: Since albumin imposes a relatively high cost to a healthcare system, drug use evaluation for this drug is much more important. This study wants to evaluate pattern of albumin use in a large university affiliated hospital in Tehran, Iran.

Methods: A concurrent, cross-sectional study was performed in "Shaheed Rajaei" Cardiovascular, Medical and Research Center. All inpatient adults that were prescribed albumin during the study period were evaluated to register the indications for albumin usage according to the evidence-based guidelines.

Results: Only for five patients (4%) the albumin prescriptions were justifiable. Of these cases, intractable edema was the leading cause of albumin misuse (73 patients; 60.8%). The total 1468 vials of Albumin were prescribed for 120 patients during the study period. The most common reasons to prescribe albumin were acute normovolemic (34%), cardiac failure (0.83%), resistance edema with Albumin>2g/dL (61%), nephrotic syndrome (0.83%), plasmapheresis (1.67%), ascetic (1.67%).

Conclusion: These data, together with previous national studies highly suggest a mandatory need for educational measures for practicing physicians along with strict regulations for prescription strategies regarding expensive drugs such as albumin.

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Introduction

Recently, the increased drug expenditures have become significant issue in managing health care systems. Indeed, financing of health care is based on a fee-for-service system and hence cost control strategies play an important role in rational usage of drugs. This control should be greater on expensive drugs (1, 2).

To achieve this goal, drug use evaluation (DUE) should be considered in any healthcare system to ensure appropriate and proficient drug use (3, 4). This evaluation means tight regulation of drug prescription regarding correct indications, continuous monitoring of the patient during treatment and possibilities for cessation of a certain treatment. These successive checkpoints in

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Table 2. Patients' demographics and underlying diseases of the study participants.

Variable (N=120)	Results*
Age, years	57.5±16.5 (14.0-90.0)
Admission ward	
Intensive care unit	77 (46.2)
Cardiovascular care unit	38 (31.7)
Other wards	5 (4.2)
Underlying disease	
Decompensate CHF	49 (40.8)
Admission during the course of CABG	19 (15.8)
Admission during the course of MVR	18 (15.0)
Other etiologies	28 (23.3)
Number of used albumin vials	12.3±13.9 (1-68)
Concurrent use of furosemide	75 (62.5)
Lab values	
Serum albumin	3.5±0.4 (2.2-4.5)
Total protein	6.3±0.9 (3.7-8.3)
Serum creatinine	1.4±0.8 (0.6-4.1)
Hematocrit	32.5±7.1 (22.0-53.0)
AST	94.4±157.2 (10-785)
ALT	69.1±153.8 (7-791)
ALP	305.6±153.4 (85-568)

CHF:Congestive Heart Failure; CABG:Coronary Artery Bypass Graft; MVR: Mitral Valve Replacement; ALT: Alanine transaminase; AST: Aspartate transaminase; ALP: Alkaline phosphatase
*Mean±SD (range) for continues variables; Frequency (%) for nominal variables.

is while in the majority of these 74 patients (42 patients; 57.5%), no albumin measurement had been carried out. In all remaining cases (32 patients; 42.5%), serum albumin level showed to be above the cutoff (i.e. >2g/L).

Moreover, for 40 patients (34.2%), the reported indication was filed as correction of acute hypovolemia which also could be categorized as an incorrect indication. These data are summarized in figure 1.

Discussion

Our findings in the current study underscore the importance of drug utilization review in prescribing of albumin. Indeed majority of the cases received albumin in an inappropriate setting. High costs of albumin in our country, as stated by official authorities (9), signify importance of the issue. Although the same results were consistently reported for the misuse of albumin (10,11) but our study had two intriguing differences. First, with the aid of a concomitant registration, rather than a widely used conventional retrospective design, we were able to minimize the confounding nature of recall bias. Moreover, simultaneous open discussion with the practicing physician helped us to fully understand his/her underlying justification for drug prescription. The cross-sectional recruitment of data also helped us to follow the course of therapy and monitor possible changes in motives for albumin prescriptions. Our study also focused in a hospital with a large load of patients requiring cardiovascular interventions. A prospective study conducted by Jahangard and colleagues in a large teaching hospital affiliated by Tehran University of Medical Sciences (Shariati Hospital) has shown that most prevalent inappropriate use of albumin is seen in patients after variety of cardiac surgeries (9). Our results in the current study not only confirm the previous results but also show that the ratio of inappropriate utilization of albumin would be much larger in a tertiary cardiovascular setting. This ratio reached 95% in our cases, whereas the reported ratio for other studies never reached this level (9-11).

There has been widespread debate over correct indications of albumin use. Although many guidelines are available for the use of albumin, but two major problems were faced in our study. To the best of our knowledge, there are no national evidenced-based guidelines that clearly state proper indications of albumin use in Iran. Moreover, most of the present guidelines from Europe and United States do not provide "clear" indications (12-14). Indeed defining a precise clinical setting in which albumin use is justifiable is not that straightforward. However, in this study, after reviewing a variety of current guidelines, we came up to an evidenced-based guideline (7). The possible inconsistencies between the studies when providing appropriate indications could be minimized considering the level of recommendation in evidence-based guidelines.

In our study, we found that 95% of albumin usage was inappropriate. This result is in line with majority of published data. The rate of inappropriate albumin use varies among studies. In a study conducted in Southeast Asia, as much as 35.6% of prescription showed to be incorrect (10). Of these patients, edema, anemia and indications related to management of patients after CABG were among most frequent inappropriate prescriptions. Some other studies reported the misuse ratio to be much higher. A multicenter study conducted in Spain showed that only 8.1% of prescriptions (corresponding to 9.8% of all used vials) were in accordance with accepted indications (11). In that study, use of albumin as the first line (before any other crystalloid or colloid solutions) for correction of volume depletion was the major cause of inappropriate prescription (as much as 30.9%). This data is comparable to our results. As stated in our findings, most of incorrect use of albumin was encountered in correction of hypovolemia after cardiac surgery. Indeed rushing into albumin before a full trial of conventional

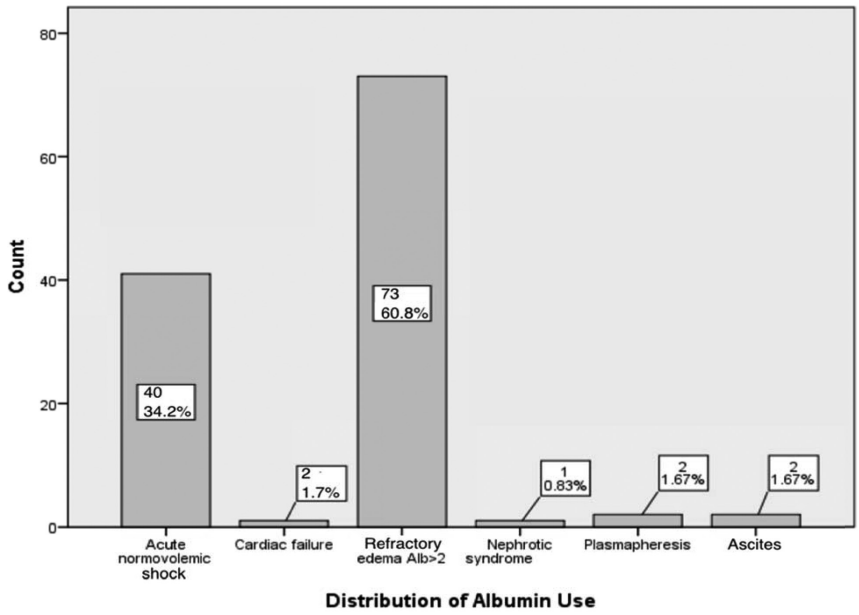

Figure 1. Graphical representation of appropriate and inappropriate prescription of albumin.

crystalloid solutions is one of the major pitfalls in albumin prescription.

Our study also showed that in most cases, no correct estimate of patients' albumin level was available before initiation of albumin injections. A threshold value of 2.0 g/dL for definition of hypoalbuminemia is a well-accepted cutoff (14), although few studies suggest a more rigid cutoff (15). Considering either cutoff as the starting point for prescription of albumin, we showed that in more than 60% of our patients, no albumin measurement was ordered.

Most of the authorities including Belgian consensus conference on albumin use suggest that when hypovolemia or shock is suspected, human albumin should only be used after an abundant amount of synthetic colloids is infused (12-16).

In conclusion, our study could be summarized in two major findings. Inappropriate human albumin use, despite its high cost, is fairly common. The misuse is more prominent when including patients of the study suffers from cardiovascular compromises. Secondly, we showed that although albumin prescription might fall into appropriate use when a laboratory diagnosis hypoalbuminemia is established, but most of the prescriptions were ordered before any confirmatory tests that show serum albumin levels were conducted. These data, together with previous national studies highly suggest a mandatory need for educational measures for practicing physicians along with strict regulations for prescription strategies regarding expensive drugs such as albumin. Thus far it is well established that educational interventions may help improvement in adherence of physicians for albumin prescription (15).

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