OBJECTIVES

To perform cost-minimization analysis of the newly available medicines sevelamer carbonate (SC) and lanthanum carbonate (LC), for the treatment of hyperphosphatemia in CKD patients not on dialysis (CKD-ND) in Bulgaria.

BACKGROUND

Hyperphosphatemia or elevated phosphorus in the blood is prevalent in patients with chronic kidney disease - mineral and bone disorder (CKD-MBD) and independently and significantly contributes to morbidity and mortality [1,2,3,4]. Early and aggressive management of mineral imbalance, especially phosphorus, is a priority for patients with CKD and can achieve significant savings to the Health Authorities due to the prevention of hospitalizations stemming from the cardiac, vascular events, mortality, risk of starting dialysis and transplantation [25,6,7]. The main goal of phosphorus management is to maintain levels within the normal range for CKD patients who are not on dialysis (CKD-ND) [1].

Phosphate binders are an essential component of managing hyperphosphatemia. For part of the CKD risk of starting dialysis and transplantation [2,5,6,7]. The main goal of phosphorus management is to allocate the eligible patients of the two treatment options SC and LC i.e. 100:0, 50:50 and 0:100 and 2354,25€ respectively. It is necessary to remark that considering the fact that the eligible patients are costs per patient/per year with SC and LC were 1441,75€ and 1569,50€ respectively at the 4000 mg SC unit cost used (tablet) were 800 mg of SC = 0,79 € and 1000 mg of LC = 2,15 €. The estimated treatment within the assumed above patients allocations and the total costs incurred from NHIF with the expected recently published survey [15].

The results of the one-way sensitivity analysis (SA, discounted) clearly shown that the major cost drivers in the treatment of hyperphosphatemia in CKD-ND patients in Bulgaria are the unit costs of SC and LC. In the figures 3 and 4 below are summarized the results of SA using Tornado diagrams within the preferred 4000 mg SC vs. 2000 mg LC dose regimens.

Table 3. Costs incurred from NHIF for the four years period, under the assumed patients allocation within the 4000 mg SC vs. 2000 mg LC drug regimens, with respect to expected savings.

Table 2. Costs incurred from NHIF for 4 years period, under the assumed patients allocation within the 4000 mg SC vs. 2000 mg LC drug regimens, with expected cost savings.

RESULTS

There were identified two trials assessing the efficacy and safety of SC and LC in CKD-ND patients [9,10] and one trial where sevelamer hydrochloride/SH was directly compared with LC in a head-to-head study in dialyzed patients [11]. Both SH and LC were proven as effective in controlling serum phosphorus within CKD-ND patients, tolerability and AE's profile were similar, event's predominately from GI origin and mild to moderate severity. In the head-to-head study, both SH and LC reduced serum phosphorus in hemodialysis patients, however, at the end of treatment LC had reduced serum phosphorus by 1.7 ± 0.1 mg/dl, compared with 1.4 ± 0.1 mg/dl for SH, but the difference was not statistically significant in the primary analysis (p = 0.113) [11]. Safety and tolerability of both phosphate binders were considered similar. From the results of the head-to-head clinical trials of SC and SH [12,13], we can assume that both are equivalent due to the same active moiety, proven equivalence concerning efficacy and the similar safety profile. The above studies allow for an indirect comparison of two studies with SH being the common arm for the indirect comparison of SC and LC. In this indirect comparison SC and LC provide similar efficacy on the control of phosphate binders in CKD-ND patients, justifying a CMA analysis.

According to the approved label in Bulgaria and using the equipotential dose ratio of 2.11 [8], it was assumed that meaningful clinical outcomes will be achieved with the following weighted average dose regimens – 4000 mg of SC vs. 2000 mg of LC and respectively 6400 mg of SC vs. 3000 mg of LC. The unit cost used (tablet) were 800 mg of SC = 0.79 € and 1000 mg of LC = 2.16 €. The estimated treatment per patient/year with SC and LC were 1441,75€ and 1599,50€ respectively at the 4000 mg SC vs. 2000 mg LC weighted average doses, while within the 6400 mg SC vs. 3000 mg LC were 2306,80€ and 2696,43€ respectively. It is necessary to remark that considering the fact that the eligible patients are in stage 3-4 of OKD, the majority are on low protein diet and with phosphorus levels close to the recommended ones, so the most suitable and preferred weighted dose regimens are seems to be 4000 mg SC vs. 2000 mg LC.

In order to forecast the HA budget impact, there were explored several scenarios considering the allocation of the eligible patients of the two treatment options SC and LC i.e. 100, 50.50 and 100 within the weighted average dose regimens. The results of eligible patients for treatment with SC and LC in Bulgaria are presented in Table 1. Overall population and the growth rates were taken from the officially published results from the last census (2011) located on the internet site of Bulgaria National Statistical Institute (NSI) [14]. Data for the prevalence of CKD patients in Bulgaria were taken from the recently published survey [15].

Table 1. Overall population, prevalence of OKD, eligible patients and the number of patients included in the analysis.

Table 2 represent the cost estimates concerning the preferable dose regimens of 4000 SC vs. 2000 LC within the assumed above patients allocations and the total costs incurred from NHIF with the expected cost savings. Those cost estimates are based on the assumption that the patients are using the drug 365 days per year with 100% treatment compliance. Depending of the patient allocation the expected cost saving to NHIF can reach as much as 4 314 941 (€ 3 749 944 discounted at 3.5%) when SC have 100% allocation of patients vs. such of SC 50% ; LC 50% and 2 881 513 (€ 2 696 431 discounted at 3.5%) when SC have 100% allocation of patients vs. 100% allocation to LC.

CONCLUSION

The equal efficacy, similar AE’s profile and lower cost of sevelamer carbonate than lanthanum carbonate when used for treatment of hyperphosphatemia in patients with CKD-ND in Bulgaria should make sevelamer carbonate a preferred alternative.

REFERENCES

1. **Prevalence of CKD stage 3-4**
2. Sanofi, Sofia, Bulgaria, *Medical University Sofia, Faculty of Pharmacy, Sofia, Bulgaria*