**Global Health Research Unit**
on Diabetes and Cardiovascular Disease in South Asians

# Skill development for prevention and control of T2D and CVD by PHC teams in India

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# 1. Acknowledgements

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## 2. Abbreviations

| | |
|---|---|
| AHP | Allied Health Professionals |
| ANM | Auxiliary Nurse Midwife |
| ASHA | Accredited Social Health Activist |
| CDC | Centres for Disease Control |
| CHW | Community Health Worker |
| COPD | Chronic Obstructive Pulmonary Diseases |
| CVD | Cardiovascular disease |
| GHRU | Global Health Research Unit |
| LMIC | Lower and Middle Income Countries |
| MO | Medical Officer |
| NCD | Non-Communicable Disease |
| PEN | Package of essential non-communicable disease interventions |
| PHC | Primary Health Care |
| SEAR | South East Asian Region |
| T2D | Type 2 Diabetes |
| WHO | World Health Organisation |

## 3. Executive summary

Mortality and disability due to non- communicable diseases (NCDs) are rising rapidly in South Asian countries and other Lower and middle income countries (LMICs). A particular concern is the exceptionally high burden of cardiovascular disease and diabetes in these countries, especially in India. The Primary Healthcare (PHC) workforce is an integral part of a country's health infrastructure. Given that NCDs, especially T2D and CVD are a continuous growing burden on the health economics of India, a strong PHC system is essential for delivering universal health coverage, effective prevention and control of NCDs and ensuring equal access for all population strata. Countries such as Bangladesh have adapted the World Health Organisation (WHO) Package of Essential Noncommunicable (PEN) disease intervention for primary healthcare in low-resource settings and a technical package for cardiovascular disease management in primary health care (HEARTS) for NCD management. The approach consists of task sharing between members of the PHC team and incorporates community health workers (CHWs) into care delivery for NCD management.

A number of NCD training manuals have been developed in countries such as India, Bangladesh and Sri Lanka at local levels for the PHC workforce and are stratified by the type of PHC provider i.e. CHWs, Allied Health Professionals (AHPs) and Medical Officers (MOs). Although the content in these manuals covers a diverse range of NCD knowledge, the effective delivery of the content to the PHC workforce and the application of this knowledge in terms of the PHC teams providing appropriate NCD care to the community remains a significant challenge.

It is possible that the PHC workforce currently faces difficulties with content acquisition and retention. To address this, it is necessary to identify gaps in the existing training manuals in India and revise them, by incorporating additional skills and knowledge areas that will enhance the learning outcomes amongst the PHC workforce, enabling the application of the knowledge and skills in the form of providing improved NCD care to the community.

This report presents our approach towards identifying the potential gaps in the current NCD training programmes for PHC teams, for the effective delivery of the healthcare interventions recommended for the prevention of T2D and CVD, informed by current guidelines and care pathways.

We adopted a two-stage approach for the identification of potential skill and knowledge areas in which current PHC training programmes for T2D and CVD might be strengthened:

1. **Development of skill domains and key skills –** Generating a list of recommended skills and skill domains, relevant to NCD care provided by PHC teams. The lists were compiled for the respective levels of the PHC workforce for effective prevention, early diagnosis and community-based management of CVD and T2D using evidence-based practice and research evidence.
2. **Mapping skills** – The mapping of current training against a compiled recommended skill list to identify the potential gaps that can be strengthened for effective prevention, early diagnosis and community-based management of CVD and T2D.

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The findings highlight that the current training programmes encompass a vast amount of T2D and CVD knowledge and clinical skills, but the knowledge and skills pertaining to lifestyle and behaviour change techniques (BCTs) and organisation and administrative skills that allow for effective and efficient service delivery are underdeveloped.

Our findings provide the basis for future revisions to training programmes that could potentially enable the PHC team to provide improved NCD care, thereby enhancing NCD clinical and behavioural outcomes in the country.

# 4. Introduction

4.1 Background information

*Primary health care team for prevention and control of NCDs*

A strong PHC system is essential for delivering effective preventive measures and control of chronic disease [1]. The PHC system in India includes physicians, AHPs (eg nurses, midwives, pharmacists, laboratory technicians), and CHWs. Traditionally, chronic disease has been addressed primarily at the level of physicians and AHPs, while CHWs have been focusing on maternal and child health. However due to the focus on health care mainly in urban areas, and the development of tertiary care facilities as opposed to primary and secondary care, the existing PHC system faces challenges in handling the current NCD burden in India.

Considerable research has demonstrated CHW's effective role beyond maternal and child health. Specifically, their involvement in the prevention, early diagnosis and community-based management of T2D and CVD in low resource settings. CHWs have successfully taken on tasks such as NCD screening, providing health education, scheduling referrals and conducting follow-ups amongst members of their communities [2,3,4,5]. CHWs have proven to be cost effective and are well accepted by the community [6], as a result of sharing cultural, linguistic and economic backgrounds with members of their communities.

The effectiveness of including trained CHWs in interventions to obtain effective clinical outcomes for NCDs has been demonstrated in studies carried out in LMICs including India, reporting improvements in HbA1c,[8,9] blood glucose,[10,11] systolic,[11,12,13,14,15] and diastolic,[11,12,14] blood pressure, weight [13,10], waist-hip ratio,[8] waist circumference,[8] BMI [13,10] and cotinine levels [16]. Additionally, a number of randomised controlled trials indicate the positive impact of CHW interventions on knowledge, glycaemic control, low-density lipoprotein level and other risk factor control [17]. Furthermore, a systematic review of trials that utilized CHWs for primary prevention or early detection strategy in the management of NCDs in LMICs revealed that compared with standard care, using CHWs in health programs have the potential to be effective in LMICs, particularly for tobacco cessation, blood pressure and diabetes control[18]. In rural India, findings suggest that CHWs can be trained to provide health education on hypertension and support hypertensive individuals[19]. The available evidence therefore demonstrates, at least in research trials, that an adequately trained PHC team including CHWs, can bridge the provider gap in low-income nations and provide expanded NCD care.

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## *Package of essential non-communicable disease interventions (PEN), HEARTS and skill development of primary health care team*

The WHO has also identified the need for proactive, long-term, patient-centred, community-based and sustainable NCD care, delivered through PHC teams, to achieve impact against NCD at population scale. To facilitate this, the WHO has developed a package of essential NCD interventions (WHO PEN) [20] for PHC teams in low-resource settings. The package includes a prioritized set of cost-effective lifestyle and pharmacological interventions that can be delivered to prevent and control NCDs, including a reduction in tobacco and alcohol consumption, weight regulation, improved diet, increased physical activity, and pharmacological measures for prevention and control of CVD and T2D. The package comes with tools to assess needs and capacity of health system, guidelines to implement the interventions, strengthen health system, and evaluate impact. In 2016, WHO in collaboration with the CDC launched another technical package known as HEARTS [21] to focus specifically on prevention and control of CVD. HEARTS is aligned with and builds on the WHO PEN. Their approach typically involves task sharing and incorporates CHWs into care delivery for chronic disease management.
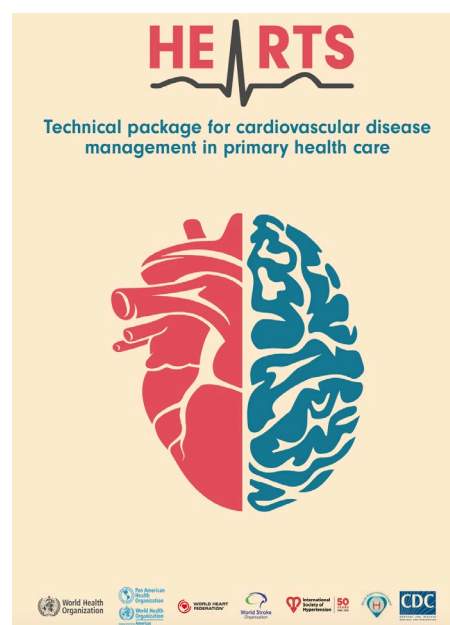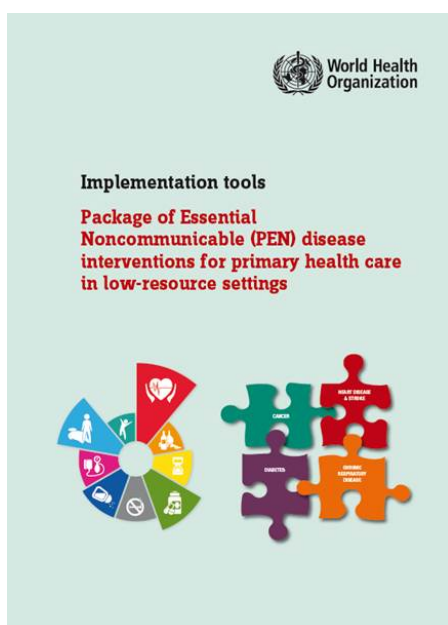
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The governments of the countries in the South-East Asia region (SEAR) have agreed to adopt both WHO PEN and HEARTS interventions in PHC and have attempted to incorporate the approaches into national guidelines and policy. Bhutan was one of the first countries that piloted the WHO PEN intervention using an integrated approach that included T2D management and involved non-physical health workers in the PHC setting. The implementation of the PEN intervention led to an improvement in blood pressure, diabetes control and a reduction in CVD risk[22]. Additionally, an economic evaluation performed on the PEN intervention for PHC in Bhutan[23] supported WHO's claim that the WHO PEN is cost-effective and feasible to implement in all countries [24].

In other SEAR countries such as in India and Thailand, NCD training manuals have been developed at national and local levels[25] in order to target PHC teams and are stratified by the type of PHC provider. For example, India has distinct NCD training manuals in the PHC setting for each of the different skill levels, recognizing that each role varies in terms of their roles and the complexities of the tasks assigned.

The content of the training packages currently being used by the SEAR countries covers a vast amount of NCD knowledge and skill areas however, the most significant challenge is the conversion of the training content delivered to the PHC workforce to the community in the form of appropriate NCD care and thus improved cardiometabolic outcomes.

The presence of NCD knowledge e.g. disease signs and symptoms, risk factors and complications and administering diagnostic tests in training packages is evident. However, research indicates the importance of including additional knowledge and skill areas that have contributed towards achieving enhanced clinical outcomes, particularly T2D and CVD. Behavioural skills, such as those that work towards changing one or more determinants of an individual's behaviour e.g non-confrontational interviewing skills,[10,11] goal setting,[14] social support,[9,14] counseling,[13,14,16] context tailored advice,[12,14] and increasing health seeking behaviour [15] have been incorporated into PHC trainings for T2D and CVD care. Additionally, the effectiveness of incorporating skills that allow the effective delivery of healthcare services such as active listening,[8] problem solving,[10,11,13,14] communication skills and strategies,[8,13] use of equipment and tools,[8, 13] scheduling appointments,[13,14] administering follow- up calls [13] and text reminders,[14] and recording and maintaining documentation [8,9,13,16] for the successful implementation of T2D and CVD care in PHC setting in LMICs has been demonstrated.

Although there are several contributing factors for the successful implementation of T2D and CVD care by the PHC workforce in LMICs, the training provided to the PHC teams appears to play a crucial role in obtaining improved clinical measures, behaviours and thus health outcomes in T2D and CVD intervention programmes. Ensuring that the content of NCD training manuals for PHC teams in India adequately incorporate lifestyle, behavioural and service delivery, in addition to knowledge and clinical skills areas, could potentially improve the delivery and fidelity of T2D and CVD interventions and thus clinical outcomes in the country.

## KEY MESSAGES

- **High burden of NCDs especially T2D and CVD in India.**

- **PHC teams are essential for providing T2D and CVD care to decrease disease burden.**

- **High disease burden may be indicative of the PHC workforce's difficulties with understanding, retaining and applying the training content**

- **Identifying the gap in knowledge and skills in the existing training manuals provide the basis for future revisions.**

- **Future revisions should incorporate additional skills and knowledge areas that aid the learning outcomes amongst the PHC workforce**

- **Improved learning outcomes amongst PHC teams may improve delivery of T2D and CVD care and thus enhance clinical and behavioural outcomes.**

4.2 Aim

To evaluate current PHC training programmes for NCD in India to identify potential areas in which these programmes might be strengthened, for the effective delivery of interventions for the prevention and control of T2D and CVD by PHC teams.
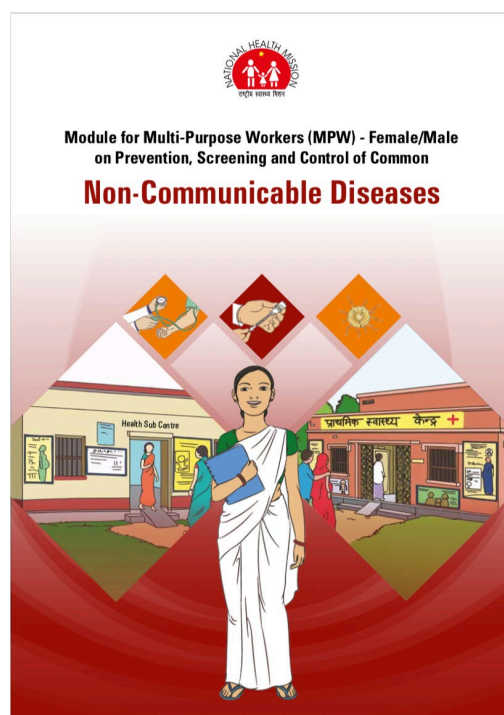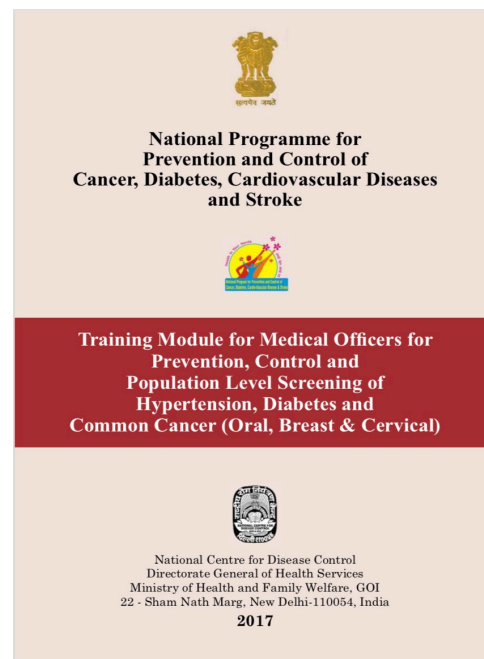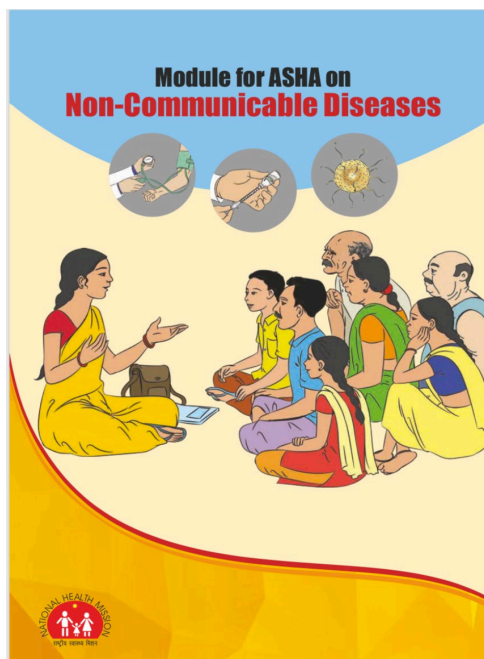
# 5.Methodology

## 5.1 Team expertise

The research team was drawn from a variety of disciplines including medicine, NCDs, public health and Bio-technology and were from five countries (India, Sri Lanka, Bangladesh, Australia and England). The members are active in their fields and engaged in investigating, designing and/or delivering T2D and CVD interventions including behaviour change interventions. The members agreed to take part and were actively involved in sharing their discipline expertise.

## 5.2 Development of skill domains and skills

The research team compiled a list of skill domains and key skills that are recommended and relevant to T2D and CVD care provided by PHC teams. The components (skill domains and their respective knowledge and skills) have been designed for the 3 respective levels of the primary health care workforce ie. Accredited Social Health Activist (ASHAs), Auxiliary Nurse Midwife (ANM) and MOs, capturing the difference in their roles and the level of their complexities. The components include both didactic and practical components for the effective prevention, early diagnosis and community-based management of T2D and CVD.

### 5.2.1. Skill domains

A rigorous literature review indicated that interventions delivered by PHC teams, that achieved effective clinical outcomes in low resource settings, trained members of the PHC team on skills pertaining to the following themes:

1. **NCD knowledge**: NCD related skills that work towards the specific study objectives such as providing an overview of the disease, risk factors, complications, anthropometric measurements, calculating BMI, measurement of blood glucose, blood pressure and pulse rate, details of medications for the disease, medication adherence, foot care, lifestyle strategies and latest guidelines.

2. **Behavioural skills**:  Enabling the PHC workforce to move beyond conceptual understanding to demonstrated ability E.g. interviewing techniques, goal setting, social support, counselling techniques, providing context tailored advice, and ways of increasing health seeking behaviour.

3. **Service delivery skills**: Skills that ensure tasks are executed appropriately such as understanding and following ethics and confidentiality, using equipment and tools correctly, scheduling appointments and follow ups and maintaining the required documentation.

In light of the improved clinical outcomes obtained in the studies carried out in LMIC settings, along with the emphasis on skills and knowledge areas relating to these three themes, the importance of including them was imperative. The themes were re-named by the research team to reflect their characteristics. Additionally, a description for each theme/domain was included in order for them to be distinct, easily distinguishable from one another and for this to be an efficient method by which knowledge and skills can be categorized. The three skill domains and their descriptions have been outlined in **Table 1**.

| Domain | Domain name | Domain Description |
|---|---|---|
| 1 | Knowledge and Clinical skills | Practical understanding of T2D and CVD and clinical skills to manage it (Screening, risk stratification, clinical review of patients, measurements, cut-off values, use of equipment and tools, identifying patients, community mobilisation) |
| 2 | Lifestyle intervention and behaviour change skills | Specific capabilities that have been demonstrated to change a behaviour (Healthy diet, salt reduction, weight management, physical activity, tobacco cessation, prevention of harmful use of alcohol and medication adherence) |
| 3 | Care delivery skills | Capabilities to manage patient care efficiently and effectively (e.g. record keeping, scheduling appointments and patient care coordination, communication skills, problem solving, basic information technology (IT) literacy |

**Table 1: Skill domains and their descriptions**

<u>5.2.2. Knowledge and skills</u>

**Domain 1. Knowledge and Clinical skills**: The development of the skills and knowledge areas was supported by research evidence carried out in LMICs, including India wherein the T2D and/or CVD interventions implemented by members of the PHC workforce resulted in improved clinical outcomes. However, majority of the recommended skills and knowledge areas were developed through the process of reviewing current NCD guidelines, care pathways and using the clinical expertise offered by the clinicians of the GHRU research team. The initial list of skills and knowledge areas was developed and reviewed by various members of the team. Appropriate revisions were made before the list was finalised.

**Domain 2. Lifestyle intervention and behaviour change skills**: On reviewing research carried out in similar settings, the presence of skills relating to this domain were apparent. However, the types of BCTs considered in these studies varied depending on the study's objectives. The use of numerous different BCTs in each of the studies, and the extent to which these findings can be generalised across behaviours and health conditions was debatable. Therefore, the decision to include numerous BCTs in order for them to be applicable to a range of behaviours and used in conjunction with one another to obtain a higher success rate in terms of achieving the required behavioural changes was made. The BCT taxonomy, an extensive taxonomy of 93 consensually agreed, distinct BCTs [26] was reviewed. The use of these respective techniques and their effectiveness in previous research led to the decision of using these techniques and the associated definitions and examples.

**Domain 3. Care delivery skills**: The skills for this domain were developed using the findings obtained during our initial search to identify our broader domain areas. The findings indicated the importance of incorporating skills that enable the PHC workforce to carry out their tasks and provide health care service in an effective and efficient way. The clinicians on the research team provided their insights on the same. Although there is a lack of evidence on NCD interventions delivered by PHC teams using digital platforms, the technical experts in the team highlighted the important role of technology in providing T2D and CVD care e.g. maintaining patient records on a database, scheduling electronic appointments and referrals, using appropriate medical equipment etc. The initial list of knowledge and skills was developed and reviewed by a number of clinicians and technical experts on the team. Appropriate revisions were made before the list was finalised.

## 5.3 Mapping skills

The existing NCD training documents for the PHC workforce in India were mapped against the recommended and identified skill domains and their respective knowledge and skill areas for the three levels of the PHC workforce. This task required two members of the team (investigators) to go through the list of skills for each domain and mark a skill as being i.Present, ii.Not present or iii. Requires adaptations/enhancements and provide any supporting comments if required. The exercise was carried out with the aim to identify the gaps in the current training documents that could then be addressed by incorporating the missing knowledge and skill areas for effective prevention, early diagnosis and community-based management of T2D and CVD.

The following are the steps followed to complete the mapping skills exercise:

### 5.3.1. Existing PHC NCD training documents

An investigator, who resided and worked in India was required to provide the most up-to-date versions of the training documents used to train the PHC workforce in their country (**See Table 2**). These documents could include trainer/facilitator guides, NCD guidelines, tools e.g. flipcharts and posters and any other supplementary materials such as presentations, videos etc that was used in the delivery of these PHC trainings.

| CHW (ASHA) | AHP (ANM) | MO |
|---|---|---|
| ASHA NCD Module (2017) | Multi-Purpose Workers (MPW)-on Prevention, Screening & Control of NCD (2017) | Module for MOs for Prevention, Control & PBS of Hypertension, Diabetes & Common Cancer (2017) |

**Table 2**. Existing NCD training documents for PHC teams in India

### 5.3.2. Mapping procedures

The mapping exercise was carried out by the in-country (India) and an out of country investigator (from Sri Lanka), both of whom were nominated by the research team to complete this task. The investigators were briefed about the aim and the procedures of the exercise and were given a Standard Operating Procedures manual to ensure the same procedures were followed by both the investigators.

### 5.3.3. Collating and comparing results

The results from the two mapping investigators (in and out of country) were compiled and presented alongside each other, to compare the two responses. The investigators' responses were colour coded to indicate their i.Agreements, ii.Disagreements, iii.Partial agreements or iv.Incomplete skill. See **Table 3.** for the descriptions used to colour code the investigators responses.

| | |
|---|---|
| **Agreement** | When the two investigators have the same response i.e. Both the investigators mark a skill as being present and provide the same page/section references OR both the investigators mark a skill as NOT being present |
| **Disagreement** | When the two investigators have different responses i.e One investigator marks a skill as being present and the other investigator marks the same skill as NOT being present OR the two investigators marked a skill as being PRESENT but provide different page/section references e.g. One investigator provides page numbers 1-5 and the other provides page numbers 31 and 12 as references |
| **Partial agreements** | When the two investigators mark a skill as being present BUT provide overlapping page/section references e.g. One investigator provides page numbers 1-5 and the other provides page numbers 4-7 as references |
| **Incomplete skill** | When the two investigators mark a skill as being present and both investigators provide comments that mention that the skill is incomplete e.g partial information for the skill has been presented in the training manual |

**Table 3**. Method followed for colour coding investigator responses

### 5.3.4. Resolving discrepancies

When there was a disagreement between the two investigators on whether a skill was present or not, the final decision was taken by introducing a mediator. A meeting was held wherein the in and out of country investigators, along with a central coordinator and a mediator from the research team were present. The mediator's role was to assess the two responses and refer to the respective training manuals to make a final decision on whether or not the skill is present and, in some cases, if a skill was incomplete and needed adaptation or further enhancements. The mediator's decision and comments were recorded by the central coordinator and was regarded as the final response. All the disagreements between the two investigators were resolved using this process.

# 6. Results

The analysis generated a list of skills that are present, not present and those that need to be adapted or further enhanced. The analysis was colour coded to indicate the same.

## 6.1 CHW

|  | Domain 1 Knowledge and Clinical skills (See Appendix A. Table 1.) | Domain 2 Lifestyle Intervention and Behaviour Change Skills (See Appendix A. Table 2.) | Domain 3 Care delivery skills (See Appendix A Table 3) |
|---|---|---|---|
| **No. of skills present** | 11 | 2 | 0 |
| **No. of skills not present** | 12 | 14 | 17 |
| **No. of skills that require enhancements/adaptations** | 4 | 0 | 1 |

**Table 4.** Skill Gap analysis for CHWs

## 6.2 AHP

|  | Domain 1 Knowledge and Clinical skills (See Appendix B. Table 1.) | Domain 2 Lifestyle Intervention and Behaviour Change Skills (See Appendix B. Table 2.) | Domain 3 Care delivery skills (See Appendix B. Table 3) |
|---|---|---|---|
| **No. of skills present** | 12 | 1 | 0 |
| **No. of skills not present** | 15 | 12 | 18 |
| **No. of skills that require enhancements/adaptations** | 0 | 3 | 1 |

**Table 5.** Skill Gap analysis for AHPs

## 6.3 MO

|  | Domain 1 Knowledge and Clinical skills (See Appendix C. Table 1.) | Domain 2 Lifestyle Intervention and Behaviour Change Skills (See Appendix C. Table 2.) | Domain 3 Care delivery skills (See Appendix C. Table 3) |
|---|---|---|---|
| **No. of skills present** | 15 | 0 | 1 |
| **No. of skills not present** | 12 | 16 | 5 |
| **No. of skills that require enhancements/adaptations** | 0 | 0 | 0 |

**Table 6.** Skill Gap analysis for MOs

## 7. Discussion

The detailed mapping of the existing NCD training manuals for the prevention and control of T2D and CVD for the PHC teams, against a list of recommended skills for them, was carried out to identify if there is a gap in knowledge and skills. The poor clinical outcomes and the high T2D and CVD disease burden in India may be due to the absence of certain knowledge and skills areas from the training documents of PHC teams, thereby hindering the quality of care being provided to the members of the community.

Our findings provide support that there is a gap in knowledge and skills in the current PHC training curriculums for providing appropriate T2D and CVD care. Although the curriculums encompass a vast amount of NCD knowledge and skills as indicated by the presence of the skills and knowledge pertaining to Domain 1: Knowledge and clinical skills, the remaining two domains i.e. Lifestyle and behaviour change techniques and Care delivery skills appear to be underdeveloped. The latter two domains consist of the knowledge and skill areas that in previous research, have been successful in achieving improved clinical outcomes in similar settings. The types of skills and knowledge included in Domains 2 and 3 allow for the conversion of the NCD knowledge into practice, thereby allowing the PHC members to provide appropriate care to obtain enhanced outcomes. Additionally, the practical and interactive approaches included in Domains 2 and 3 aid the acquisition of knowledge and increase overall learning outcomes which in turn may result in improved care being provided by the PHC teams.

There are three distinct training manuals for each of the three PHC skill levels (CHW, AHP and MO) in India, that clearly distinguishes and recognises the difference in roles and duties along with level of complexities of tasks for each skill level. However, as the manuals have been published in 2017, it is important to ensure that the content is verified with the concerned governmental bodies and the content is validated and kept up-to-date.

As per the recommended list of knowledge and skills compiled by the research team, although domain 1 is more dominant in its presence in comparison to domains 2 and 3, there are several shortcomings observed with regard to the domain. The training manuals fail to acknowledge "CVD" and instead only discuss hypertension. Additionally, there are certain skill areas that have briefly been mentioned, but require enhancements and elaborations in terms of their complexities as per the skill level they have been designed for. Furthermore, a few BCTs from Domain 2 have been included however, these techniques

require enhancements, in terms of including their mechanisms of change and practical use for a range of lifestyles and behaviours as opposed to just one e.g. the concept of goal setting has been introduced in relation to tobacco and smoking cessation only. With regard to Domain 3, the knowledge and skills are limited and require development, especially given that the current training manuals do not include the use of technology in providing care, an essential component used to provide health care today.

The methodology used to identify the gaps in existing NCD training manuals for PHC teams enabled a thorough exploration of information that is required to develop an effective training package. This extensive exercise provided us with a wealth of information regarding the current skills and knowledge in PHC training manuals, the mechanism of the PHC system, the use of various tools and resources, guidelines and care pathways, implementation of PHC trainings e.g. training schedules, trainer criteria's etc. This key information will be vital in developing a PHC training package to provide effective T2D and CVD care to the Indian community.

Given the present findings, an imperative is to address the identified gaps in knowledge and skills in the current training manuals by incorporating the skill and knowledge areas that are missing or require enhancements or adaptations. Given that the main source of information which PHC teams have access to in terms of T2D and CVD are the training manuals, revising them to include the identified skill and knowledge areas may result in improved clinical outcomes and can have a positive impact on the NCD  burden in the country. Furthermore, it is important to acknowledge that the addition and enhancement of the identified skill and knowledge areas will require clinical and education expert(s) whose expertise lay within the area of public health with a focus on NCDs. Additionally, the ongoing support of the local and national governments will be essential and valuable for this to be a success.

## 8. Conclusion

The PHC workforce is an integral part of a country's health system. Given that T2D and CVD are a continuous growing burden on the health economics of India, the effectiveness of T2D and CVD care provided by PHC teams can shape the health status of a country. The training of the PHC workforce therefore becomes an important aspect in achieving these desired goals. Existing NCD training packages for the PHC teams target a diverse range of T2D and CVD related knowledge and skills but lack those pertaining to lifestyle interventions and BCTs and service delivery skills. Addressing the existing gap in knowledge and skill areas may better equip the PHC teams to provide enhanced T2D and CVD care and therefore improve T2D and CVD clinical outcomes in India. The addition and enhancements of the identified knowledge and skills areas will require clinical and educational expertise, along with the support of the national and local governmental authorities.

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## 10.Appendices

**Appendix A.** CHW Result gap analysis of skills and knowledge for Domains1- 3.

The list of skills that have been colour coded as the following:

| | |
|---|---|
| Skill Present | Green |
| Skill Absent | Red |
| Skill to be enhanced/adapted | Orange |

| Topic | Knowledge/skill | Skill Present (Yes/ No) Comments (if any) |
|---|---|---|
| | *Background knowledge* | |
| | *Purpose: To have a basic understanding of the following, with the aim to provide culturally appropriate health education and information and navigate participants through the health care system by providing assistance with enrolment and referrals to ensure that participants get the services they need.* | |
| **Non-Communicable Diseases** | **1.1** Types and emphasize on the characteristics: chronic, preventable and modifiable | To be enhanced |
| **T2D and CVD** | **1.2** Definition and knowledge of complications | To be enhanced |
| **T2D and CVD risk factors** | **1.3** Risk factors (Excess weight, smoking, sedentary lifestyle and alcohol) | To be enhanced |
| **T2D and CVD symptoms** | **1.4** How to identify common symptoms (Excessive thirst, lethargy, weight loss and non-healing wounds) | To be enhanced |
| **Public Healthcare system** | **1.5** Organisation of the Public Healthcare system and how to navigate through it | Yes |
| **Public Healthcare workforce** | **1.6** Roles and functions of Community Health Workers | Yes |
| **Community mobilisation** | **1.7** Community mobilisation and encouraging participation | No |
| **T2D and CVD Guidelines** | **1.8** Overview of evidence-based guidelines | No |
| **Continuous medical education** | **1.9** Up-to date knowledge of precise measurement techniques (equipment and process) | Yes |
| **Medical record keeping** | **1.10** Recording measurements in the correct units | No |
| **Capacity building** | **1.11** Health awareness amongst community members | Yes |
| | **2. Measurement and ranges** | |
| | *Purpose: To administer health screening tests relating to T2D and CVD accurately, and have the ability to identify the need for referral if test values do not fall within the normal range.* | |

| Blood pressure | **2.1** Measure accurately | Yes |
|---|---|---|
| Height | **2.2** Measure accurately | No |
| Weight | **2.3** Measure accurately | No |
| Body Mass Index | **2.4** Calculate correctly | No |
| Blood Glucose | **2.5** Administer test | Yes |
| Total Cholesterol | **2.6** Administer test | No |
| | **3. Risk stratification** | |
| | *Purpose*: To have the ability to stratify participants according to their T2D and CVD risk status (low, high or disease). | |
| T2D and CVD risk status | **3.1** Stratify using WHO 10 - year risk prediction chart | No |
| | **4. Advice** | |
| | *Purpose*: To provide basic level advise and to educate participants and their families on the importance of making lifestyle changes. | |
| Blood pressure | **4.1** Reduce salt intake | Yes |
| Body Mass Index and weight management | **4.2** Body weight (measured) is high in relation to height (measured) | No |
| Fasting Blood Glucose (FBG) | **4.3** More than 120mg/dl and HbA1c more than 6.5% indicates Diabetes. In already diagnosed diabetics a high FBG (more than 120 mg/dl) indicates poor control | No |
| Cholesterol | **4.5** Reducing oil intake, limiting fried foods and consuming healthy oils | No |
| Smoking | **4.6** Limit/stop active and passive smoking | Yes |
| Alcohol | **4.7** Reduce consumption | Yes |
| Fruits and vegetables | **4.8** Increase intake and provide options | Yes |
| Physical Activity | **4.10** Increase daily/weekly activity | Yes |
| | **5. Follow-up** | |
| | *Purpose*: To evaluate the current health condition of participants by re-taking measurements and re-assessing their health risk. The follow up protocol will guide the participant to appropriate care and ensure that preventative measures can be applied. | |
| Protocol | **5.1** Adhere-escalate as per the protocol | No |

**Table 1. CHW, Domain 1 skill gap analysis**

| Skill label | Skill Definition | Skill Present (Yes/ No) Comments (if any) |
|---|---|---|
| 1. **Goals and planning** | Techniques that help people to set goals for their behaviour or for an outcome of the behaviour (e.g. weight loss) and plan how these goals will be met. Action plans include a description of what will happen in what situation or at what time: how often it will happen, for how long, and where it will take place. Behaviour goals are reviewed in the light of | No |

| | | |
|---|---|---|
| | experience and further plans are made according to past progress. | |
| 2. **Feedback and monitoring** | A specific behaviour (e.g. alcoholic drinks consumed) or outcome (e.g. changes in weight following changes to diet) is recorded. The person trying to change their behaviour is given feedback on the recorded behaviour or outcomes. | No |
| 3. **Social support** | Social support involves friends, relatives, or colleagues providing support for people who want to change their behaviour. | Yes |
| 4. **Shaping knowledge** | Providing information to increase knowledge on a healthy lifestyle. | Yes |
| 5. **Natural consequences** | Providing information about the consequences of the outcomes that happen as a result of behaviour. | No |
| 6. **Comparison of behaviour** | Provide comparative data (standard behaviour, person's own past behaviour, others' behaviour). | No |
| 7. **Repetition and substitution** | Prompt repetition of the behaviour in the same context repeatedly so that the context elicits the behaviour and prompts substitution of the unwanted behaviour with a wanted or neutral behaviour. | No |
| 8. **Reward and threat** | Minimize a person's threats and maximize their rewards in regard to a specific behaviour. | No |
| 9. **Regulation** | Facilitate the performance of the behaviour by teaching methods to increase the frequency and/or intensity of the behaviour. | No |
| 10. **Antecedents** | Provide information about antecedents (e.g. social and environmental situations and events, emotions, cognitions) that reliably predict performance of the behaviour. | No |
| 11. **Identity** | Integrate the behaviour with the identity of the person. The behaviour becomes robust to change because it is so closely linked to central self-views. | No |
| 12. **Self-belief** | Instil confidence in one's own abilities or judgment to change a behaviour. | No |
| 13. **Associations** | Introduce or define environmental or social stimulus with the purpose of prompting or cueing the behaviour. | No |
| 14. **Comparison of outcomes** | Comparing the different outcomes in favour or against the behaviour. | No |

| 15. Scheduled consequences | The withdrawal of something valued if an unwanted behaviour is performed. | No |
| 16. Covert learning | Learning about a behaviour using only mental processes e.g. visualising, predicting, inferring. | No |

**Table 2. CHW, Domain 2 skill gap analysis**

| Skill | Skill definition | Skill Present (Yes/ No) Comments (if any) |
|---|---|---|
| 1. Data entry | Collecting participant data (paper based and electronically) | No |
| 2. Data processing | Create/save/retrieve files, typing, editing documents, generating passwords, creating reports, printing and system navigation | No |
| 3. Scheduling appointments and enrolments | Paper based and electronically | No |
| 4. Scheduling referrals | Paper based and electronically | No |
| 5. Maintenance of consumables and equipment | Ensuring appropriate maintenance of consumables and equipment (quantity, cleaning and use) | No |
| 6. Data quality | Paper based and electronically | No |
| 7. Basic technology troubleshooting | Basic troubleshooting of equipment, and computer hardware and software and applications | No |
| 8. Speaking | Ability to verbally convey information correctly | No |
| 9. Active listening | Giving full attention to what other people are saying, understand the points being made, asking questions as appropriate, and not interrupting | No |
| 10. Writing | Communicating effectively in writing as appropriate for the needs of others | No |
| 11. Service coordination | Working together with team members | No |
| 12. Service orientation | Actively looking for ways to help people | No |
| 13. Time management | Managing one's own time, dividing time between specific activities appropriately | No |

| | | |
|---|---|---|
| **14. Stress Tolerance and management** | Accepting criticism and dealing with situations calmly and effectively | No |
| **15. Problem solving** | Identifying problems and reviewing related information to develop and evaluate options and implement solutions | No |
| **16. Cultural competence** | Having an awareness of others' views and cultures | No |
| **17. Knowledge of equipment and procedures** | Ability to use equipment appropriately and well versed with all operating procedures | To be enhanced |
| **18. Protection of people, data and property** | Well versed with the procedures of safeguarding data, people and property | No |

**Table 3. CHW, Domain 3 skill gap analysis**

# NIHR Global Health Research Unit

**Appendix B.** AHP Result gap analysis of skills and knowledge for Domains1- 3.

The list of skills that have been colour coded as the following:

| | |
|---|---|
| Skill Present | Green |
| Skill Absent | Red |
| Skill to be enhanced/adapted | Orange |

| Topic | Knowledge/skill | Skill Present (Yes/ No) Comments (if any) |
|---|---|---|
| | *Background knowledge* | |
| | *Purpose: To have a comprehensive understanding of the following topics with the aim to provide culturally appropriate health education and information and navigate participants through the health care system by providing assistance with enrolment and referrals to ensure that people get the services they need.* | |
| **Non-Communicable Diseases** | **1.1** Definition and characteristics (common symptoms) of each type | Yes |
| **T2D and CVD** | **1.2** Definition, complications and early identification of complications | Yes |
| **T2D and CVD risk factors** | **1.3** Risk factors and their identification (**behavioural**: smoking, alcohol consumption, physical activity and **clinical**: BMI, BP, and shortness of breath, blurred vision, swelling of feet, non-healing wounds) | Yes |
| **T2D and CVD symptoms** | **1.4** Diagnosis (Identification of symptoms and investigations), lifestyle modification measures and prevention of complications | Yes |
| **Public Healthcare system** | **1.5** Organisation of the Public Healthcare system and how to navigate through it | No |
| **Public Healthcare workforce** | **1.6** Roles and functions of Allied Health professionals | Yes |
| **Community mobilisation** | **1.7** Community mobilisation and encouraging participation | No |
| **T2D and CVD Guidelines** | **1.8** Up-to date recommendations based on evidence-based guidelines | Yes |
| **Continuous medical education** | **1.9** Up-to-date knowledge of precise measurement techniques (equipment and process) | No |
| **Medical record keeping** | **1.10** Recording measurements in correct units | No |
| **Capacity building** | **1.11** Health awareness amongst community members and organising educational and teaching activities which will benefit the Community Health Workers | No |

| | 2. Measurement and ranges | |
|---|---|---|
| | *Purpose: To administer health screening tests relating to T2D and CVD, interpret results and have the ability to identify the need for referral if test values do not fall within the normal range.* | |
| **Blood pressure** | **2.1** Measure and interpret accurately | No |
| **Height** | **2.2** Measure and interpret accurately | No |
| **Weight** | **2.3** Measure and interpret accurately | No |
| **Body Mass Index** | **2.4** Calculate and interpret accurately | Yes |
| **Blood Glucose** | **2.5** Administer test and interpret results accurately | No |
| **Total Cholesterol** | **2.6** Administer test and interpret results accurately | No |
| | **3. Risk stratification** | |
| | *Purpose: To have the ability to stratify participants according to their T2D and CVD risk status (low, high or disease) and use this information to direct care and improve participants' overall health outcomes.* | |
| **T2D and CVD risk status** | **3.1** Stratify using WHO 10 - year risk prediction chart and identify participants' needs and provide case specific care | No |
| | **4. Advice** | |
| | *Purpose: To provide advanced level advise that specifies the details of the lifestyle changes that need to be made by the participant and to educate participants and their families on the importance of making these lifestyle changes.* | |
| **Blood pressure** | **4.1** Salt and oil reduction with specified amount and discuss benefits and adverse effects | No |
| **Body Mass Index and weight management** | **4.2** Adequate and timely weight reduction and discuss benefits and adverse effects | No |
| **Fasting Blood Glucose (FBG)** | **4.3** Advise for HbA1c test and discuss benefits and adverse effects of poor control and neglect | No |
| **Cholesterol** | **4.5** Limiting the amount of oil consumed per person per month and discuss benefits and adverse effects | No |
| **Smoking** | **4.6** Discuss adverse effects of active and passive smoking and benefits of smoking cessation | Yes |
| **Alcohol** | **4.7** Limit consumption, daily unit allowance and discuss adverse effects and benefits of limited intake | Yes |
| **Fruits and vegetables** | **4.8** Increase intake by _ amount/day, specify types of fruits and vegetables to be eaten, discuss healthier recipes and discuss benefits e.g. targets obesity, antioxidants, healthy for heart and low glycaemic | Yes |
| **Physical Activity** | **4.10** Increase and specify types of exercise and specific time spent exercising every day and discuss benefits | Yes |
| | **5. Follow-up** | |
| | *Purpose: To evaluate the current health condition of participants by re-taking measurements and re-assessing* | |

| | | |
|---|---|---|
| | *their health risk. The follow up protocol will guide the participant to appropriate care and ensure that preventative measures can be applied.* | |
| **Protocol** | **5.1** Adhere-escalate as per the protocol | Yes |

**Table 1. AHP, Domain 1 skill gap analysis**

| Skill label | Skill Definition | Skill Present (Yes/ No) Comments (if any) |
|---|---|---|
| 1. **Goals and planning** | Techniques that help people to set goals for their behaviour or for an outcome of the behaviour (e.g. weight loss) and plan how these goals will be met. Action plans include a description of what will happen in what situation or at what time: how often it will happen, for how long, and where it will take place. Behaviour goals are reviewed in the light of experience and further plans are made according to past progress. | Needs to be enhanced to be applicable to all lifestyle behaviours |
| 2. **Feedback and monitoring** | A specific behaviour (e.g. alcoholic drinks consumed) or outcome (e.g. changes in weight following changes to diet) is recorded. The person trying to change their behaviour is given feedback on the recorded behaviour or outcomes. | Needs to be enhanced to be applicable to all lifestyle behaviours |
| 3. **Social support** | Social support involves friends, relatives, or colleagues providing support for people who want to change their behaviour. | Needs to be enhanced to be applicable to all lifestyle behaviours |
| 4. **Shaping knowledge** | Providing information to increase knowledge on a healthy lifestyle. | Yes |
| 5. **Natural consequences** | Providing information about the consequences of the outcomes that happen as a result of behaviour. | No |
| 6. **Comparison of behaviour** | Provide comparative data (standard behaviour, person's own past behaviour, others' behaviour). | No |
| 7. **Repetition and substitution** | Prompt repetition of the behaviour in the same context repeatedly so that the context elicits the behaviour and prompts substitution of the unwanted behaviour with a wanted or neutral behaviour. | No |
| 8. **Reward and threat** | Minimize a person's threats and maximize their rewards in regard to a specific behaviour. | No |

| | | |
|---|---|---|
| 9. **Regulation** | Facilitate the performance of the behaviour by teaching methods to increase the frequency and/or intensity of the behaviour. | No |
| 10. **Antecedents** | Provide information about antecedents (e.g. social and environmental situations and events, emotions, cognitions) that reliably predict performance of the behaviour. | No |
| 11. **Identity** | Integrate the behaviour with the identity of the person. The behaviour becomes robust to change because it is so closely linked to central self-views. | No |
| 12. **Self-belief** | Instil confidence in one's own abilities or judgment to change a behaviour. | No |
| 13. **Associations** | Introduce or define environmental or social stimulus with the purpose of prompting or cueing the behaviour. | No |
| 14. **Comparison of outcomes** | Comparing the different outcomes in favour or against the behaviour. | No |
| 15. **Scheduled consequences** | The withdrawal of something valued if an unwanted behaviour is performed. | No |
| 16. **Covert learning** | Learning about a behaviour using only mental processes e.g. visualising, predicting, inferring. | No |

**Table 2. AHP, Domain 2 skill gap analysis**

| **Skill** | **Skill definition** | **Skill Present (Yes/ No) Comments (if any)** |
|---|---|---|
| 1. **Data entry** | Collecting participant data (paper based and electronically) | To be adapted |
| 2. **Data processing** | Create/save/retrieve files, typing, editing documents, generating passwords, creating reports, printing and system navigation | No |
| 3. **Scheduling appointments and enrolments** | Paper based and electronically | No |
| 4. **Scheduling referrals** | Paper based and electronically | No |
| 5. **Maintenance of consumables and equipment** | Ensuring appropriate maintenance of consumables and equipment (quantity, cleaning and use) | No |

| | | |
|---|---|---|
| **6. Data quality** | Paper based and electronically | No |
| **7. Data monitoring** | Proactively reviewing and evaluating your data to ensure that it is fit for purpose | No |
| **8. Basic technology troubleshooting** | Basic troubleshooting of equipment, and computer hardware and software and applications | No |
| **9. Speaking** | Ability to verbally convey information correctly | No |
| **10. Active listening** | Giving full attention to what other people are saying, understand the points being made, asking questions as appropriate, and not interrupting | No |
| **11. Writing** | Communicating effectively in writing as appropriate for the needs of others | No |
| **12. Service coordination** | Working together with team members | No |
| **13. Service orientation** | Actively looking for ways to help people | No |
| **14. Time management** | Managing one's own time, dividing time between specific activities appropriately | No |
| **15. Stress Tolerance and management** | Accepting criticism and dealing with situations calmly and effectively | No |
| **16. Problem solving** | Identifying problems and reviewing related information to develop and evaluate options and implement solutions | No |
| **17. Cultural competence** | Having an awareness of others' views and cultures | No |
| **18. Protection of people, data and property** | Well versed with the procedures of safeguarding data, people and property | No |
| **19. Knowledge of equipment and procedures** | Ability to use equipment appropriately and well versed with all operating procedures | No |

**Table 3. AHP, Domain 3 skill gap analysis**

**Appendix C.** MO Result gap analysis of skills and knowledge for Domains1- 3.

The list of skills that have been colour coded as the following:

| | |
|---|---|
| Skill Present | Green |
| Skill Absent | Red |
| Skill to be enhanced/adapted | Orange |

| Topic | Knowledge/skill | Skill Present (Yes/ No) Comments (if any) |
|---|---|---|
| | ***Background knowledge*** | |
| | ***Purpose:*** *To provide effective and efficient T2D and CVD management, culturally appropriate health education and information to prevent T2D and CVD in the community, establish an effective referral mechanism and assist in capacity building of PHC teams.* | |
| **Non-Communicable Diseases** | **1.1** Burden at global and national level | No |
| **T2D and CVD** | **1.2** Burden at global and national level | No |
| **T2D and CVD risk factors** | **1.3** Screening for risk factors (**T2D**: pedal pulse, sensation on the foot, RBS, regular and retina check **CVD**: BP and ECG) | No |
| **T2D and CVD symptoms** | **1.4** Assess symptomology of complications (e.g. burning sensation of the feet) | Yes |
| **Public Healthcare system** | **1.5** Facilities and capabilities of health care centres | Yes |
| **Public Healthcare workforce** | **1.6** Roles and functions of primary health care teams | Yes |
| **Community mobilisation** | **1.7** Identify and target vulnerable population(s) and provide effective and timely referral to specialist centre/care | Yes |
| **T2D and CVD Guidelines** | **1.8** T2D (ADA) and Hypertension (AHA) and up-to-date knowledge of diagnosis, management and complications and standardised care pathways | Yes |
| **Continuous medical education** | **1.9** Up-skill prescribing knowledge (regimens, doses and side effects) | Yes |
| **Medical record keeping** | **1.10** Legible and detailed medical recording and reporting | No |

| Capacity building | **1.11** Engage in educational and teaching activities which will benefit PHC teams | Yes |
|---|---|---|
| | **2. Measurement and ranges** | |
| | ***Purpose***: *To Advise participant for case specific advance testing or to prescribe* | |
| **Blood pressure** | | Yes |
| **Height** | | No |
| **Weight** | | Yes |
| **Body Mass Index** | | Yes |
| **Blood Glucose** | | Yes |
| **Total Cholesterol** | | No |
| | **3. Risk stratification** | |
| | ***Purpose***: *To have the ability to correlate medical tests with participants' T2D and CVD risk factors to plan adequate management and refer to specialist (if required)* | |
| **T2D and CVD risk status** | **3.1** Provide case specific care, based on participants' risk status | Yes |
| | **4. Advice** | |
| | ***Purpose***: *To provide specific e.g. Age, targeted advice. Tailored to address individual needs e.g. prescribing based on co-morbid conditions.* | |
| **Blood pressure** | | Yes |
| **Body Mass Index and weight management** | | No |
| **Fasting Blood Glucose (FBG)** | | Yes |
| **Cholesterol** | | No |
| **Smoking** | | No |
| **Alcohol** | | No |
| **Fruits and vegetables** | | No |
| **Physical Activity** | | No |
| | **5. Follow-up** | |
| | ***Purpose***: *Optimisation of participant medication, and ensuring adequate adherence to lifestyle intervention and medication.* | |
| **Protocol** | **5.1** Adhere-escalate as per the protocol | Yes |

# NIHR Global Health Research Unit

**Table 1. MO, Domain 1 skill gap analysis**

| Skill label | Skill Definition | Skill Present (Yes/ No) Comments (if any) |
|---|---|---|
| 1. **Goals and planning** | Techniques that help people to set goals for their behaviour or for an outcome of the behaviour (e.g. weight loss) and plan how these goals will be met. Action plans include a description of what will happen in what situation or at what time: how often it will happen, for how long, and where it will take place. Behaviour goals are reviewed in the light of experience and further plans are made according to past progress. | No |
| 2. **Feedback and monitoring** | A specific behaviour (e.g. alcoholic drinks consumed) or outcome (e.g. changes in weight following changes to diet) is recorded. The person trying to change their behaviour is given feedback on the recorded behaviour or outcomes. | No |
| 3. **Social support** | Social support involves friends, relatives, or colleagues providing support for people who want to change their behaviour. | No |
| 4. **Shaping knowledge** | Providing information to increase knowledge on a healthy lifestyle. | No |
| 5. **Natural consequences** | Providing information about the consequences of the outcomes that happen as a result of behaviour. | No |
| 6. **Comparison of behaviour** | Provide comparative data (standard behaviour, person's own past behaviour, others' behaviour). | No |
| 7. **Repetition and substitution** | Prompt repetition of the behaviour in the same context repeatedly so that the context elicits the behaviour and prompts substitution of the unwanted behaviour with a wanted or neutral behaviour. | No |
| 8. **Reward and threat** | Minimize a person's threats and maximize their rewards in regard to a specific behaviour. | No |
| 9. **Regulation** | Facilitate the performance of the behaviour by teaching methods to increase the frequency and/or intensity of the behaviour. | No |
| 10. **Antecedents** | Provide information about antecedents (e.g. social and environmental situations and events, emotions, cognitions) that reliably predict performance of the behaviour. | No |

| 11. Identity | Integrate the behaviour with the identity of the person. The behaviour becomes robust to change because it is so closely linked to central self-views. | No |
| 12. Self-belief | Instil confidence in one's own abilities or judgment to change a behaviour. | No |
| 13. Associations | Introduce or define environmental or social stimulus with the purpose of prompting or cueing the behaviour. | No |
| 14. Comparison of outcomes | Comparing the different outcomes in favour or against the behaviour. | No |
| 15. Scheduled consequences | The withdrawal of something valued if an unwanted behaviour is performed. | No |
| 16. Covert learning | Learning about a behaviour using only mental processes e.g. visualising, predicting, inferring. | No |

**Table 2. MO, Domain 2 skill gap analysis**

| Skill | Skill definition | Skill Present (Yes/ No) Comments (if any) |
|---|---|---|
| 1. Data entry | Collecting participant data (paper based and electronically) | No |
| 2. Data processing | Create/save/retrieve files, typing, editing documents, generating passwords, creating reports, printing and system navigation | No |
| 3. Scheduling referrals | Paper based and electronically | Yes |
| 4. Data quality | Paper based and electronically | No |
| 5. Basic technology troubleshooting | Basic troubleshooting of equipment, and computer hardware and software and applications | No |
| 6. Protection of people, data and property | Well versed with the procedures of safeguarding data, people and property | No |

**Table 3. MO, Domain 3 skill gap analysis**