Abstract
Background: The elderly population is particularly at risk for developing vitamin B12 deficiency. Serum cobalamin does not necessarily reflect a normal B12 status. The determination of methylmalonic acid is not available in all laboratories. Issues of sensitivity for holotranscobalamin and the low specificity of total homocysteine limit their utility. The aim of the present study is to establish a diagnostic algorithm by using a combination of these markers in place of a single measurement. Methods: We compared the diagnostic efficiency of these markers for detection of vitamin B12 deficiency in a population (n = 218) of institutionalized elderly (median age 80 years). Biochemical, haematological and morphological data were used to categorize people with or without vitamin B12 deficiency. Results: In receiver operating curves characteristics for detection on vitamin B12 deficiency using single measurements, serum folate has the greatest area under the curve (0.87) and homocysteine the lowest (0.67). The best specificity was observed for erythrocyte folate and methylmalonic acid (100% for both) but their sensitivity was very low (17% and 53%, respectively). The highest sensitivity was observed for homocysteine (81%) and serum folate (74%). When we combined these markers, starting with serum and erythrocyte folate, followed by holotranscobalamin and ending by methylmalonic acid measurements, the overall sensitivity and specificity of the algorithm were 100% and 90%, respectively. Conclusion: The proposed algorithm, which combines erythrocyte folate, serum folate, holotranscobalamin and methylmalonic acid, but eliminate B12 and tHcy measurements, is a useful alternative for vitamin B12 deficiency screening in an elderly institutionalized cohort.

Keywords
Key words, Elderly, B12 deficiency, Diagnostic accuracy, Biomarkers, Algorithms.