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How much does it cost to implement a community-based walking football programme for patients with type 2 diabetes?

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ABSTRACT

Objectives The current study analysed the implementation costs of a community-based walking football exercise programme for patients with type 2 diabetes.

Methods The direct costs of a community-based walking football programme for middle-aged and older male patients with type 2 diabetes, designed and tested in Porto (Portugal), were calculated from the payer's perspective. One season of this programme consists of three sessions per week (60 min per session) for nine months (October to June). Cost calculations were based on two groups of 20 patients and included the sports infrastructure and equipment, human resources, pre-exercise clinical evaluation, medical equipment, technical training and other consumable costs. An economic depreciation of 1 year using the linear method for sports and electronic materials was considered. Cost analysis dated December 2021 and is expressed in international dollars ($).

Results This programme was estimated to have a total implementation cost of $22 923.07; $2547.01/month; $573.08/patient; $106.13/session; $63.68/patient/month and $5.31/patient/session.

Conclusion A community-based walking football programme for patients with type 2 diabetes is affordable and can be scaled up by local communities to promote physical activity and manage type 2 diabetes with the involvement of multiple stakeholders such as the football clubs, municipalities and primary healthcare units.

WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ Physical activity is a first-line strategy for type 2 diabetes management.
⇒ Costs of physical inactivity in patients with type 2 diabetes represent an extensive burden to the healthcare system and society.
⇒ Cost analysis of physical activity interventions is essential for optimising financial resources and supports the elaboration of public policies.

WHAT THIS STUDY ADDS

⇒ Cost analysis is focused on the direct implementation costs of one season from the payer (host institution(s))'s perspective.
⇒ The cost of a walking football programme for patients with type 2 diabetes is competitive with other physical activity programmes available in the community.
⇒ Policymakers may scale up walking football to support type 2 diabetes management.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ This study provides a ground for policymakers to decide about the existing physical activity interventions.
⇒ This study supports the development of public policies that stimulate the elaboration and implementation of physical activity programmes.

INTRODUCTION

The important role regular physical activity plays in preventing and managing non-communicable diseases is recognised and emphasised by health authorities around the world.[1–6] In 2016, it was estimated that almost 28% of the adult population worldwide did not meet the recommended 150 weekly minutes of moderate-intensity physical activity.[2]

Globally, physical inactivity was estimated to be responsible for 6% to 10% of the disease burden associated with major non-communicable diseases, including coronary heart disease, breast and colon cancers and type 2 diabetes (T2D).[7] Physical inactivity costed the global healthcare system at least $53.8 billion in 2013, with most of the costs attributable to T2D ($37.6 billion).[8] T2D is one of the most prevalent non-communicable diseases globally.[5] In 2021, 537 million and 9.8% of the world's population lived with T2D. Physical activity is a first-line strategy for T2D prevention and management through improved glycaemic control and quality of life,[5] reduced risk of cardiovascular events and overall mortality.[9 10] Unfortunately,

despite the established evidence, most patients with T2D continue to be physically inactive compared with their counterparts without T2D (2291.63 metabolic equivalents (MET) vs 3734.11 MET, p<0.001),[11] which incurs extensive burden on the healthcare system and society.[12]

Economic analyses of physical activity interventions are essential in informing prioritisation and decision-making in the current policy environment with finite resources and competing priorities.[13 14] Economic evaluations of physical activity interventions have yet to be conducted among people living with T2D.[15–24] Of the existing studies, cost analysis is particularly lacking, and such information would be essential for optimising financial resources and supporting the elaboration of public policies.

The current study aimed to analyse the implementation costs of a community-based walking football programme for patients with T2D. We focus on the direct costs from the payer's perspective.

MATERIALS AND METHODS

Patient and public involvement

Not involved.

Study design

Within a clinical trial (ClinicalTrials.gov, reference number NCT03810846), we calculated the implementation costs of a community-based walking football programme for middle-aged and older male patients with T2D, ran in Porto (Portugal).[25]

In 2021, Portugal had 10 299.423 inhabitants, a human capital index of 0.8 (2020), a Gross Domestic Product (GDP) of $249.89 billion and a GDP per capita of $24,262.2.[26]

Exercise programme and procedures

Walking football was found to have high levels of adherence (median (P25–P75) adherence of 86.1% (77.8–97.2%)) and enjoyment (median (P25–P75) of 5 (4–5))[25] and be safe.[25] Available studies on walking football revealed light-to-vigorous exercise intensity and effectiveness in health outcomes, such as body mass index and blood pressure.[25 27]

Walking football has the following rules: no running with or without the ball; no physical contact, including slide tackles; the ball must always be played below the players' average waist height.[28]

The exercise programme consists of two groups of 20 players, training at different time schedules. Each group participates in 60 min walking football sessions three times per week (Mondays, Wednesdays and Fridays) for 9 months (October to June; 216 sessions), implemented in a sports complex with indoor or outdoor football fields.

Sessions are conducted by a UEFA-certified soccer coach and supervised by a nurse and include a warm-up, strength and conditioning exercises, technical skills drills, small-sided and conditioned walking football games, and a cool-down period.

In case of symptoms during or after the session, participants are subjected to capillary blood glucose, blood pressure evaluations and foot observation. At the end of the session, participants classify the perceived exercise intensity and the level of enjoyment. A detailed explanation of these procedures is described in a previous publication.[25]

Cost analysis

The cost analysis is dated December 2021 and reflects the direct implementation costs of one season (time horizon: 9 months, from October to June) from the payer's (host institution(s))'s perspective.

The calculation of costs considered the following parameters:

- Sports infrastructure rental: a local sports facility for football practice was estimated to be 216 hours, based on two groups training 60 min per session three times a week.
- Human resources: two personnel, a football coach and a nurse, were included in the calculation. For each one, we considered a monthly gross salary of $2127.25 based on the 2021 Portuguese Public Administration Remuneration System (remuneration level 15 of the single remuneration table)[29] for 14 months (vacation and Christmas salaries included), national insurance contributions (*Segurança Social*) paid by the employer (23.75% of the gross salary), the daily meal allowance ($8.35 per day), an average of 248 working days per year and 7 working hours per day. Then, we calculated the cost for 75 min per session for each professional (60 min of walking football session plus 15 min of logistics) for 216 sessions.
- Sports equipment: 20 football balls, ten cones 30 cm, one kit of 50 markers, one kit of 4 sticks and 10 sports bibs were included in the costs.
- Pre-exercise clinical evaluation: treadmill cardiac stress tests for 40 participants.
- Medical equipment: vital signs monitoring equipment (digital blood pressure and blood glucose monitors); other disposable medical materials (gloves, compresses, hand sanitiser).
- Technical training: a total of 8 hours is needed for the football coach's technical training and the nurse's procedures.
- Sports practice insurance for 40 participants.
- Other consumables: alkaline batteries, paper sheets, and pens.

Data analysis

The analysis includes the programme's delivery costs (the sum of all costs with a depreciation of one year using the linear method for the sports materials and electronic equipment (digital sphygmomanometer and blood glucose monitor)); costs per month (implementation costs divided by the nine months); costs per patient (implementation costs divided by 40 participants); costs per session (implementation costs divided by the total of

sessions (n=216) for the nine months); costs per patient per month (implementation costs divided by 40 patients and by the nine month); costs per patient per session (costs per patient divided by a total of 108 sessions).

Costs were initially calculated in euros (€, Portuguese coin) and then converted to purchasing power parity international dollars ($) using conversion factors provided by the World Bank in 2021.[30]

RESULTS

The estimated costs of implementing a community-based walking football programme for 40 patients with T2D for nine months (n=216 sessions) are represented in table 1.

The programme implementation (with a 1-year economic depreciation) was estimated to be $22 923.07, which amounts to $2547.01 per month; $573.08 per

Table 1 Estimated cost of an implementation programme for nine months (n=40 participants)

		Cost/unit		Depreciation (1 year)		Cost	
Equipment/ service	Units	Euro (€)	International dollar ($)	Euro (€)	International dollar ($)	Euro (€)	International dollar ($)
Sports infrastructure							
Sports facility (hours)	216	15.00 €	$26.24			3240.00 €	$5668.34
Human resources							
Football coach (hours)	270	12.82 €	$22.42			3460.38 €	$6053.89
Nurse (hours)	270	12.82 €	$22.42			3460.38 €	$6053.89
Sports equipment							
Balls	20	11.00 €	$19.24	44.00 €	$76.98	44.00 €	$76.98
Cones 30 cm	10	2.65 €	$4.64	5.30 €	$9.27	5.30 €	$9.27
Kit 50 markers	1	39.00 €	$68.23	7.80 €	$13.65	7.80 €	$13.65
Kit 2 vertical sticks	2	26.20 €	$45.84	10.48 €	$18.33	10.48 €	$18.33
Sport bibs	20	2.50 €	$4.37	10.00 €	$17.49	10.00 €	$17.49
Pre-exercise clinical evaluation							
Cardiac stress test	40	35.00 €	$61.23			1400.00 €	$2449.28
Medical equipment							
Digital blood pressure monitor	1	40.00 €	$69.98	8.00 €	$14.00	8.00 €	$14.00
Digital blood glucose monitor	1	25.00 €	$43.74	5.00 €	$8.75	5.00 €	$8.75
Blood glucose test strips	500	0.50 €	$0.88			250.10 €	$437.55
Lancet capillary puncture	500	0.079 €	$0.14			39.30 €	$68.75
Other medical materials	1	50.00 €	$87.47			50.00 €	87.47
Technical training							
Staff technical training (hours)	8	40.00 €	$69.98			320.00 €	$559.84
Insurance							
Sports practice insurance	40	19.62 €	$34.32			784.80 €	$1373.00
Other consumables							
Alkaline batteries, paper sheets and pens	12	0.60 €	$1.05			7.20 €	$12.60
Total						13 102.74 €	$22 923.07
Total/month						1455.86 €	$2547.01
Total/patient						327.57 €	$573.08
Total/session						60.66 €	$106.13
Total/patient/month						36.40 €	$63.68
Total/patient/session						3.03 €	$5.31

patient; $106.13 per session; $63.68 per patient per month; and $5.31 per patient per session.

Without attending to the economic depreciation, this programme was estimated to have an initial investment of $23 556.94; $2617.44 per month; $588.92 per patient; $109.06 per session; $65.44 per patient per month; and $5.45 per patient per session.

DISCUSSION

This study demonstrated that a community-based walking football programme has affordable costs, considering the present socioeconomic context of the country and similar interventions in this area. This might facilitate its implementation in the community setting and be used as a tool for T2D control.

Given their well-known health benefits, interventions to increase physical activity levels across the lifespan are recommended as a public health service. However, the available evidence regarding the cost-effectiveness of physical activity interventions is limited and restricted to a short time frames, which cannot inform about their sustainability.[31]

Although with the current data, we cannot assume the cost-effectiveness of this intervention, the literature has consistently shown the cost-effectiveness of physical activity interventions, especially in the context of primary care and the community. Examples include walking, exercise groups, or brief exercise counselling delivered in person.[32]

A previous systematic review regarding the economic evaluation of physical activity interventions for T2D management found that the evidence is limited and very heterogeneous.[24] However, these interventions report some economic benefits compared with the usual care, that is, are cost saving, cost effective or have cost-utility, which is encouraging for upcoming studies.[15–17 19–24]

In Portugal, a similar 9-month exercise programme for patients with T2D (*Diabetes em Movimento*) was implemented nationally and reported implementation costs in 2016.[21] To understand to which extent the community-based walking football programme could be compared with *Diabetes em Movimento* in the Portuguese context, we updated the latter's costs using the most recent annual consumer prices inflation indicators from the World Bank[33] (online supplemental appendix A). Costs are similar, although walking football still costs more per patient. The difference in the expenses of walking football is mainly due to the pre-exercise cardiac stress tests. Hence, walking football programme may have the potential to be scaled up and be competitive with the existing community exercise programmes.

In studies from other contexts (Europe, America, Asia and Oceania continents) and perspectives (healthcare, societal, payer)—which presented the cost of exercise programmes for patients with T2D, it was found that an intervention with a lower cost ($274.21) per participant.[24] From the payer's perspective, the intervention was based on a pedometer walking programme. The intervention group had a statistically significant incremental rate of 919 steps, compared with an increment of 393 in the control group. A decrease in costs in all categories (physician, outpatient and inpatient costs) was observed in the intervention group, compared with the control group, with a difference in total costs between groups of $82.26 per participant.

Other studies from this systematic review described costs above this programme.[24] The interventions and outcomes varied; some of these studies reported cost-effectiveness.[24]

Physical inactivity was estimated to cost $53.8 billion globally, and T2D to cost $37.6 billion to the healthcare system in 2013.[8] Physical inactivity contributed to at least $13.7 billion in productivity losses and 13.4 million disability-adjusted life-years worldwide.[8]

Becoming physically active would be reflected in reducing working-age mortality and morbidity and increasing productivity and life satisfaction, contributing to considerable economic gains.[31] For example, Portugal loses over 7.6 million working days to absenteeism and presenteeism yearly from insufficiently active workers.[34] When looking at healthcare savings and increased productivity, each person who becomes physically active has an annual economic benefit of $1165.[34] This estimate may be even higher among those with chronic conditions as poorly managed chronic diseases, such as T2D, are costly to the healthcare system and the economy.

A previous scientific study on walking football for patients with T2D[25] showed benefits at three levels: (1) at the individual level, the programme improved individuals' health (eg, body fat, acute effects on blood glucose and blood pressure); was perceived as being safe (considering the low rate of injuries that occurred) and fun; moreover, participants developed their skills in walking football, which can, in turn, increase the likelihood of lifelong engagement in physical activity; (2) at the interpersonal level, participants experienced support from the family, the research team and healthcare providers; they also realised that the programme was an opportunity to socialise; (3) at the institutional level, through walking football, we developed partnerships across institutions from multiple sectors, such as health, sports, education and social care, which were fundamental to implementing and scaling up the programme.

The development of environments, policies and interventions that address the determinants of physical activity at various levels is essential to increasing opportunities for physical activity within communities.[35 36]

Strengths and limitations

Most physical activity interventions do not report the costs of implementation and maintenance. To our knowledge, this is the first study describing the costs of a community-based walking football programme. We found that the cost of a walking football programme is competitive compared to other available community programmes. The main limitation inherent to this study is that it only

calculates the direct costs of the intervention's implementation. In future studies, other indirect costs, such as the participants' transportation and sports equipment costs (eg, football boots), should be considered. Nevertheless, this study already provides a ground for policymakers taking decisions about the existing interventions and build up an economic evidence base around them.

The payer perspective of analysis assists decision-makers in making informed decisions about which interventions to fund and how to allocate resources. This perspective is also useful for assessing the financial impact of an intervention on the payer, helping decision-makers identify interventions that provide good value for money and that can be funded within the available budget, and ensuring that funding decisions are consistent with payer interests and that resources are used most efficiently and effectively possible.

Future studies on physical activity interventions in patients with T2D, such as walking football, can use a framework to prospectively collect implementation costs and improve economic evaluations of public health interventions,[37] therefore supporting the development of public policies that stimulate the elaboration and implementation of physical activity programmes.

CONCLUSION

From the payer's perspective, the implementation costs of the community-based walking football programme for patients with T2D were $573.08 per patient. This cost is affordable compared with similar interventions implemented at the community level. This evidence can guide policy decisions to allocate resources and scale-up this intervention, to support T2D management.

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