Preliminary cost-effectiveness of vitamin D3 supplementation in older adults with vitamin D deficiency (defined by serum 25-hydroxyvitamin D) in Ireland

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Vitamin D deficiency is particularly high amongst older Irish adults[1]. Clinical vitamin D deficiency (serum 25-hydroxyvitamin D (25(OH)D) concentration below <30 nmol/L) increases the risk of excess mortality and disease[2]. Vitamin D3 supplementation is likely to be most beneficial in deficiency[2]. This study investigated the cost-effectiveness of vitamin D3 supplementation in older adults in Ireland, with year-round vitamin D deficiency (25(OH)D concentration <30 nmol/L) (13% of adults1), from the perspective of the Health Service Executive (HSE).

The methodology[3] uses Irish Life Table No. 17 (from Central Statistics Office (CSO)), together with invasive cancer deaths in 2015 from the National Cancer Registry of Ireland (NCRI), and the number of bone fractures in Ireland (2014) and associated hospitalisation costs[4]. Three age groups were investigated: (1) ≥50 years, (2) ≥60 years, (3) ≥70 years. Based on the clinical literature, vitamin D3 supplementation may (1) decrease all-cause mortality by 7%[5], of which 4.2% (of the 7%) is a reduction in cancer mortality, and (2) reduction in hip fractures by 16% (and related excess mortality)[6], and non-hip fractures by approx. 20%[7,8]. A discount rate of 5% was applied to life expectancy. EQ-5D index population norms for the UK[9] were used for age-related utility values. Average UK end of life cancer costs[10] were applied to Irish invasive cancer deaths, using the method of purchasing power parity, with inflation of costs to €(2020) values. Other healthcare costs included: serum 25(OH)D measurement; the average cost of a GP visit per patient; drug acquisition costs of vitamin D3. Vitamin D deficiency was assumed to be treated with vitamin D3 4,000 IU daily for up to 10 weeks, followed by 800 IU daily thereafter, and to be GP initiated and monitored.

It is estimated that such a public health primary prevention programme in adults ≥50 years of age would have a net annual cost to the HSE of €27.3 million, and produce approx. 1,600 QALYs gained, for a cost/QALY of approx. €17,000. The corresponding costs and outcomes for adults ≥60 years of age, would be approx. €15.3 million, 1,400 QALYs gained, with a cost/QALY of €11,000. For adults ≥70 years of age, these costs and outcomes would be approx. €6.2 million, 1,000 QALYs gained, with a cost/QALY of €6,200.

The cost/QALY estimates in all three age groups are below the usually acceptable cost-effectiveness threshold of €20,000/QALY. The most cost-effective and least costly intervention was in adults ≥70 years of age. The results are most sensitive to the risk reductions following vitamin D3 supplementation. Further work is needed to determine the probabilities of cost-effectiveness at €20,000/QALY. A pilot research study should be considered to determine whether the model predicted clinical and healthcare resource-use outcomes are realised in clinically vitamin D deficient populations.

References

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