Maximising Health Outcomes in Type 2 Diabetes

Programme Budgeting & Marginal Analysis (PBMA) for type 2 diabetes services in Cardiff & Vale University Health Board

PBMA Recommendations and Feedback on process

November 2024

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Foreword

At a time when the NHS and social care face enormous challenges there is a need for collegiate, transparent and evidence-based decision-making about the use of limited resources to protect and promote the health of the population. Cardiff and Vale University Health Board have set out an ambition to move resources upstream towards the prevention of avoidable ill health, disability and premature death. One of the largest challenges facing the health of the local population is the increasing prevalence of Type 2 diabetes (T2D). With T2D comes increased risk of heart disease, stroke, and many other comorbidities. Due largely to obesity trends in the population, people are developing T2D at a younger age.

At the Centre for Health Economics and Medicines Evaluation (CHEME) at Bangor University, the Public Health and Prevention Economics Research Group (PHERG), has a track record in supporting health boards in the application of programme budgeting and marginal analysis (PBMA) as a resource allocation and prioritisation framework. This report presents the findings of the PBMA exercise we undertook with Cardiff and Vale University Health Board during 2024. We report on both the outcomes which underpin recommendations by the PBMA panel and the process of undertaking the PBMA exercise. Finally, we report on feedback from the panel members. PBMA is not a new idea. It has been around for over 40 years. In Wales, we have demonstrated its successful use over the years, most recently in the Cardiff and Vale University Health Board. We hope that this report is useful to those considering undertaking a PBMA exercise in the future.

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Maximising Health Outcomes in Type 2 Diabetes

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Executive Summary

This report details the findings of a Programme Budgeting and Marginal Analysis (PBMA) exercise conducted by Cardiff and Vale University Health Board (CaVUHB) in conjunction with the Centre for Health Economics and Medicines Evaluation (CHEME). The purpose of this exercise was to improve resource allocation for Type 2 Diabetes (T2D) with an emphasis on a preventative shift at a system level.

The PBMA aimed to identify high-value interventions for investment to improve patient outcomes and promote cost-effective resource use in the short and long term. A project steering group and a panel of 17 diabetes experts, service providers, patient representatives and third sector representatives was formed. The terms of reference detailing the number of people involved and their responsibilities and the plan of the PBMA process is included in *Appendix 1*. The panel reviewed various services within the T2D care pathways which were presented in the steering group's background document. On the basis of this background document and their own experience, the panel identified six diabetes programmes for evaluation. Through interviews and an evidence review, the steering group presented the panel with six evidence-based options for future investment. Three rounds of voting were conducted to prioritise these options based on criteria agreed by the panel. The criteria used to evaluate the six evidence-based options included: clinical and cost-effectiveness; reducing health inequalities; user acceptability and patient-centeredness; accessibility and patient empowerment.

The first vote showed equal votes for two candidates: Additional Community Diabetes Specialist Nurses to conduct medication reviews and Extension of the All-Wales Diabetes Prevention Programme to all GP clusters. The second round of voting allowed participants to allocate percentage of 100% of funding to each programme and shows a slight nuance. The voting in Meeting 3 indicated the following funding priorities for CaVUHB:

1. **Additional Community DSNs to conduct medication reviews (23%)**
2. **Extension of the All-Wales Diabetes Prevention Programme to all GP clusters (20%)**
3. **Additional DSNs diabetes specialist nurses in perioperative care (17%)**
4. **Additional clinical space for the Community Diabetes Hub (15%)**
5. **T2D structured education for the Children and Young population (14%)**
6. **Additional exercise professionals for a prediabetes pathway within the National Exercise Referral Scheme for Cardiff and Vale University Health Board (12%)**

Overall, the panel members rated the PBMA process positively in terms of helpfulness, engagement, and recommending it for future use. Suggestions for improvement included more time for panel members to review the evidence and more clarity on how the priorities might be implemented.

Maximising health outcomes in type 2 diabetes (T2D)

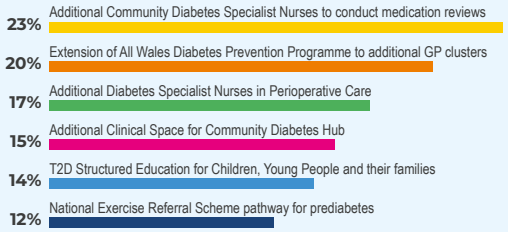
Summary on a Page | Programme Budgeting & Marginal Analysis (PBMA) for T2D Services in Cardiff & Vale University Health Board (CaVUHB)

Recommendations

CaVUHB should prioritise investment in type 2 diabetes services in the following order:

1. Additional Community DSNs to conduct medication reviews
2. Extension of the All-Wales Diabetes Prevention Programme to all GP clusters
3. Additional DSNs diabetes specialist nurses in perioperative care
4. Additional clinical space for the Community Diabetes Hub
5. T2D structured education for the Children and Young population
6. Additional exercise professionals for a pre-diabetes pathway within the National Exercise Referral Scheme for CaVUHB

To indicate your strength of preference, what percentage of potential funding would you allocate to each option?

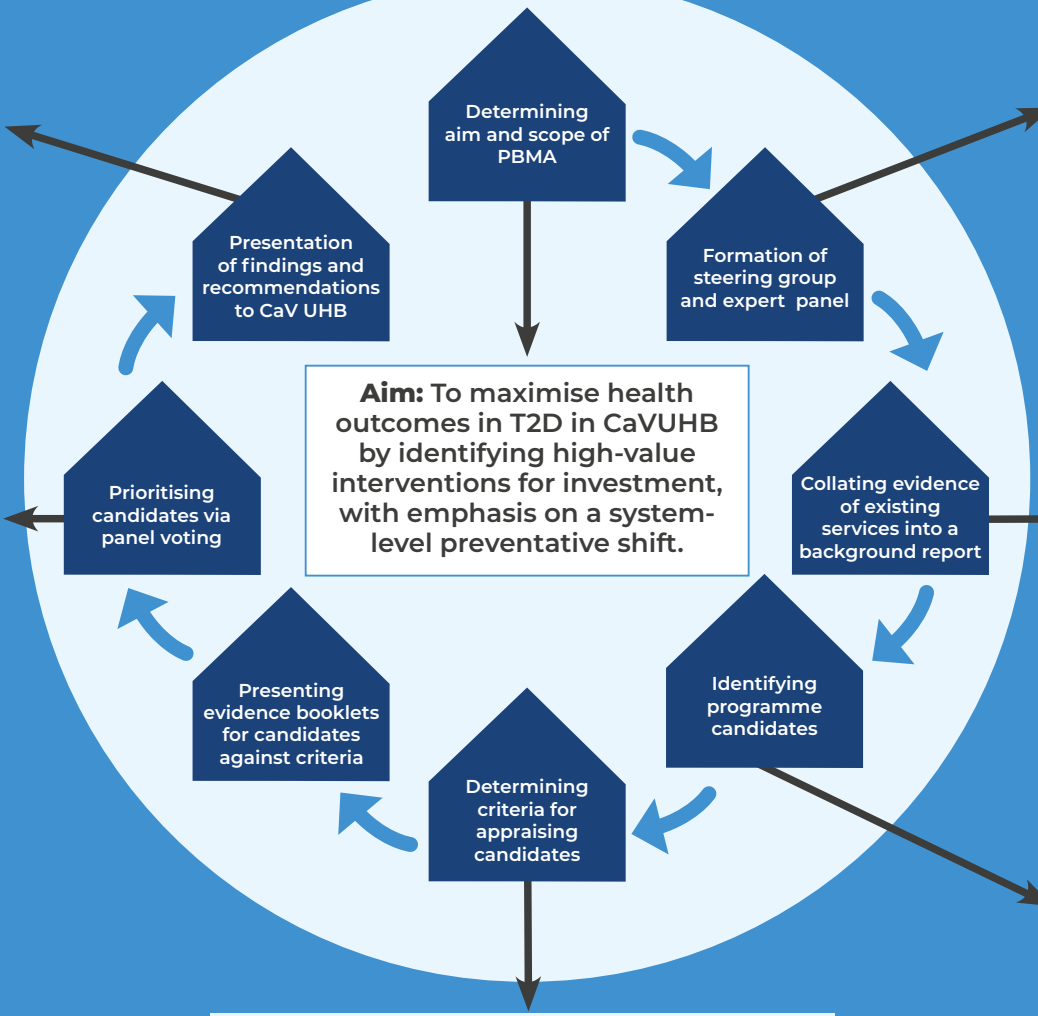


Type 2 Diabetes Engagement Survey

- To understand views of current service users a short survey was developed for online completion
- 43 responses were received

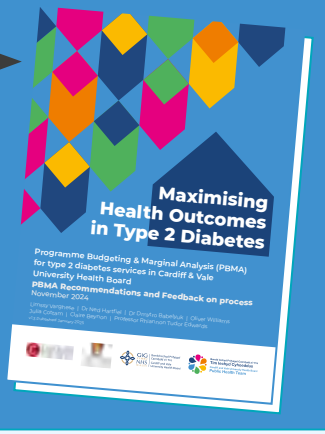
Key themes for improvement that emerged were:

- Service accessibility
- Patient empowerment
- Proactive approaches
- More education and training
- Attentiveness and avoidance of blame
- Minimisation of medication
- Reduction in cancelled appointments
- Reduced waiting times



The Panel

1. Executive Director of Public Health (Chair)
2. GP and Clinical Director for Diabetes, PCIC
3. Consultant Physician and Diabetologist
4. Costing and Value Senior Business Partner, Finance
5. Independent Member (Vice-Chair)
6. Pharmacist Prescribing Advisor
7. Strategic lead for community dietetic services
8. Public Health Consultant/Registrar
9. Head of Nutrition and Dietetics
10. Director of Integrated Health and Social Care
11. Childrens Specialist Nurse for Diabetes
12. Consultant Physician Diabetes
13. Podiatry Professional Lead / Lead for Diabetic Foot Services
14. Consultant Paediatrician / Clinical Lead for Paediatric Diabetes
15. Patient Representative
16. Health Systems Engagement Manager, Diabetes UK Cymru
17. Nurse Lead Diabetes



6 Programme Candidates identified by the panel:

- Structured education for children and young people and families
- Medicines optimisation
- Community diabetes hub
- All Wales Diabetes Prevention Programme
- Peri-operative care
- Pre-diabetes National Exercise Referral Scheme pathway

5 appraisal criteria identified by the panel:

- Clinical and cost effectiveness
- Reducing health inequalities
- User acceptability and patient-centeredness
- Accessibility
- Patient empowerment

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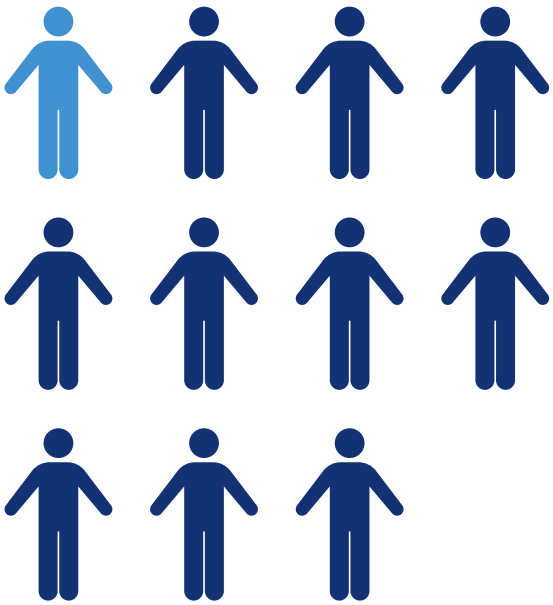
Section 1:
Prevalence of Type 2 Diabetes in Wales

In 2021/22, over 210,000 adults (aged 17+) in Wales had diabetes, with around 90% of these cases being T2D (Public Health Wales, 2023). Over half of these T2D cases could be prevented or delayed through lifestyle changes (Public Health Wales, 2023).

Approximately 6.6% of the T2D population in Wales, or 13,860 individuals, were registered in Cardiff and Vale University Health Board (Public Health Wales, 2023). **If current trends continue, around one in 11 adults in Wales could be living with diabetes by 2035** (Public Health Wales, 2023). This would be an additional 48,000 people with the disease, and a 22 per cent increase compared with 2021/22. Therefore, it is important to identify services that can shift funding upstream to address the root causes of T2D and improve prevention efforts. It is important to guide investment towards interventions that optimise patient outcomes.



Section 2:
Evidence-based strategic planning to shift resources upstream

A recommendation was made in the Annual Director of Public Health Report 2021 (published in 2022) for Cardiff and Vale University Health Board 'to consider the use of PBMA as a tool to help shift funding from low-value interventions to high-value interventions and move funding upstream towards prevention'.

PBMA, as a tool for increasing co-production, shared-decision making and reducing low-value interventions, has an important role in moving towards an evidence-based approach in the health field. Cardiff and Vale University Health Board identified T2D as an area to pilot the use of PBMA.

Section 3:
Definition of PBMA

PBMA is an opportunity to increase value through resource allocation by directing funding away from lower value interventions and towards higher value ones.

This approach has been described as a platform for discussion and prioritisation of initiatives while considering budget, evidence-base and stakeholder views. It is a dynamic process that requires ongoing evaluation and adaptation. By implementing PBMA, organisations can make transparent, evidence-based decisions about resource allocation through a collegiate process of discussion ensuring that limited resources are effectively and efficiently utilised to achieve desired outcomes. A review of potential programme areas could lead to recommendations for no changes, increasing investment in some programmes, or reallocating resources to better meet needs through disinvestment and reinvestment. Reallocation might involve scaling back or stopping certain services, to allow expansion of more impactful programmes (Donaldson, 2010; Mitton & Peacock, 2015).

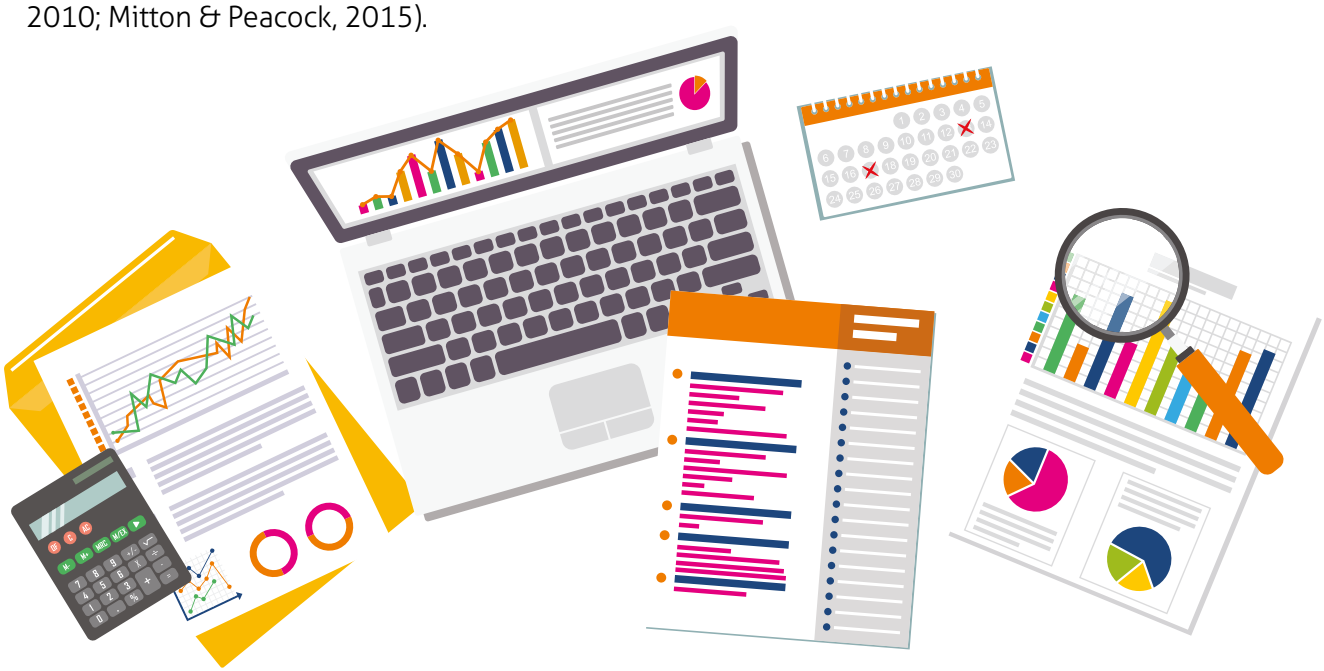
Section 4:
Application of PBMA in Wales and the UK

Within Wales, health economists at CHEME at Bangor University were responsible for this current application of PBMA methods in Cardiff and Vale University Health Board.

CHEME health economists have undertaken several PBMA exercises in the past, including 'A national PBMA of health improvement spending across Wales: disinvestment and reinvestment across the life course' (Edwards et al., 2014) and a PBMA exercise reshaping resource use in the respiratory care pathways in North Wales (Charles et al., 2014).

Currently CHEME is undertaking a PBMA exercise of resource use in frail elderly care pathways focusing on the potential future use of physician associate roles in Hywel Dda University Health Board (Babelyuk, ongoing PhD research, unpublished).

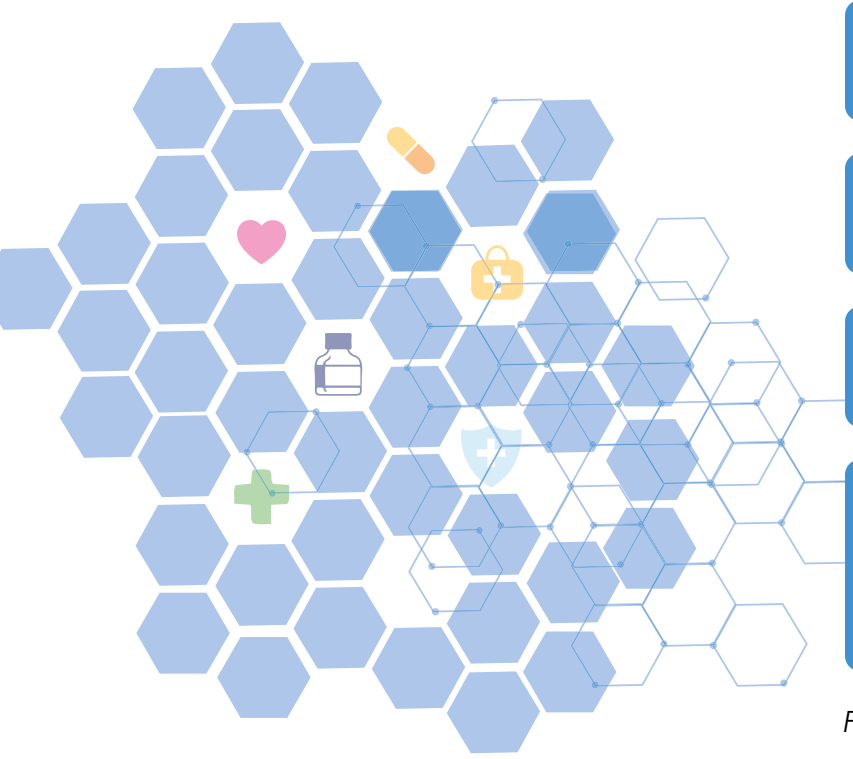
In England, PBMA exercises have been undertaken in areas of heart disease (Madden et al., 1995), maternity care (Ratcliffe et al., 1996), and dental care (Holmes et al., 2018).



Section 5:
Value-based Healthcare for Wales

Value-based care has been the driving force behind healthcare in Wales since January 2014 (Public Health Wales, 2024).

Its key principles of coproduction, equity, intervening effectively (and only as much as needed) and reducing unwarranted variation (including under and over-treatment) are key to achieving value for patients and citizens across a whole system of health and social care. In addition, Public Health Wales has had a strong tradition of collaboration with health economists at Bangor University and Swansea University focusing on return on investment in prevention at different life-course stages, for example, early years (Edwards et al., 2016), working age (Edwards et al., 2019), and living well for longer (Edwards et al., 2018). These reports formed the basis for a new book entitled 'Health economics of well-being and well-becoming across the life-course' (Edwards and Lawrence, 2024).



Section 6:
Aim and process of PBMA in Cardiff and Vale University Health Board

The aim of this PBMA was to maximise health outcomes in T2D in Cardiff and Vale University Health Board by identifying high-value interventions for investment, with emphasis on a system-level preventative shift.

Aim: To maximise health outcomes in Type 2 Diabetes in Cardiff and Vale University Health Board by identifying high-value interventions for investment, with emphasis on a system-level preventative shift.

The flow chart (Figure 1) shows the approach to priority setting in the PBMA process to maximise health outcomes in Type 2 Diabetes.

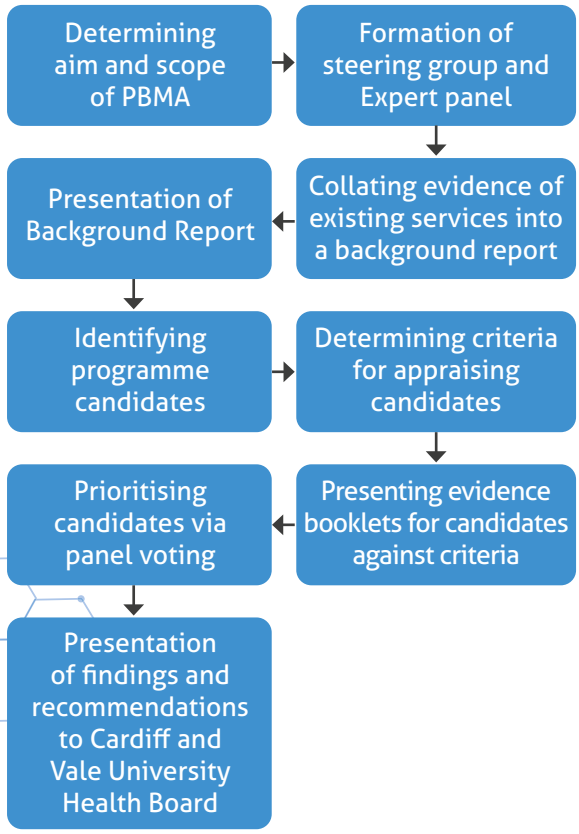


Figure 1: Flow Chart for Priority Setting

Section 7:
Appointment of a steering group and a PBMA panel

From March to November 2024, Cardiff and Vale University Health Board conducted a PBMA exercise to optimise health outcomes in T2D management by evaluating various services offered. The main stages of conducting a PBMA are illustrated in Figure 2.

1 Create a type 2 diabetes PBMA steering team and panel	Panel representatives will include clinicians, nursing staff, healthcare managers in therapies and medicines management, finances, service-users, and business support.
2 Choose a set of type 2 diabetes programmes to evaluate	Programmes for resource allocation will be generated by asking staff and managers about what does or does not work in type 2 diabetes prevention.
3 Identify activity and expenditure of selected programmes	Information for each programme includes annual budgets, FTE posts, resources utilised, cots, and activity levels.
4 Determine the outcomes of each programme	Qualitative and quantitative outcomes from evidenced based programmes will be identified (i.e. health outcomes, service-user feedback).
5 Compare costs and benefits, create priority list, decide on changes	An evidenced table will be created. Cost-effectiveness ratios will be calculated when possible and programmes will be ranked based on their cost-effectiveness.

Figure 2: Stages of PBMA

In March 2024, a PBMA steering group was formed which included:

- Claire Beynon, Executive Director of Public Health for Cardiff and Vale University Health Board
- Oliver Williams, Specialty Registrar in Public Health at Public Health Wales
- Julia Cottam, Costing & Value Finance Manager at Cardiff and Vale University Health Board
- Professor Rhiannon Tudor Edwards, Co-director of the Centre for Health Economics and Medicines Evaluation (CHEME) at Bangor University
- Dr Ned Hartfiel, Research Fellow at CHEME
- Limssy Varghese, Research Project Support Officer at CHEME.

The steering group met fortnightly during the eight-month PBMA process from March to October 2024.

The steering group identified an expert voting panel of 17 members (see Terms of Reference in Appendix 1) representing diverse areas of expertise in diabetes care, including consultants, nurses, dietitians, paediatricians, podiatrists, pharmacists, finance professionals, patient representatives, and a representative from the third sector. The steering group and panel members met three times during the eight-month process to identify high-value programmes for investment, to select criteria for decision-making, and to prioritise programme options for funding.

Before the first meeting, members of the steering group conducted 14 interviews with panel members to gain a broader understanding of the strengths and weaknesses of various services offered within T2D care in Cardiff and Vale University Health Board. The steering group collated evidence from the interviews to categorise T2D services under the five stages of the Value in Healthcare model: prevention, early accurate diagnosis, optimising intervention, supportive treatment, and end of life care (Figure 3).

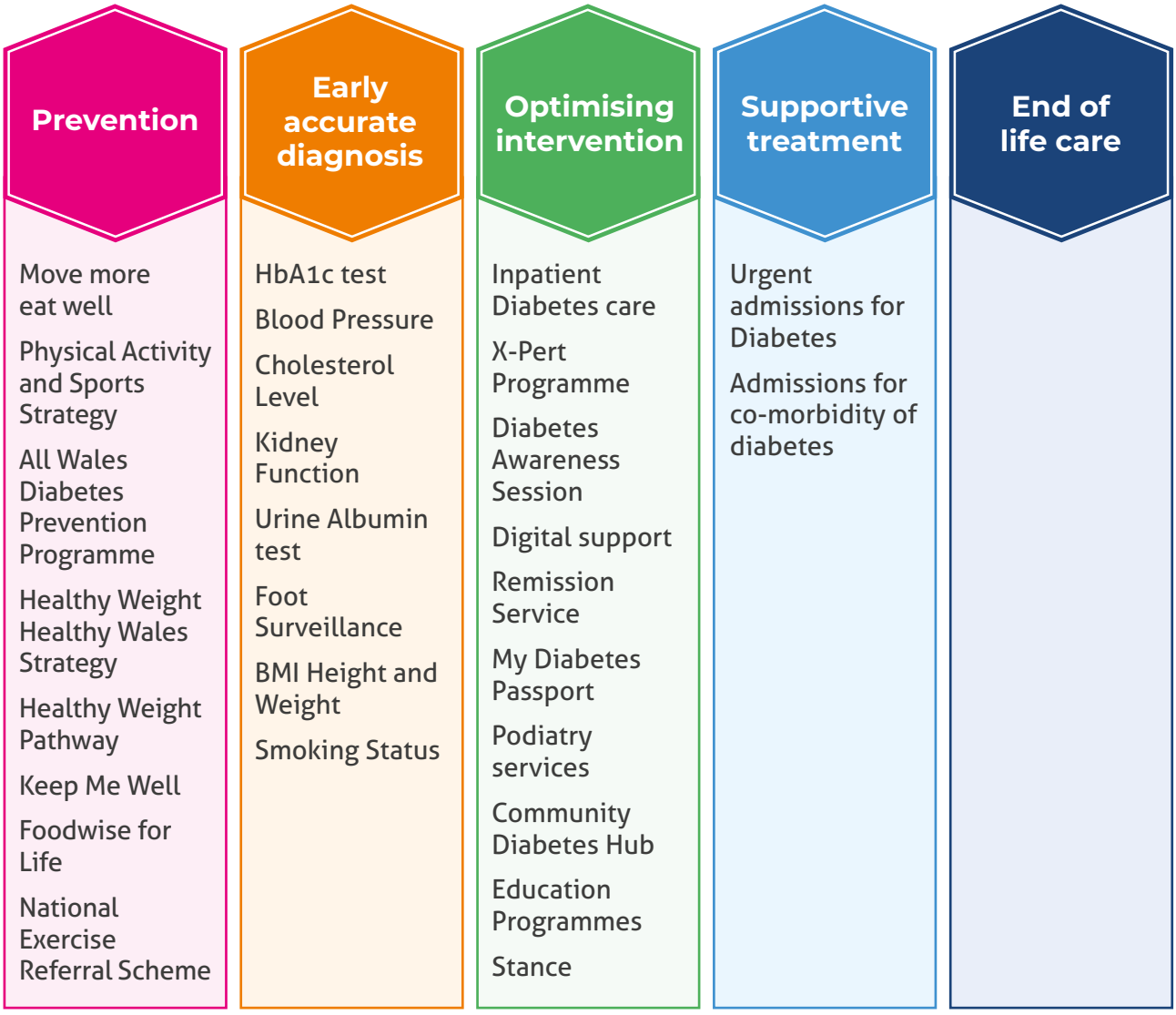


Figure 3: Current understanding of T2D services in Cardiff and Vale University Health Board

This process enabled the selection of a meaningful set of programmes for evaluation. Nineteen programmes were identified from both the interview process and a review of evidence from published literature. A concise summary of each programme, along with links to additional resources, was compiled into a background report and distributed to the 17 expert panel members before the first meeting. Additionally, the background report outlined 12 key areas of importance that emerged as themes from the expert interviews:

1. Importance of diabetes prevention programmes
2. Greater focus on diabetes structured education programmes
3. More equitable access to diabetes care
4. Greater focus on primary and community care
5. Importance of early diagnosis
6. Improved pre-surgery optimisation
7. Importance of diabetes specialist nurses
8. Review the effectiveness of T2D remission services
9. Prescribing medications for better outcomes
10. Establishing an integrated patient database for diabetes care in Cardiff and Vale University Health Board
11. Better monitoring of outcomes of diabetes care
12. Importance of prevention and care of paediatric diabetes

Section 8:
Programme budget for T2D in Cardiff and Vale University Health Board

Health Boards in Wales are required to retrospectively classify annual expenditure into 23 categories of disease (plus sub-disease areas).

These disease areas are defined with reference to the International Classification of Diseases v10 (ICD-10) designed through the World Health Organization. Diabetes is a sub-category of the disease programme "Endocrine, Nutritional and Metabolic Problems". The Welsh mapping guidance for Programme Budgeting (PB) is reviewed annually updating the methodology recommendations where possible. The recommended methodology varies for different expenditure types and settings of service delivery as there are differences in the data capture for disease areas for which the expenditure relates. This process of calculation is complex, with some methods of allocation subjective. However, it allows the health system to track expenditure by disease area over time.

The 2022-23 PB for diabetes in Cardiff and Vale University Health Board is summarised below in Table 1:

Diabetes	*Cost (£)*
Admitted Patient Care	2,102,538
Outpatient Care	2,299,761
Primary & Community	20,637,034
TOTAL	**25,039,333**

Table 1: Programme Budgeting for diabetes in Cardiff and Vale University Health Board 2022-23

Table 1 identifies the cost of diabetes in Cardiff and Vale University Health Board to be approximately £25 million. The identification of Admitted Patient Care (APC) expenditure is based on the ICD-10 code contained in the primary diagnosis field of coded activity. Uncoded activity is excluded. A significant element of expenditure cannot be subclassified into Type 1/Type 2 diabetes.

The cost of APC for all patients with diabetes involves collating the costs of activity where the diabetes ICD-10 codes occur within any of the 13 diagnosis fields. Where the codes are outside of the primary field, the cause of the admission is deemed to be as a result of a different disease area. Despite admissions having a different primary disease cause, there is often an additional cost as a result of diabetes being a comorbidity. The cost of APC for diabetic patients in 2022-23 was £52 million (Table 2).

Diabetes	*Cost (£)*
Type 1	4,324,156
Type 2	46,375,626
Unspecified Diabetic Type	2,063,517
TOTAL	**52,763,298**

Table 2: Cost of Admitted Patient Care for Patients with Diabetes Cardiff and Vale University Health Board in 2022-23.

Calculating the true cost of Diabetes for the population of Cardiff and Value UHB is challenging, as for some healthcare activity the disease area for which the contact relates is not always recorded. The true costs of Diabetes will be a blend of Table 1 and 2.

Section 9:
Meeting 1, July 2024

During Meeting 1, the steering group presented a summary of the background report on the T2D pathway, providing an overview of the various services offered.

Meeting 1 covered the following:

- Introduction of the PBMA process.
- Successful implementation of PBMA in other settings.
- Discussion of the current T2D services in Cardiff and Vale University Health Board.
- Presentation of the 12 key areas identified through interviews with T2D experts.
- Discussion of the criteria to appraise the evidence for each programme.

After Meeting 1, panel members were emailed two proformas (data collection forms), one for proposing the programme candidates and another one for choosing the criteria to appraise these candidates.

Proforma 1: Panel members were asked to identify up to six programme candidates and provide a brief explanation for why each programme candidate should be discussed by the panel. They were also asked to classify each programme as either a high-value or low-value intervention. 11 of the 17 panel members (65%) completed the first proforma.

Six candidates were identified:

Candidate 1
T2D Structured Education for Children and Young People (CYP) and Families:

Due to the increasing prevalence of T2D and the potential development of complications in the young population, early diagnosis and the right intervention were considered important for CYP to maintain long-term health and prevent aggressive complications.

Candidate 2
Medicines Optimisation:

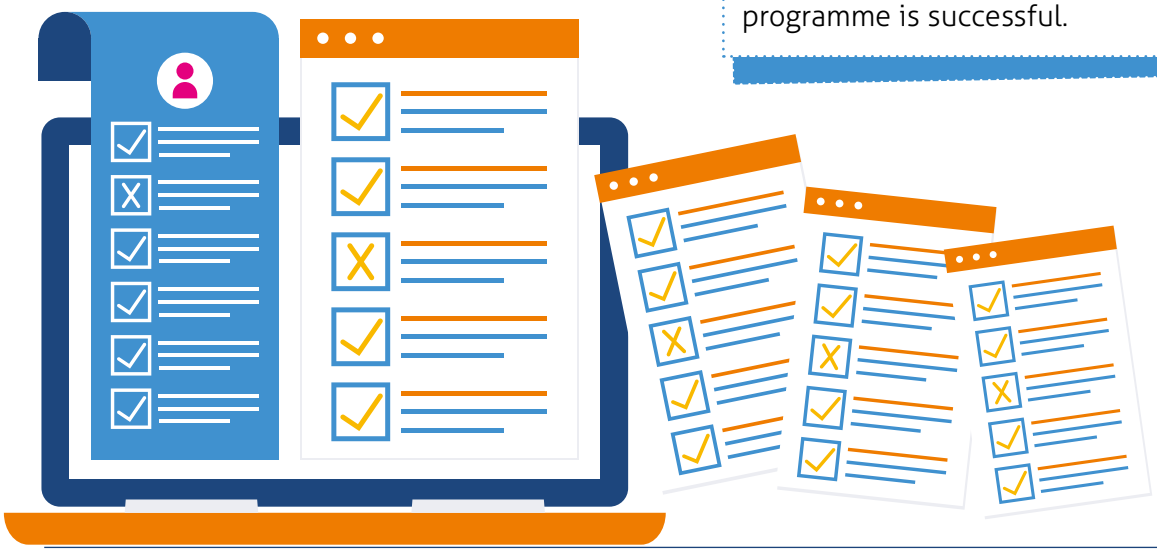
The proforma responses in medicines optimisation included: a review of medication wastage in primary care, prescribing better medicines for optimal patient outcomes, reducing prescribing variation across GP clusters, and identifying inappropriate insulin use. Panel member interviews highlighted the potential benefits of more regular medication reviews to address the above-mentioned concerns. This will help to support patients to consider the most appropriate medication at the right dose with regular review. A diabetic specialist nurse (DSN) was proposed as a suitably qualified person to conduct these reviews.

Candidate 3
Community Diabetes Hub (CDH):

Proforma responses included further development of a CDH to enhance primary care delivery. Respondents emphasised CDH goals such as early intervention of care after T2D diagnosis, adhering to the 8-step care process for high-risk T2D patients, and maintaining active patient follow-up in primary care settings. The primary focus for investment in the CDH is securing a dedicated clinical space in Central Cardiff and expanding the DSN team. Clinical space will serve as a central hub for the CDH Multi-Disciplinary Team, enabling more effective communication and coordination of care. It will provide a venue for addressing urgent appointments.

Candidate 4
All Wales Diabetes Prevention Programme (AWDPP):

Another candidate identified from proforma responses was the expansion of AWDPP to reduce the variation of care across the nine GP clusters in Cardiff and Vale University Health Board. Since the AWDPP is not currently available in all clusters, expansion to the remaining clusters was considered important. The initial evidence suggests this programme is successful.



Candidate 5

Perioperative Care: Proforma responses under the broad theme of perioperative care included:

The need for an inpatient DSN, reducing length of stay (LoS) in the hospital, and improving the perioperative pathway for patients.

Optimising the perioperative pathway for patients with T2D may help reduce LoS. Patients with T2D have higher rates of post-operative readmissions, causing distress and increased costs (GIRFT, 2020). Evidence suggests that funding DSNs for inpatient perioperative care is cost-effective.

Candidate 6

National Exercise Referral (NERS) Pathway for Pre-diabetes:

Proformas identified the need for a physical activity intervention for people at risk of T2D. The current NERS scheme is not adequately equipped to meet the increasing demand for physical activity interventions for people with T2D. Lifestyle changes are the best way to prevent or delay the onset of T2D. Staying physically active with at least 30 minutes of moderate exercise each day can help prevent T2D and its complications (WHO, 2023). Creating a dedicated NERS prediabetes pathway within Cardiff and Vale University Health Board was considered an important option. Information from the evidence booklet suggested hiring two exercise referral professionals, one for Cardiff and one for the Vale of Glamorgan.

Proforma 2: Panel members were asked to identify the criteria to be used for deciding which interventions were potential high-value candidates. 12 of the 17 panel members (71%) responded to Proforma 2.

Section 10:
Meeting 2, August 2024

Before the second meeting, panel members received the meeting agenda and a comprehensive evidence booklet for each of the six candidates.

Meeting 2 covered the following:

- Discussion on the Cardiff and Vale University Health Board T2D Service User Survey
- Presentation of suggested criteria for decision-making
- Presentation of the six evidence booklets for the candidates

Cardiff and Vale University Health Board T2D Service User Survey

As part of the PBMA process, a service user survey was created and distributed within Cardiff and Vale University Health Board in July/August 2024 to obtain feedback from those with lived experience of T2D on what was working and what could be improved in the T2D pathways.

From 43 service user responses, key themes for improvement that emerged were:

During Meeting 2, panel members reached a consensus on five criteria:

1. **Clinical and cost-effectiveness**
2. **Reducing health inequalities**
3. **User acceptability and patient-centeredness**
4. **Accessibility**
5. **Patient empowerment**

The criteria identified by the panel members aligned with the themes identified in a Cardiff and Vale University Health Board T2D Service User Survey.

Evidence booklets

Each evidence booklet for the six candidates contained a brief introduction, evidence on clinical and cost-effectiveness, cost of the programme, and recommendations. The booklets were created from the information collected from published literature and follow-up interviews with the panel members and other experts involved in the Cardiff and Vale University Health Board T2D pathway.

Section 11:
Meeting 3, October 2024

Meeting 3 covered the following:

- Presentation of the six candidates within the prevention triangle
- Comparison of the six candidates with the five criteria
- Presentation of six evidence-based options (derived from the six candidates) for prioritisation
- Presentation of estimated costs for each evidence-based option
- Invest-to-save evidence
- First vote – Ranking the evidenced-based options
- Second vote – Allocating resources
- Third vote – Reinvestment

Prevention Triangle:

Figure 4 shows how each candidate is aligned with the Prevention Triangle.

Primary level interventions aim to prevent T2D progression in high-risk individuals. Secondary level interventions focus on reducing T2D risks and preventing disease advancement. Tertiary interventions seek to reduce readmission and adverse events, such as long-term vascular events.

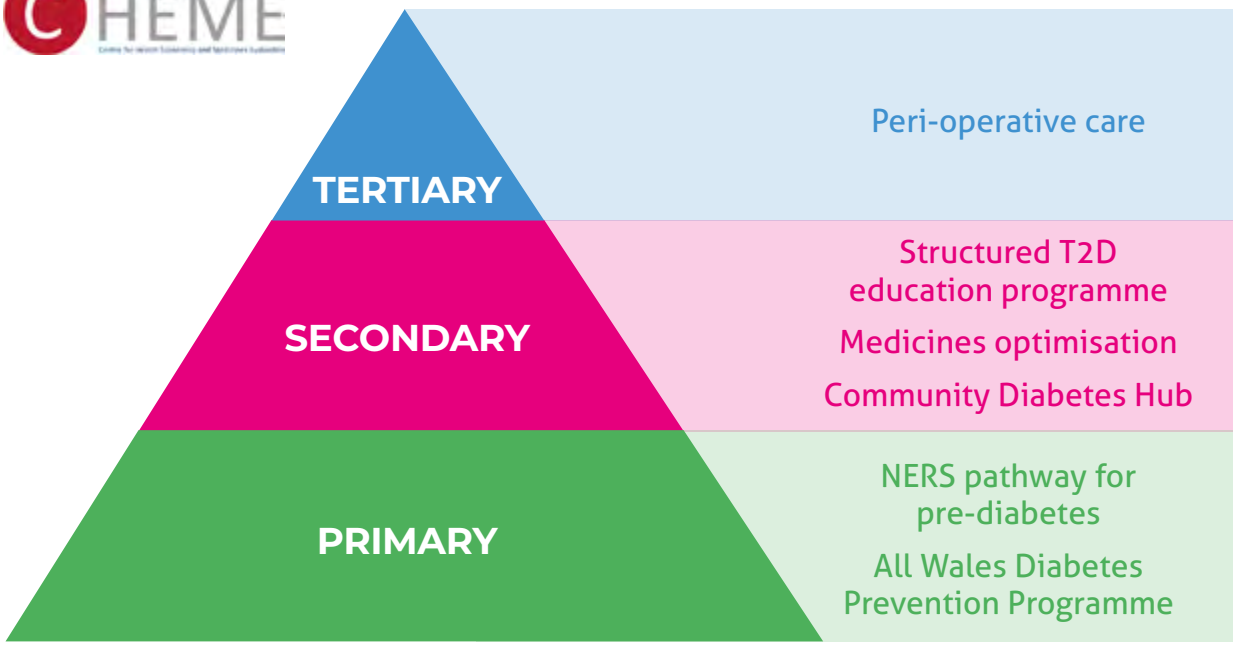


Figure 4: Prevention Triangle

Comparing the six evidence-based options with the five criteria

The six candidate programmes were assessed against the five criteria: a Red-Amber-Green (RAG) methodology was used to indicate the degree to which information/evidence was available (Figure 5). This provided a clear and concise visual representation of the extent to which information or evidence was available for each candidate in relation to each criterion.

The red indicates insufficient evidence to satisfy the criteria on the clinical and cost-effectiveness of structured education for children and young families with T2D. While the steering group successfully identified studies on the clinical and cost-effectiveness of T2D structured education among adults, no suitable studies were found for children and families to support the specified criterion.

Lack of Information showing the criteria is satisfied:	***Red***
Fair amount of Information showing criteria is satisfied:	***Amber***
Good amount of information showing the criteria is satisfied:	***Green***

	Clinical and cost effectiveness	Health inequalities	User acceptability and patient centred	Accessibility	Empowerment	Evidence of Invest-to-Save
Completing T2D structured education for children and young people (CYP) and their families						
Additional community DSNs to conduct medication reviews for T2D patients						
Additional clinical space for the Community Diabetes Hub (CDH) in Central Cardiff						
Extension of AWDPP to three additional clusters						
Additional DSNs in perioperative care						
Develop and fund a NERS pathway for people with prediabetes						

Figure 5: Comparing the six evidence-based options with the five criteria

Invest-to-Save Evidence

Invest-to-save evidence suggests that some interventions, such as adding community DSNs to conduct medication reviews for T2D patients and additional DSNs in perioperative care, can improve healthcare outcomes by improving the quality of care for patients (GIRFT, 2024).

Additionally, there is scope for cost reduction. Reduced expenditure through deprescribing certain medications, reducing prescription variation, and avoiding frequent GP consultations can lower costs for the health system.

Evidence from the Cardiff and Vale University Health Board shows that the average length of stay for diabetic patients undergoing elective surgery is longer than that of non-diabetic patients. One of the reasons is poor HBa1c management. DSNs can help inform patients about glycaemic management before and after surgery, reducing unnecessary readmissions and shortening hospital stays, which contributes to cost savings.

Figure 6 shows the mean Average Length of Stay (AVLOS) comparison for T2D versus non-diabetic patients (Cardiff and Vale University Health Board, 2022-23). The T2D cohort (n=134), compared to non-diabetic cohort (n=1,253), spent an average of 4.28 additional days in hospital.

	No. of episodes		AVLOS					
	Diabetic Type 2	Non Diabetic	Diabetic Type 2	Non Diabetic	AVLOS Excess / Variance	Excess Total Bed days	22/23 Bed day costs	22 / 23 Bed Total Bedday Excess
1. Total Knee Replacements	48	316	7.5	5.1	2.5	119	487	58,079
2. Total Hip Replacements	54	424	13.8	6.9	7.0	377	488	183,711
3. Laparoscopic Cholecystectomies	22	212	6.7	2.9	3.8	84	894	74,711
4. Inguinal Hernia Repairs	4	129	1.3	2.7	(1.42)	(5.70)	626	(3,567)
5. Appendicectomy Laparoscopic	4	143	2.8	3.4	(0.65)	(2.59)	928	(2,409)
6. Appendicectomy Open	2	29	9.5	8.2	1.3	3	928	2,337
	134	**1,253**				**574**		**312,864**
					Per Patient	4.28		

Figure 6: AVLOS (Mean) comparison for T2D versus non-diabetic patients (Cardiff and Vale University Health Board, 2022-23)

Estimated Costs for each Evidence-Based Option

Based on the interviews with panel members and the data provided by the finance team in Cardiff and Vale University Health Board, an approximate cost was estimated for each evidence-based option (Table 3).

A comparison of benefits, costs and potential cost savings for each candidate is presented in Appendix 2.

The estimated cost for each evidence-based option is listed in Table 3 and a more detailed itemisation of costs is listed in Appendices 2 and 3:

Table 3: Estimated costs for each evidence-based option

1	T2D structured Diabetes Education for CYP and families and case finding	£249,043/year
2	Additional community Diabetes Specialist Nurses (DSNs) to conduct medication reviews	£504,543/year
3	Additional clinical space for CDH in Central Cardiff	£122,138/year
4	Extension of All Wales Diabetes Prevention Programme	£191,137/year
5	Additional DSNs in perioperative care	£466,419/year
6	NERS pathway for prediabetes	£133,800/year

Prioritisation of Evidence-Based Options by the Panel

During Meeting 3, three rounds of voting were conducted to prioritise the evidence-based options, focusing on ranking, resource allocation, and reinvestment. The voting was anonymous and conducted through Mentimeter.

First Vote – Ranking

The first vote was to rank the 6 evidence-based options based on the priorities for funding. Fifteen panel members voted. The results of the first vote are illustrated in Figure 7.

Figure 7: First vote results

Second Vote – Resource Allocation

The second vote involved panel members allocating a percentage of resources to each option. Fourteen panel members voted.In terms of potential funding, the panel recommended the following allocations (Figure 8).

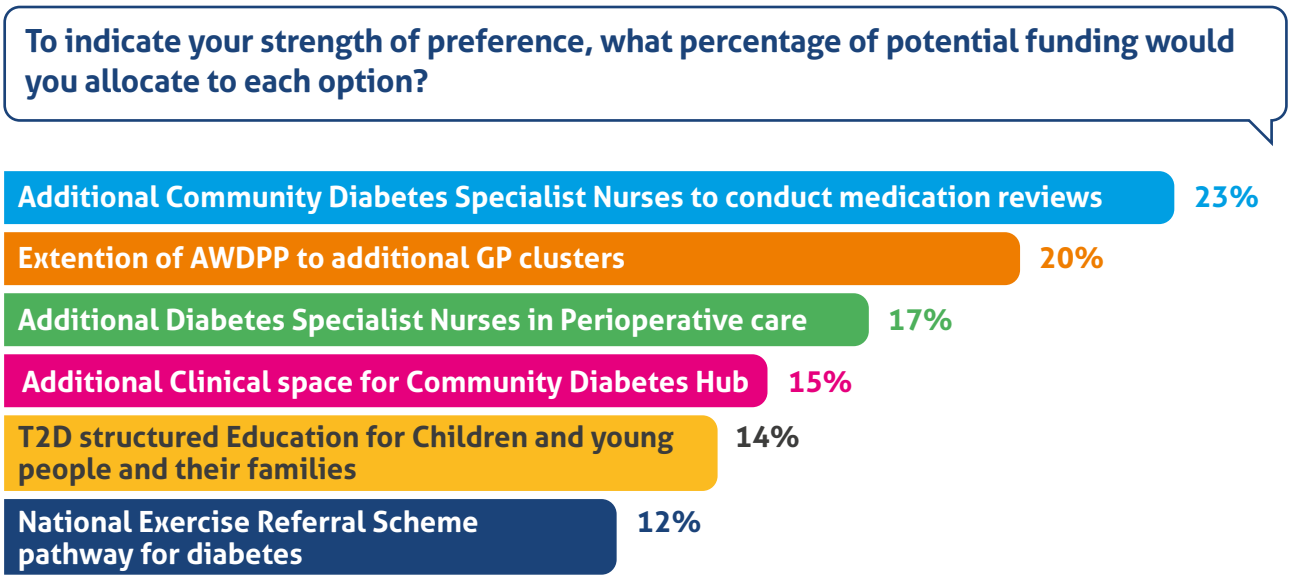


Figure 8: Second vote results

Third vote - Reinvestment

The third question addressed reinvestment of potential first and second-year cost savings (Figure 9). 15 panel members voted. Panel members expressed confusion both before and after the third vote as they were unable to fully comprehend its purpose. Despite the team's efforts to clarify the misunderstanding, the result may have been affected.

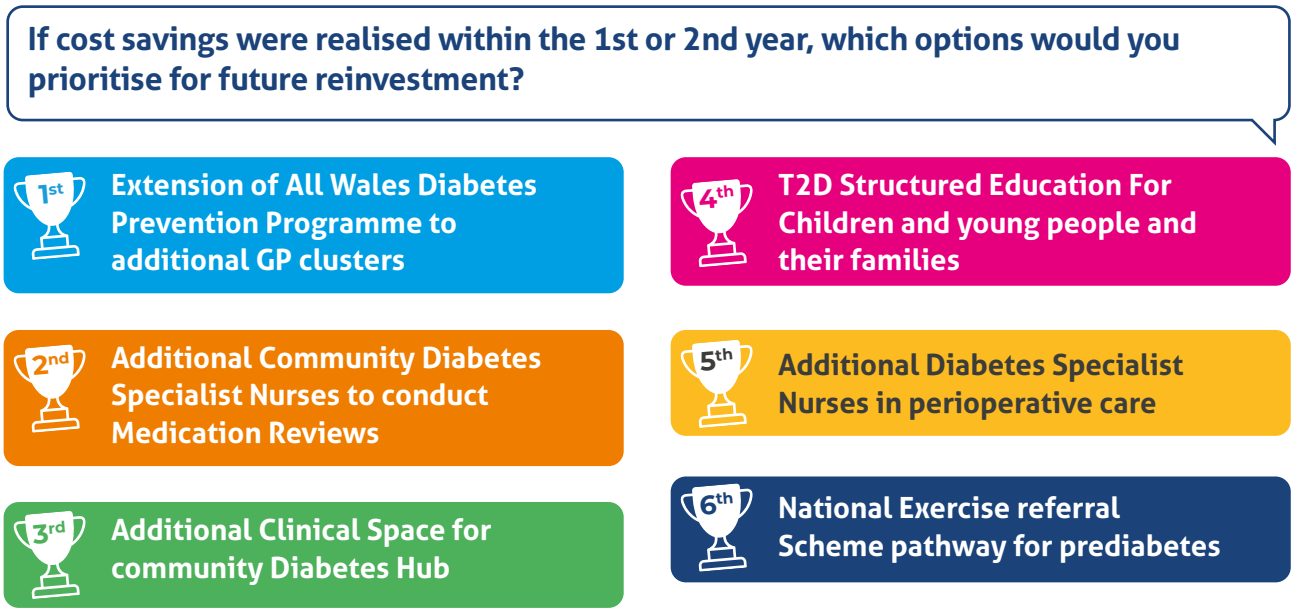


Figure 9: Third vote results

Section 12:
Recommendations from Panel Voting

The first vote showed equal votes for two candidates: Additional Community Diabetes Specialist Nurses to conduct medication reviews and Extension of the All-Wales Diabetes Prevention Programme to all GP clusters. The second round of voting allowed participants to allocate percentage of 100% of funding to each programme and shows a slight nuance.

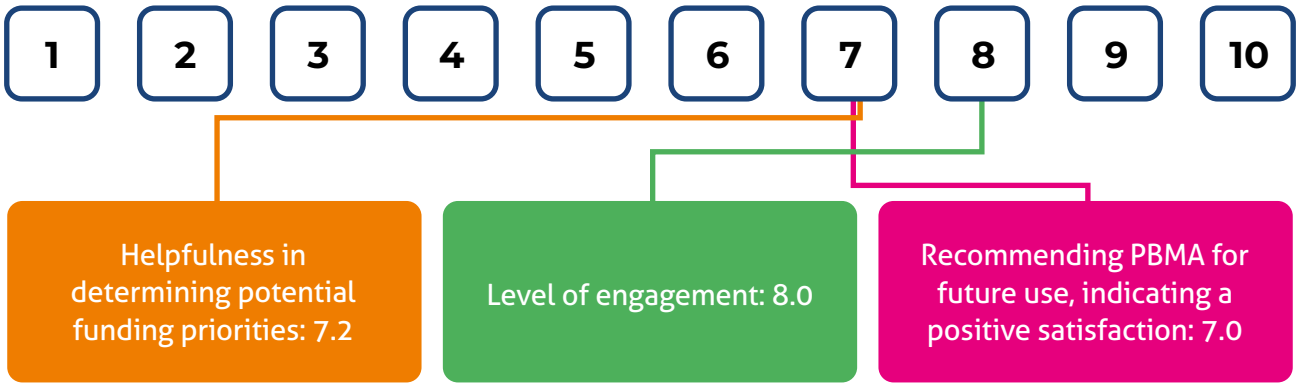
The voting in Meeting 3 indicated the following final order of priorities for Cardiff and Vale UHB investment in type 2 diabetes services:

*** within the National Exercise Referral Scheme for Cardiff and Vale University Health Board**

Section 13:
Feedback survey from Panel Members on participating in the PBMA process

Following the final PBMA panel meeting, members were asked to complete a short feedback form. 12 panel members responded (71%). The results are below.

On a scale of 1 to 10, panel members rated the PBMA process in three different areas. The mean score is reported below:



Panel members reported that the following aspects were helpful in the PBMA process:

- **Evidence booklets and background reports**
- **Open forum for discussion**
- **Patient input and representation**
- **Structured approach**
- **Opportunity to hear from peers and learn about other diabetes programmes**

The panel provided suggestions for improving the PBMA process, including:

- **Time constraints: Timelines for the PBMA process were too short, particularly where staff happened to be on leave or held part-time roles. More time should be allocated for reviewing evidence booklets.**
- **Clarity on funding and future implementation: More clarity was needed regarding potential funding necessary to implement the PBMA priorities.**
- **Extended meeting time: Meetings should be longer to allow for more in-depth discussion of steering group reports.**

Section 14:
Concluding remarks

Investment in services for people living with or on the brink of developing T2D provides an opportunity to shift the balance of resource use from treatment to prevention. Through this PBMA process, we found real evidence of potential benefits on an invest-to-save basis. We demonstrated the power of working together in a multidisciplinary context as stakeholders with vested interests, but still able to see the big picture at a system level.

On this basis, the voting panel made recommendations for the future use of resources to improve the health and well-being of people living with T2D in Cardiff and Vale University Health Board. This work will be shared with the newly established Strategic Diabetes Programme Board.

Section 15:
Acknowledgements

Thanks to all of the Panel Members for their time and commitment to this process.

Thanks to the Public Health Team Administrators for organising the steering group and panel meetings and supporting the team throughout the process.

Thanks to Dr Catherine Lawrence as reader support worker to RTE.

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Appendices

Appendix 1: Terms of Reference

Cardiff and Vale University Health Board
Maximising Health Outcomes in Type 2 Diabetes Panel
Terms of Reference

Date: 20/06/2024	*Version: 1*

Background:

In 2022, a recommendation was made in the annual report of the Director of Public Health for Cardiff and Vale UHB to 'Consider the use of Programme Budgeting and Marginal Analysis (PBMA) as a tool to help shift funding from low-value to high-value interventions and move funding upstream towards prevention'.

PBMA is a transparent, consultative decision-making framework that can be used by those planning services to maximise health outcomes by reallocating resources. It is not a new method; it has been used successfully at both national and local level in Wales and around the UK , . By implementing PBMA, organisations can make consultative, informed and evidence-based decisions about resource allocation, ensuring that limited resources are effectively and efficiently utilised to achieve desired outcomes.

Type 2 diabetes has been identified by Cardiff and Vale UHB as a suitable programme to trial the use of PBMA in the Health Board.

This group constitutes an expert panel for working through the PBMA process, facilitated by the Centre for Health Economics and Medicines Evaluation (CHEME), Bangor University.

Aim:

To maximise health outcomes in type 2 diabetes by producing recommendations for shifting funding from low-value to high-value interventions and to move funding upstream towards prevention.

Purpose of the series of three panel meetings is to:

- Identify what is currently working well and not working well in the diabetes pathway
- Request candidate interventions for resource reallocation
- Determine decision-making criteria for resource allocation (e.g. clinical effectiveness, cost-effectiveness, reducing health inequalities, alignment with government policy, etc)
- Discuss and decide on candidate interventions for resource allocation
- Produce an evidence booklet for suggested candidate interventions
- Complete a priority ranking exercise to provide Cardiff and Vale University Health Board with a direction of travel via a set of recommendations as a result of the process

Membership:

Voting members:

1. Executive Director of Public Health (Chair)
2. GP and Clinical Director for Diabetes, PCIC
3. Consultant Physician and Diabetologist
4. Patient Representative
5. Costing and Value Senior Business Partner, Finance
6. Independent Member
7. Pharmacist Prescribing Advisor
8. All Wales Dietetic Lead for Diabetes (Adult) / Dietetic Lead for AWDPP
9. Public Health Consultant/Registrar
10. Head of Nutrition and Dietetics
11. Director of Integrated Health and Social Care
12. Children's Specialist Nurse for Diabetes
13. Consultant Physician Diabetes / National Strategic Clinical Network for Diabetes Chair
14. Podiatry Professional Lead / Lead for Diabetic Foot Services / National Rep.
15. Consultant Paediatrician / Clinical Lead for Paediatric Diabetes
16. Health Systems Engagement Manager, Diabetes UK Cymru
17. Nurse Lead Diabetes

Non-voting members:

18. Administrative support
19. Senior Communication and Engagement Officer
20. Co-Director, Centre for Health Economics and Medicines Evaluation, Bangor University
21. Research Fellow, Centre for Health Economics and Medicines Evaluation, Bangor University
22. Research Project Support Officer, Centre for Health Economics and Medicines Evaluation, Bangor University

Frequency of meetings:

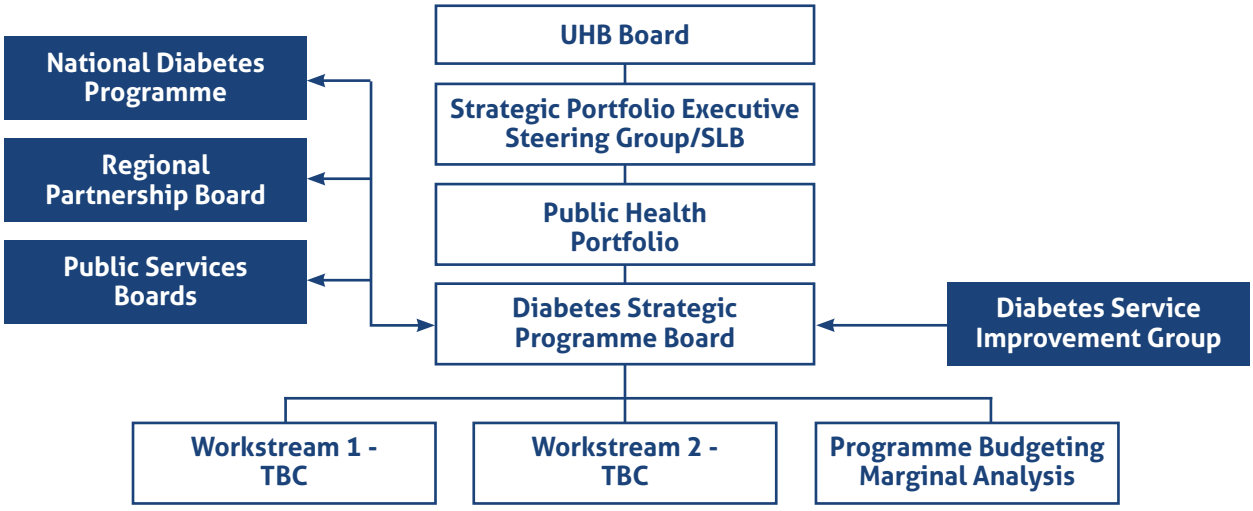
- Meetings will be held three times between July to October 2024.

Reporting to:

- Cardiff and Vale University Health Board Diabetes Programme Board

Governance Structure:

The group is a workstream under the new Diabetes Strategic Programme Board.



Appendix 2: Costs, Benefits, and Potential Cost-Savings of each candidate

Table:1 Candidates	Cost	Benefits	Potential cost savings
Complete T2D Structured Education for CYP and their families	Cost including the design cost of workbooks for children and families, a separate funding for finding diagnosed cases among children aged 10-15 years, other staff costs, and evaluation cost totals an approximate amount of £249,043/year	• Helps CYP with T2D to maintain long-term health and prevent progression and aggressive complications • Less financial burden on health and social care system, as this intervention helps to prevent the T2D progression • Long term savings due to prevention of developing T2D and avoiding treatment cost from associated comorbidities	• Long term cost-saving due to prevention/ reversal of diabetes and comorbidities
Additional community DSNs to conduct medication reviews for T2D patients	Cost including salary of band 7 Diabetic specialist Nurses, their training cost and evaluation costs totals an approximate amount of £504,543 per year	• Additional 7 community DSNs across the clusters would work along with the GPs together to support patients through co-production. • Ensuring safety by avoiding drug related adverse effects • Supporting patients to consider the most appropriate medication at the right dose with regular review. • Reducing health inequality by supporting hard to reach communities, frail people, care home residents, deprived communities • Reducing the number of secondary care appointments, reducing waiting lists, reducing medicine wastage in primary care.	• Cash release from reducing medicine wastage, reducing variation in prescription, avoiding frequent GP consultations, improved medicine optimisation

Additional clinical space for the Community Diabetes Hub in Central Cardiff	Cost includes staff salary of a receptionist, healthcare worker, rent, utilities, cleaning, totals an approximate amount of £122,138/year	• The CDH enables an integrated pathway between primary and secondary care, providing a one-stop-shop for patients with T2D • Clinical space serves as a central hub for the CDH MDT, enabling more effective communication and coordination of care, also provides a venue for addressing urgent appointments • Only specialist cases will be referred to secondary care	• Cash release from reduced referrals in secondary care, number of adverse health events avoided such as long-term vascular events.
Extension of AWDPP to three additional clusters to address people with prediabetes	Cost includes salary of staffs, Hba1c test, Phlebotomy test, postage totals an approximate amount of £191,136/year	• AWDPP can reduce the risk of developing T2D by reducing weight, increasing physical activity and improving the diet of those at high risk. • Reduce the incidence of T2D, thereby reduce the burden on health care system • Lower risk of developing T2D and related comorbidities	• Evidence based evaluation of an AWDPP pilot within Swansea Bay UHB (Harris et al., 2019) showed that the cost per QALY gained was -£5,351 per QALY indicating that AWDPP was more effective and less costly than usual care
Additional DSNs in perioperative care	Cost includes staffing cost of 8.8 wte DSNs £466,419 per year	• Facilitate communication among MDT in secondary care. • Reduce length of stay. • Reduce cancellations (documenting glycaemic status, metabolic status (renal profile, lactate and ketones)) • Improve patient safety through staff and patient education.	• Based on the assumption (coded as 1020 inpatient surgeries) Cardiff and Vale University Health Board could reduce length of stay range between 1.2 -4.2 bed days per case using an average cost per bed day of £500 the opportunity Cost saving is estimated to be £612,000-2,142,000.
Fund a National Exercise Referral Scheme (NERS) pathway for people with prediabetes	Cost including salaries of two exercise professional one for Cardiff and one for vale, along with room hire costs £133,800 per year	• NERS prediabetes pathway will help participants manage their weight through increased physical activity and healthy lifestyle changes, can help prevent or delay the onset of T2D • Helps to reduce the incidence of T2D prevalence at a population level	• Long-term cost savings due to prevention/ reversal of T2D and related comorbidities

Appendix 3: Indicative costs for the six evidence-based options

Indicative cost of T2D Structured Education for CYP and families (plus case finding)	
Children population in Cardiff and Vale University Health Board (Wales stats 2023)	£92,049
Number of children aged 10-15	£37,195
Assuming 10% of the children need to do screening	3720
Cost of Hba1c test	£33
Total cost for Screening	£122,760
Salary of 2 Band 5 nurse	£92,650
Administrator cost	£10,000
Management support	£8,000
Structured Diabetes Education	£5,600
Evaluation cost	£10,000
Annual Total cost	**£249,043**

Indicative cost for Medicines Optimisation	
Salary of Band 7 DSN -	£67,649
Travel cost	£2,000
Training	£1,000
Total cost for 1 DSN	£70,649
Total cost for 7 DSNS	£49,4543
Monitoring	£10,000
Total Annual cost	**£504,543**

Indicative cost for Community Clinic space	
Staff Salaries (Receptionist, plus administrator)	£64,138
Rent and Utilities	£10,000
Medical Equipment and Supplies	£10,000
Pharmacy services	£10,000
Facility Maintenance and Cleaning	£10,000
Laptop cost	£3,000
IT support	£5,000
Evaluation Costs	£10,000
Total Annual Cost	**£122,138**

Indicative cost for extension of AWDPP to 3 new Clusters	
Staff costs 0.25 wte Dietitian (Bd 7)	£16,912
1 Health Care Support Worker (Band 3)	£30,813
Staff total	£47,725
Accommodation/ contingency	£7,143
HbA1c lab test	£2,662
HbA1c phlebotomy	£3,300
Stationary/postage	£2,882
Delivery total	£15,987
Cost per cluster	£63,712
Grand total per annum for additional 3 clusters	**£191,136**

Indicative cost for additional 8.8 DSNs perioperative care	
Salary of 1 Band 6 DSN	£67,649
Salary of 3.5 DSNs at UHL	£200,896
Salary of 5.3 DSNs at UHW	£245,522
Evaluation	£10,000
Training	£10,000
Annual Total Cost	**£466,419**

Indicative cost for funding a prediabetes NERS pathway	
Exercise Referral Professional (ERP) x 1: Salary and oncosts (grade 5 - £24,702 - £26,421 – based on top of scale)	£38,000
Recruitment	£1,500
Office space	£1,500
Administration support	£4,000
Management support	£3,000
Laptop, mobile phone, dongle, internet access, licences etc.	£2,000
Extra classes (£25 per hour: 2 classes per centre per week = £200/week)	£10,400
Pool car/Mileage	£2,000
Training	£1,000
Miscellaneous/Contingency	£1,000
Annual Cost for 1 ERP	£64,400
Annual Cost for 2 ERP	£128,800
Marketing cost	£5,000
Annual Total Cost	**£133,800**