NATIONAL CLINICAL GUIDELINES

ATHEROSCLEROTIC CARDIOVASCULAR DISEASE RISK ASSESSMENT & MANAGEMENT

Ministry of Public Health

P.O. Box 42,
Doha, Qatar
Phone: (+974)4 407 0969
Email: clinicalguidelines@moph.gov.qa

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المبادئ الإرشادية السريرية لدولة قطر
NATIONAL CLINICAL GUIDELINES FOR QATAR

State of Qatar
MINISTRY OF PUBLIC HEALTH

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Version History

Version	Status	Date	Editor	Description
1.0	Final	24th April 2017	Guidelines Team	Final version for publication.
2.0	Final	25th August 2020	Guidelines Team	Updates to Sections 5, 7 and 8.

Citation

Suggested citation style:

Ministry of Public Health Qatar. National Clinical Guideline: Atherosclerotic Cardiovascular Disease Risk Assessment and Management (2020).

Abbreviations

The abbreviations used in this guideline are as follows:

ABPM	Ambulatory blood pressure monitoring
ACC/AHA	American College of Cardiology / American Heart Association
ACS	Acute coronary syndrome
ASCVD	Atherosclerotic cardiovascular disease
BMI	Body mass index
BP	Blood pressure
CBT	Cognitive behavioural therapy
CVD	Cardiovascular disease
DBP	Diastolic blood pressure
ESC	European Society of Cardiology
HBPM	Home blood pressure monitoring
LDL-C	Low density lipoprotein cholesterol
NSTEMI	Non-ST-segment elevation myocardial infarction
PCSK-9	Proprotein Convertase Subtilisin/Kexin Type 9
SBP	Systolic blood pressure
STEMI	ST-segment elevation myocardial infarction

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1 Information about this Guideline

1.1 Objective and Purpose of the Guideline

The purpose of this guideline is to define the appropriate risk assessment and management of atherosclerotic cardiovascular disease in adults. The objective is to improve appropriate prescribing and referral of patients presenting to provider organisations in Qatar. It is intended that the guideline will be used primarily by physicians, nurses and health educators in primary care and specialist settings.

1.2 Scope of the Guideline

Aspects of care covered within this guideline include:

- All of the following in adults (age 18 years and older):
    - Primary and secondary prevention of atherosclerotic cardiovascular disease.
    - Discussion of interventions − lipid lowering, antihypertensive and antiplatelet therapies.
    - Discussion of lifestyle interventions including diet, physical activity, smoking, alcohol, and psychological issues.

Aspects of care not covered within this guideline:

- Inpatient and outpatient cardiac rehabilitation following cardiac event.
- Risk assessment and management of atherosclerotic cardiovascular disease in pregnancy.
- Detailed management of:
    - Hypertension.
    - Dyslipidaemia.
    - Smoking cessation.

1.3 Editorial Approach

This guideline document has been developed and issued by the Ministry of Public Health of Qatar (MOPH), through a process which aligns with international best practice in guideline development and localisation. The guideline will be reviewed on a regular basis and updated to incorporate comments and feedback from stakeholders across Qatar.

The editorial methodology, used to develop this guideline, has involved the following critical steps:

- Extensive literature search for well-reputed published evidence relating to the topic.
- Critical appraisal of the literature.
- Development of a draft summary guideline.
- Review of the summary guideline with a Guideline Development Group, comprised of practising healthcare professionals, subject matter experts and patient representatives, from across Qatar.
- Independent review of the guideline by the National Clinical Guidelines & Pathways Committee, appointed by the MOPH, from amongst stakeholder organisations across Qatar.

Whilst the MOPH has sponsored the development of the guideline, the MOPH has not influenced the specific recommendations made within it.

1.4 Sources of Evidence

The professional literature has been systematically queried using specially developed, customised, and tested search strings. Search strategies are developed to allow efficient yet comprehensive analysis of relevant publications for a given topic and to maximise retrieval of articles with certain desired characteristics pertinent to a guideline.

For each guideline, all retrieved publications have been individually reviewed by a member of the Editorial Team and assessed in terms of quality, utility, and relevance. Preference is given to publications that:

1. Are designed with rigorous scientific methodology.
2. Are published in higher-quality journals.
3. Address an aspect of specific importance to the guideline in question.

Further information about the literature search and appraisal process is included in the appendix.

1.5 Evidence Grading and Recommendations

Recommendations made within this guideline are supported by evidence from the medical literature and where possible the most authoritative sources have been used in the development of this guideline. In order to provide insight into the evidence basis for each recommendation, the following evidence hierarchy has been used to grade the level of authoritativeness of the evidence used, where recommendations have been made within this guideline.

Where the recommendations of international guidelines have been adopted, the evidence grading is assigned to the underlying evidence used by the international guideline. Where more than one source has been cited, the evidence grading relates to the highest level of evidence cited:

- **Level 1 (L1):**
  - Meta-analyses.
  - Randomised controlled trials with meta-analysis.
  - Randomised controlled trials.
  - Systematic reviews.

- **Level 2 (L2):**
  - Observational studies, examples include:
    - Cohort studies with statistical adjustment for potential confounders.
    - Cohort studies without adjustment.
    - Case series with historical or literature controls.
    - Uncontrolled case series.
  - Statements in published articles or textbooks.

- **Level 3 (L3):**
  - Expert opinion.
  - Unpublished data, examples include:
    - Large database analyses.
    - Written protocols or outcomes reports from large practices.

In order to give additional insight into the reasoning underlying certain recommendations and the strength of recommendation, the following recommendation grading has been used, where recommendations are made:

- **Recommendation Grade A (RGA):** Evidence demonstrates at least moderate certainty of a net benefit from the recommendation.
- **Recommendation Grade B (RGB):** Evidence is insufficient, conflicting, or poor and demonstrates an incomplete assessment of net benefit vs harm; additional research is recommended.
- **Recommendation Grade C (RGC):** Evidence demonstrates potential harm that outweighs benefit; additional research is recommended.
- **Recommendation of the GDG (R-GDG):** Recommended best practice on the basis of the clinical experience of the Guideline Development Group members.

1.6 Guideline Development Group Members

The following table lists members of the Guideline Development Group (GDG) nominated by their respective organisations and the National Clinical Guidelines & Pathways Committee. The GDG members have reviewed and provided their feedback and approval of the guideline document. Each member has completed a declaration of conflicts of interest, which has been reviewed and retained by the MOPH.

Guideline Development Group Members		
Name	**Title**	**Organisation**
Dr Ahmed M. Hussein Babiker	Head of Registration Section & Clinical Pharmacist	Dept of Pharmacy and Drug Control, MOPH[1]
Dr Djamel Bendaas	Consultant Interventional Cardiologist	Al Ahli Hospital
Dr Ahmed Abdalla Ali Elyas	Consultant Cardiologist	Hamad Medical Corporation
Dr Abdul Hakeem Hamza	Senior Consultant, Family Medicine	Primary Health Care Corp
Dr Emad Ahmed Ali Hassan	Consultant Cardiologist	Hamad Medical Corporation
Dr Arif Mahmood	Consultant Family Medicine	Qatar Petroleum
Dr Joji Mathews	Specialist Cardiologist	Aster Medical Center
Dr Nursabrina Sabtu	Consultant Family Medicine	Qatar Petroleum
Dr Nermin Abdel-Rahman Shalaan	Consultant Cardiologist	Al Emadi Hospital

[1] Dr Ahmed Babiker attended the MOPH in his capacity as a Clinical Pharmacist and advisor on the availability of medications in Qatar.

1.7 National Clinical Guidelines & Pathways Committee Members

The following table lists members of the National Clinical Guidelines & Pathways Committee (NCGPC), appointed by the MOPH. The NCGPC members have reviewed and provided their feedback and approval of the guideline document. Each member has completed a declaration of conflicts of interest, which has been reviewed and retained by the MOPH.

National Clinical Guidelines & Pathways Committee (NCGPC) Members		
Name	**Title**	**Organisation**
Ms Huda Amer Al-Katheeri	Chair of the NCGPC, Director- Strategic Planning & Performance Department	Ministry of Public Health
Shk Dr Mohammed Hamad J. Al Thani	Co-Chair of NCGPC, Director of Public Health	Ministry of Public Health
Prof Anthony Akobeng	Chair Clinical Practice Guidelines Committee	Sidra Medicine
Dr Alshaymaa Mohammed A. M. Al-Motawa	Consultant Family Medicine	Qatar Petroleum
Dr Basil Bashqawi	Accreditation Coordinator, Dept of Health Professions	Ministry of Public Health
Dr Abi Khalil Charbel	Associate Professor of Medicine Consultant Cardiology	Weill Cornell Medicine -Qatar
Dr Paul Dijkstra	Director of Medical Education	Aspetar
Dr Mohamed Elrishi	Consultant Endocrinology and Internal Medicine	Al Ahli Hospital
Dr Dahlia Mustafa Hassan	Consultant Family Medicine	Primary Health Care Corp
Dr Ghassan Youseph Hommos	Consultant Endocrinology	Al Emadi Hospital
Dr Hani Benhassen Kilani	Senior Consultant, Executive Director for Corporate Clinical Policy and Guidelines	Hamad Medical Corporation
Dr Egon Toft	VP and Dean	College of Medicine, Qatar University

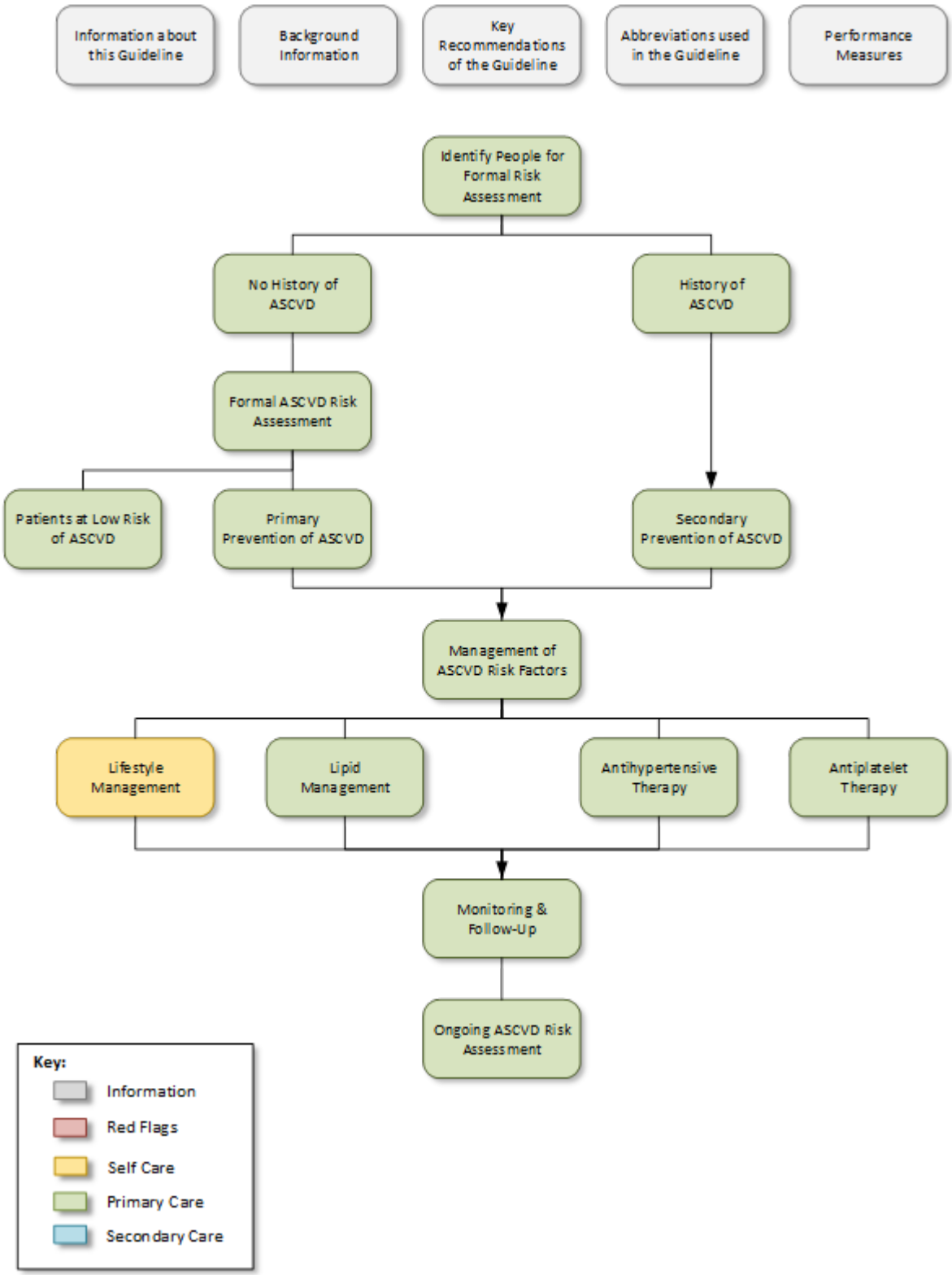
1.8 Responsibilities of Healthcare Professionals

This guideline has been issued by the MOPH to define how care should be provided in Qatar. It is based upon a comprehensive assessment of the evidence as well as its applicability to the national context of Qatar. Healthcare professionals are expected to take this guidance into account when exercising their clinical judgement in the care of patients presenting to them.

The guidance does not override individual professional responsibility to take decisions which are appropriate to the circumstances of the patient concerned. Such decisions should be made in consultation with the patient, their guardians, or caregivers and should consider the individual risks and benefits of any intervention that is contemplated in the patient's care.

2 ASCVD Risk Assessment and Management Pathway

Click on a box below to see the relevant page of the Pathway.



3 Key Recommendations of the Guideline

The key recommendations of this guideline are:

ASCVD Risk Assessment (*Section 5*):

- For the **primary prevention** of ASCVD, a systematic strategy should be used in a primary care setting to identify people who are likely to be at high risk [1] .
- The ACC/AHA Pooled Cohort Equations should be used to estimate 10-year ASCVD risk in appropriate individuals with and without diabetes [2–4] .

Secondary Prevention of ASCVD (*Section 6.3*):

- Unless contraindicated, offer a **high-intensity statin** to all patients with pre-existing ASCVD for secondary prevention [1–3,5,6] .
- Offer **antihypertensive treatment** to all hypertensive patients aged over 18 years with established ASCVD [7] .
- Unless contraindicated, **start antiplatelet therapy** in all patients with established ASCVD [4,8,9] .

Primary Prevention of ASCVD (*Section 6.2*):

- **Lifestyle advice** should be given independently of any drug treatment [9] .
- Unless contraindicated, offer a **moderate intensity statin** to the following patients [2,3,10] :
    - Patients aged 40-75 years who have a 10-year risk of ASCVD using the ACC/AHA Pooled Cohort Equations of ≥7.5%.
    - Patients aged ≥50 years with chronic kidney disease stage 3-5 or those of any age with other manifestations of chronic kidney disease (e.g. albuminuria or polycystic kidney disease). See also the MOPH National Guideline on *The Assessment and Management of Chronic Kidney Disease* [11] .
    - Patients aged 40-75 years with type 2 diabetes mellitus with a 10-year risk of ASCVD using the ACC/AHA Pooled Cohort Equations of <7.5%.
- Unless contraindicated, offer a **high intensity statin** to the following patients [1–3] :
    - All patients aged ≥21 years with an LDL-C level of ≥4.9 mmol/L.
    - Patients aged 40-75 years with type 2 diabetes mellitus who have a 10-year risk of ASCVD using the ACC/AHA Pooled Cohort Equations of ≥7.5%.
    - Adults with type 1 diabetes who:
        - Are older than age 40 years; or
        - Have had diabetes for more than 10 years; or
        - Have established nephropathy; or
        - Have other ASCVD risk factors.
- Consider starting **antihypertensive therapy** if the following apply [4,7] :
    - Stage 1 hypertension is diagnosed and:
        - 10-year ASCVD risk, using the ACC/AHA Pooled Cohort Equations is ≥7.5%.; or
        - Target organ damage, renal disease or diabetes mellitus are present.
    - Stage 2 or Stage 3 hypertension is diagnosed.

Antiplatelet Therapy in Primary Prevention of ASCVD (*Section 7.3*):

- In primary prevention of ASCVD, **antiplatelet therapy** should not be routinely prescribed due to the increased risk of haemorrhage, relative to the benefit [4–6,12] [**L**1, **RGA**].
- Aspirin and other antiplatelets are also not routinely recommended for patients with type 1 or type 2 diabetes mellitus in the absence of established ASCVD [4–6,12–14] .

- NB: Aspirin may however be considered for primary prevention, in diabetic patients with a high risk of ASCVD, but the decision to use antiplatelets must be balanced against the risk of bleeding [**R-GDG**].

Lipid-Lowering Treatment Targets (*Section 7.1.7*):

- If the patient was started on **high-intensity** statin therapy [2,3,5,6] [**R-GDG**]:
  - Aim for a reduction in LDL-C of ≥50% from the untreated baseline level; or
  - An absolute level of LDL-C of <1.8 mmol/L (if the baseline is unknown).
  - For patients with ASCVD who experience a second vascular event within two years (not necessarily of the same type as the first event), while taking maximally tolerated statin-based therapy, an LDL-C target of <1.0 mmol/L (<40 mg/dL) may be considered [6] **[L2, RGA]**.
- If the patient was started on **moderate-intensity** statin therapy [2,3,5,6] [**R-GDG**]:
  - Aim for a reduction in LDL-C of 30%-50% from the untreated baseline level; or
  - An absolute level of LDL-C of <2.6 mmol/L (if the baseline is unknown).

Antihypertensive Treatment Targets (*Section 7.2.3*):

- For patients *without* diabetes mellitus, aim to achieve a clinic BP of [7] :
  - <140/90 mmHg in people aged less than 80 years.
  - <150/90 mmHg in people aged 80 years and older.
- For patients with either type 1 or type 2 diabetes mellitus, aim to achieve a clinic BP of [13–15] :
  - <140/90 mmHg; or
  - <130/80 mmHg if the patient has albuminuria or additional risk factors for ASCVD.

For detailed discussion of the management of related conditions, refer to the following MOPH National Guidelines:

- *The Diagnosis and Management of Hypertension in Adults* [16].
- *The Assessment and Management of Dyslipidaemia* [17] .
- *The Assessment and Management of Acute Coronary Syndrome in Adults* [18] .
- *The Management of Obesity in Adults* [19] .
- *The Assessment and Management of Chronic Kidney Disease*[11].

4 Background Information

4.1 Definitions

Atherosclerotic Cardiovascular Disease:
The American College of Cardiology / American Heart Association (ACC/AHA) guidelines define *clinical* atherosclerotic cardiovascular disease (ASCVD) as acute coronary syndromes, or a history of myocardial infarction, stable or unstable angina, coronary or other arterial revascularization, stroke, transient ischaemia attack, or peripheral arterial disease presumed to be of atherosclerotic origin [2,3] .

Premature Coronary Artery Disease:
Premature coronary artery disease is defined as a coronary event occurring before the age of [2,3] :

- 55 years in a male.
- 65 years in a female.

Acute Coronary Syndrome:
Acute coronary syndrome (ACS) is typically caused by the rupture or erosion of an atherosclerotic plaque within the wall of a coronary artery with subsequent formation of an arterial thrombus [8] .

ACS includes the following conditions [20] :

- ST-segment-elevation myocardial infarction (STEMI);
- Non-ST-segment-elevation myocardial infarction (NSTEMI); and
- Unstable angina.

Hypertension:
Hypertension is defined as follows [7] :

- Stage 1 hypertension [7] :
  - Clinic blood pressure (BP) is between 140/90 and 159/99 mmHg; and
  - Subsequent daytime average of Ambulatory BP Monitoring (ABPM), or average of Home BP Monitoring (HBPM), is between 135/85 and 149/94 mmHg.

- Stage 2 hypertension [7] :
  - Clinic BP is between 160/100 and 179/109 mmHg; and
  - Subsequent ABPM daytime average or HBPM average is between 150/95 and 179/109 mmHg.

- Stage 3 hypertension (Severe hypertension) [7] :
  - Clinic systolic BP (SBP) is 180 mmHg or higher; or
  - Clinic diastolic BP (DBP) is 110 mmHg or higher.

4.2 Epidemiology

The current prevalence of ASCVD in Qatar in not known, however in 2013, 12.9 % of registered deaths in Qatar, were recorded as being related to cardiovascular disease [21] :

- In the Qatari population, CVD-related deaths were 12.2%.
- In the non-Qatari population, CVD-related deaths were 13.2%.

The 2012 Qatar the STEPwise survey showed the following prevalences for key ASCVD risk factors in the survey population [22] :

- Raised blood pressure in 32.9%:
  - Females - 37.7%.
  - Males – 28%.
- Raised total cholesterol in 21.9%:
  - Females - 24.6%.
  - Males -19.1%.
- Raised blood glucose (blood glucose greater than or equal to 110 mg/dl) as well as those with history of receiving medication for diabetes was 16.7%:
  - Males - 17.6%.
  - Females - 15.9%.
- Smoking was 16.4%.
  - Males - 31.9%.
  - Females - 1.2%.
- Low level of physical activity was 45.9%:
  - Females - 54.2%.
  - Males - 37.4%.
- Obesity (body mass index (BMI) ≥30 kg/m^2) was 41.4%:
  - Females - 43.2%.
  - Males - 39.5%.

4.3 Risk Factors for ASCVD

Non-modifiable risk factors include [1,5,6,23,24] :

- Age:
  - ASCVD predominantly affects people over the age of 50 years.
- Gender [23,24] :
  - Men have a higher prevalence of coronary artery disease until the age of 75 years.
- Family history of premature ASCVD.
- Ethnicity.

Modifiable risk factors include [1,5,6,25] :

- Smoking.
- Impaired glucose metabolism or diabetes mellitus
- Dyslipidaemia.
- Hypertension.
- Sedentary lifestyle.
- Unhealthy dietary habits.
- Excess alcohol intake.
- Psychosocial stress.
- Obesity.

5 ASCVD Risk Factor Assessment

ASCVD risk assessment [1,5,6,26] :

- Multiple risk factors contribute to an individual's overall risk of an ASCVD event.
- Management aims to reduce this overall risk by addressing modifiable risk factors.
- Risk assessment should determine the patient's overall risk of a future ASCVD event.

5.1 Identify People for Formal ASCVD Risk Assessment

For the primary prevention of ASCVD, a systematic strategy should be used in a primary care setting to identify people who are likely to be at high risk [1] :

- Identify people who are at risk of ASCVD through an assessment of risk factors recorded in the medical record.
- Perform a formal ASCVD risk assessment on those identified.
- NB: Opportunistic assessment can also be used to identify ASCVD risk in the patient population but should not be the main strategy [**R-GDG**].

Risk estimation tools should not be used for the following groups of patients who are already at high risk[1–3,27] :

- Primary dyslipidaemia.
- Type 1 diabetes mellitus – ASCVD risk assessment should be based on the patient's age and the duration since diagnosis.
- Chronic kidney disease stages 3-5 (refer also to the MOPH National Guideline for *The Assessment and Management of Chronic Kidney Disease* [11]).
- Patients aged over 75 years.
- Patients with established cardiovascular disease.

5.2 Formal ASCVD Risk Assessment

Assessment of ASCVD risk [1–4,25,27] :

- Risk is not static and should be repeated every 4-6 years from the age of 40, until either treatment has been started or ASCVD has become established.

Risk assessment tools [2–4] :

- The ACC/AHA Pooled Cohort Equations should be used to estimate 10-year ASCVD risk in appropriate individuals with and without diabetes.
- NB: The tool can only provide an approximate value of ASCVD risk – interpretation of risk scores should always reflect informed clinical judgement.

5.3 Communicating the Risk Assessment Results

When communicating to the patient about their risk assessment and treatment:

- Offer patients information on [1] :
    - Their risk of ASCVD.
    - The benefits and harms of either intervention or failure to intervene.
    - Offer information in a form that:
        - Presents individualised risk and benefit scenarios.
        - Presents the risk of events numerically using appropriate diagrams and text.

- Offer decision aids:
    - To help patients understand and participate in medical decisions.
    - Include visual representations of risk information, and may include booklets, DVDs, interactive computer programmes, tapes, and web-based products.

If the patient's ASCVD risk is at a level where intervention is recommended but they decline the offer of treatment, advise them that their CVD risk should be reassessed in the future and record their choice in their medical notes [1] .

6 Management of ASCVD Risk

6.1 Patients at Low Risk

Patients at low risk of ASCVD include those [2–4] :

- Aged <75 years without clinical ASCVD; and
- With a calculated ASCVD risk score of <7.5% over 10 years.

For patients with a ASCVD risk of <7.5% [1–6,28] :

- Use clinical judgement to decide on whether to consider the patient high risk on the basis of other factors not included in the risk calculator.
- Perform a risk assessment of people aged over 40 years, every 4-6 years.
- Provide lifestyle advice to all patients:
    - The intensity of lifestyle intervention should increase with increasing risk.
- The caregiver and patient should share decision-making, and include the person's spouse and family, to enable active involvement in lifestyle change and medication adherence.

6.2 Primary Prevention of ASCVD

Patients *without* established clinical ASCVD who are at increased risk of ASCVD, should be considered for pharmacological treatment.

This group includes [1–4] :

- Patients with ASCVD risk of ≥7.5% over 10 years - calculated using the ACC/AHA Pooled Cohort Equations; or
- High-risk groups which include the following [1,25] :
    - Primary dyslipidaemia.
    - Type 1 diabetes mellitus – ASCVD risk assessment should be based on the patient's age and the duration since diagnosis.
    - Chronic kidney disease stages 3-5 (refer also to the MOPH National Guideline for *The Assessment and Management of Chronic Kidney Disease* [11]).
    - Patients with an LDL-cholesterol (LDL-C) of ≥4.9 mmol/L.
    - Patients aged over 75 years.

Lifestyle modification is necessary in all patients at increased risk of ASCVD [9] . Some patients may require additional pharmacological treatment in order to manage modifiable risk factors to acceptable levels [1] . Advice and treatment should take into account the patient's needs, preferences and circumstances [1] .

6.3 Secondary Prevention of ASCVD

Secondary prevention aims to prevent further events, in patients who already have clinical evidence of ASCVD, by addressing modifiable risk factors [25] .

Secondary prevention is appropriate in patients with a history of [1] :

- Coronary artery disease.
- Stroke or transient ischaemic attack (TIA).
- Peripheral arterial disease.

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Management of patients with established ASCVD [5–7,26] :

- Use an intensive approach to risk factor modification, including:
  - Pharmacological therapy.
  - Lifestyle intervention.
- Offer psychosocial support if necessary − depression should be routinely screened for, and appropriately treated, in patients with ASCVD.
- Offer annual influenza vaccination.
- Offer a comprehensive and intensive rehabilitation program to patients who have experienced an ischaemic cardiac event. Such patients should be managed by a multidisciplinary cardiac rehabilitation team.

See the MOPH National Guideline for *The Assessment and Management of Acute Coronary Syndrome* [18] for details on the management of ACS.

7 Pharmacological Management

NB: Lifestyle advice should be given simultaneously with drug treatment [29] .

7.1 Lipid Management

7.1.1 Consider Statins

The decision on whether to start statin therapy should be made after an informed discussion between the clinician and patient about the risks and benefits of statin treatment [5,6] .

Consider the following, particularly for older people (over 75 years) [1] :

- Potential benefits from lifestyle modifications.
- Informed patient preference.
- Comorbidities.
- Polypharmacy.
- General frailty.
- Life expectancy.

7.1.2 Low, Moderate and High-Intensity Statin Therapies

The following statin therapies are classified as either low, moderate or high intensity and are used according the patient's history of or risk of ASCVD [2,3] (see subsequent sections).

High Intensity Statin Therapies		Moderate Intensity Statin therapies		Lower Intensity Statin Therapies	
Atorvastatin	40-80 mg	Atorvastatin	10-20 mg	Simvastatin	10 mg
Rosuvastatin	20-40 mg	Rosuvastatin	5-10 mg	Pravastatin	10–20 mg
		Simvastatin	20-40 mg		
		Pravastatin	40-80 mg		

Table 7.1.2: Low, Moderate and High-Intensity Statin Therapies [2,3] .

7.1.3 Primary Prevention of ASCVD

Unless contraindicated, offer a **Moderate Intensity** statin to the following patients [2,3,10] :

- Patients aged 40-75 years who have a 10-year risk of ASCVD using the ACC/AHA Pooled Cohort Equations of ≥7.5%.
- Patients aged ≥50 years with chronic kidney disease stage 3-5 or those of any age with other manifestations of chronic kidney disease (e.g. albuminuria or polycystic kidney disease). See also the MOPH National Guideline on *The Assessment and Management of Chronic Kidney Disease* [11] .
- Patients aged 40-75 years with type 2 diabetes mellitus with a 10-year risk of ASCVD using the ACC/AHA Pooled Cohort Equations of <7.5%.

Unless contraindicated, offer a **High Intensity** statin to the following patients [1–3] :

- All patients aged ≥21 years with an LDL-C level of ≥4.9 mmol/L.
- Patients aged 40-75 years with type 2 diabetes mellitus who have a 10-year risk of ASCVD using the ACC/AHA Pooled Cohort Equations of ≥7.5%.
- Adults with type 1 diabetes who:
    - Are older than age 40 years; or

- Have had diabetes for more than 10 years; or
- Have established nephropathy; or
- Have other ASCVD risk factors.

7.1.4 Secondary Prevention of ASCVD

Unless contraindicated, offer a **High-Intensity** statin to all patients with pre-existing ASCVD for secondary prevention [1–3,5,6] :

- Do not delay statin therapy for lifestyle modification.
- Use a lower dose if any of the following apply [1] [**L1, RGA**]:
  - Potential drug interactions.
  - High risk of adverse effects.
  - Patient preference.

7.1.5 Consider Ezetimibe

Ezetimibe is a recommended option for hypercholesterolaemia in adults, if the following apply[30] [**L1, RGA**]:

- In conjunction with initial statin treatment when:
  - Serum total cholesterol or LDL-C levels are not appropriately controlled after titration of the statin treatment; or
  - Dosing is limited by intolerance to the statin.
- As monotherapy if there is:
  - A contraindication to initial statin treatment.
  - Intolerance to statin treatment.

7.1.6 PCSK-9 Inhibitors

For primary prevention patient at very high risk but without familial hypercholesterolaemia, if the LDL-C goal is not achieved on a maximum tolerated dose of a statin and ezetemibe, a combination with a PCSK-9 inhibitor may be considered [6] **[L1, RGA]** .

For secondary prevention, patients at very high risk not achieving their LDL-C goal on a maximum tolerated dose of a statin and ezetemibe, a combination with a PCSK-9 inhibitor is recommended [6] **[L1, RGA]** .

For very high risk familial hypercholesterolemia patients i.e. with ASCVD or with another major risk factor, who do not archive their LDLC goal on a maximum tolerated dose of a statin and ezetemibe, a combination with a PCSK-9 inhibitor is recommended [6] **[L2, RGA]** .

If a statin- based regimen is not tolerated at any dosage (even after a repeat challenge), a PCSK-9 inhibitor added to ezetemibe may also be considered [6] **[L2, RGA]** .

7.1.7 Treatment Targets

Use the following treatment targets to guide adjustment of statin therapy:

- If the patient was started on **High-Intensity** statin therapy [2,3,5,6] [**R-GDG**]:
  - Aim for a reduction in LDL-C of ≥50% from the untreated baseline level; or
  - An absolute level of LDL-C of <1.8 mmol/L (if the baseline is unknown).

- For patients with ASCVD who experience a second vascular event within two years (not necessarily of the same type as the first event), while taking maximally tolerated statin-based therapy, an LDL-C target of <1.0 mmol/L (<40 mg/dL) may be considered [6] **[L2, RGA]** .

- If the patient was started on **Moderate-Intensity** statin therapy [2,3,5,6] [**R-GDG**]:
  - Aim for a reduction in LDL-C of 30%-49% from the untreated baseline level; or
  - An absolute level of LDL-C of <2.6 mmol/L (if the baseline is unknown).

Refer to the MOPH National Guideline on *The Assessment and Management of Dyslipidaemia* [17] for further information on investigation and management.

7.2 Antihypertensive Therapy

7.2.1 Primary Prevention of ASCVD

In the absence of established ASCVD, consider starting antihypertensive therapy if the following apply [4,7] :

- Stage 1 hypertension is diagnosed; and:
  - 10-year ASCVD risk, using the ACC/AHA Pooled Cohort Equations is ≥7.5%.; or
  - Target organ damage, renal disease or diabetes mellitus are present.
- Stage 2 or Stage 3 hypertension is diagnosed.

Refer to the MOPH National Guideline *on The Diagnosis and Management of Hypertension* [16] for further information on investigation and management.

7.2.2 Secondary Prevention of ASCVD

Offer antihypertensive treatment to all hypertensive patients aged over 18 years with established ASCVD[7].

Unless contraindicated, angiotensin converting enzyme antagonists are recommended as a first line antihypertensive agents in case hypertension associated with [7,8] :

- Diabetes mellitus and microalbuminuria.
- Chronic kidney disease.
- Cardiac dysfunction or heart failure.

7.2.3 Treatment Targets

For patients *without* diabetes mellitus:

Aim to achieve a clinic BP of [7] [**L1, RGA**]:

- <140/90 mmHg in people aged less than 80 years.
- <150/90 mmHg in people aged 80 years and older.

For people monitored with ambulatory blood pressure monitoring (ABPM) or home blood pressure monitoring (HBPM), e.g. those identified as having a 'white coat' effect, target average blood pressure during waking hours should be[7]:

- <135/85 mmHg in people aged less than age 80 years.
- <145/85 mmHg in people aged 80 years and older.

NB: The European Society of Cardiology (ESC) recommends lowering the target threshold to 130-139/80-85 mmHg for patients with established ASCVD [31,32]. The SPRINT Trial [33] recommends lower target blood pressure ranges, however, further post study data is required prior to its adoption into these guidelines [**R-GDG**].

For patients with either type 1 or type 2 diabetes mellitus:

Aim to achieve a clinic BP of [13–15] :

- <140/90 mmHg; or
- <130/80 mmHg if the patient has albuminuria or additional risk factors for ASCVD.

Monitor BP every 1-2 months and intensify therapy until BP is consistently within target range. Continue to reinforce lifestyle advice [13,14] . If BP is consistently attained at the target level, monitor the patient's BP at every clinic visit and check for adverse effects including risks of hypotension [13,14] .

7.3 Antiplatelet Therapy

7.3.1 Primary Prevention of ASCVD

In primary prevention of ASCVD, antiplatelet therapy should not be routinely prescribed due to the increased risk of haemorrhage, relative to the benefit [4–6,12] [**L1**, **RGA**].

Aspirin and other antiplatelets are also not routinely recommended for patients with type 1 or type 2 diabetes mellitus in the absence of established ASCVD [4–6,12–14] . However, the American Diabetes Association recommends initiating low-dose aspirin use for the primary prevention of ASCVD in adults aged ≥50 years who have a 10-year ASCVD risk of a ≥10%, using the ACC/AHA Pooled Cohort Equations. Patients must not be at increased risk for bleeding, have a life expectancy of at least 10 years and be willing to take low-dose aspirin daily for at least 10 years [13,14] .

Aspirin may therefore be considered for primary prevention, in diabetic patients with a high risk of ASCVD, but the decision to use antiplatelets must be balanced against the risk of bleeding [**R-GDG**].

7.3.2 Secondary Prevention of ASCVD

Coronary Artery Disease:

Unless contraindicated, start antiplatelet therapy in all patients with established ASCVD [4,8,9] .

Following ACS [4] :

- Offer aspirin to all patients and continue it indefinitely, unless they are intolerant or have an indication for anticoagulation.
    - Clopidogrel monotherapy can be used for patients with aspirin hypersensitivity.
- A second antiplatelet in combination with aspirin should be offered for up to 12 months and should be chosen based on the classification of ACS and treatment received [4] :
    - Clopidogrel.
    - Ticagrelor.

Refer to the MOPH National Guideline *on The Assessment and Management of Acute Coronary Syndrome* [18] for further information on investigation and management.

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Peripheral Arterial Disease:

Patients with peripheral arterial disease should be started on an antiplatelet agent [25] :

- Clopidogrel is recommended as first choice.

Ischaemic Stroke and TIA:

Following ischaemic stroke, unless contraindicated [25] :

- Patients should initially receive aspirin daily for 2 weeks.
- This should then be changed to long-term clopidogrel.
- If clopidogrel is contraindicated or not tolerated, alternatively treat with:
    - Modified-release dipyridamole with aspirin; or
    - Modified-release dipyridamole alone, if the patient is unable to have either aspirin or clopidogrel.

For patients with TIAs, unless contraindicated, options for long-term antiplatelet treatment for secondary prevention include [25] :

- Clopidogrel; or
- Modified-release dipyridamole with aspirin; or
- Modified-release dipyridamole alone, if the patient is unable to take aspirin.

8 Lifestyle Management

Lifestyle advice should be provided independently of any pharmacological treatment [9] .

8.1 Smoking

Smoking is a strong and independent risk factor for ASCVD and smoking cessation benefits smokers of all ages [1,5,6,25] [**L1, RGA**]:

- Offer support and advice to patients who want to stop smoking.
    - Offer referral to an intensive support service.
    - If the patient is unable or unwilling to accept referral, offer pharmacotherapy for smoking cessation.
        - Combining pharmacotherapy, with behavioural intervention support, is the most effective approach in reducing use of and exposure to tobacco [28] [**L1, RGA**].
        - In case of secondary prevention, caution is recommended when prescribing varenicline if there is a history of ASCVD.
- Advise minimising exposure to passive smoking [5,6,25] [**L1, RGA]**.
- Consumption of tobacco in forms other than smoking should also be discouraged [1] .

8.2 Weight Management

Weight management:

- Offer overweight and obese patients, appropriate advice and support to work towards achieving and maintaining a healthy weight [34] .
- Base weight loss targets on the individual's comorbidities and risks, rather than their weight alone [35] [**L2**, **RGA**]:
- For patients with mild symptoms or functional impairment resulting from obesity (Edmonton Obesity Stage 0-1 [36]):
    - A 5-10% weight loss is required for cardiovascular disease and metabolic risk reduction [**R-GDG**].
- For patients with established clinical ASCVD, type 2 diabetes mellitus, moderate symptoms or functional disability (Edmonton Obesity Stage 2 or more [36]):
    - A greater than 10% weight loss, will often be required to obtain a sustained improvement in comorbidities [**R-GDG**].
    - NB: Patients from certain ethnic groups such as South East Asians, are more likely to have related comorbidities at a lower BMI [35] [**L2**, **RGA**].

Refer to the MOPH National Guideline on *The Management of Obesity in Adults*[19] for further information on weight management.

8.3 Dietary Modification

Provide support for patients to consume a diet associated with the lowest cardiovascular risk, based on the following principles [1,25,27,29,37] [**L1**]:

- A fat intake of 30% or less than total energy intake.
- A saturated fat intake of 10% or less of the total energy intake.
- Replace saturated fats with monounsaturated and polyunsaturated fats.
- A cholesterol intake of <300mg per day.
- Decrease dietary sodium intake [7] .

- At least five portions of fruit and vegetables per day – legumes other than soy have been shown to decrease total and LDL-C.
- At least two portions of fish per week, including a portion of oily fish – pregnant women should limit their intake of oily fish to two portions a week, and avoid marlin, shark and swordfish.
- Do not routinely recommend omega-3 fatty acid supplements.
- Inform people who wish to consume food products containing stanols and sterols, that they need to be eaten consistently to be effective [25] [**L1, RGA**].
- Individualised nutritional advice should be offered by a healthcare professional with specific expertise in nutrition.

8.4 Alcohol Consumption

Alcohol consumption [25] :

- Advise men who drink alcohol, to limit their alcohol intake to 3-4 units a day.
- Advise women who drink alcohol, to limit their alcohol intake to 2-3 units a day.
- Advise the avoidance of binge drinking.
- Instigate brief multi-contact interventions for hazardous drinkers to encourage reduction of drinking [21] [**L1, RGA**].

8.5 Exercise

Advise patients of the following key points regarding exercise:

- To reduce sedentary behaviour [35,38] [**L2**, **RGA**].
- Encourage walking where possible, as no equipment or change of clothing is required [39,40] :
    - Increase number of steps gradually over several weeks.
    - >10,000 steps per day is necessary for weight loss.
    - Patients should be encouraged to use pedometers or fitness trackers to self-monitor their daily activity.
- To be physically active [35,38] [**L1**, **RGA**]:
    - Moderate intensity exercise performed for at least 30 minutes ≥5 days per week, or vigorous intensity aerobic exercise done for at least 20 minutes ≥3 days per week is recommended for maintaining health and preventing disease.
    - To promote or maintain weight loss, 50-60 minutes per day or more of daily exercise is recommended.
    - Performance of intermittent exercise of at least 10 minutes in duration to accumulate the minimum duration recommendations above is an effective alternative to continuous exercise.
- Those with a BMI over 35 kg/m^2 and/or joint problems should consider moderate intensity non-weight bearing activities, e.g. [35] [**L2**, **RGA**]:
    - Cycling.
    - Swimming.
    - Water aerobics.
- Sedentary patients to build up to their physical activity targets over several weeks by [35] [**L2**, **RGA**]:
    - Starting with 10-20 minutes of physical activity every other day during the first one to two weeks of the programme.
- Those who wish to incorporate vigorous intensity physical activity [35] [**L2**, **RGA**]:
    - To introduce vigorous activity gradually after an initial 4-12week period of moderate intensity activity.

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8.6 Psychosocial Factors

Depression, social isolation, and lack of quality social support are risk factors for the development and prognosis of ASCVD, and should be taken into account[5,6]:

- Interventions may include [5,6] :
  - Individual or group counselling on psychosocial risk factors and coping with illness.
  - Meditation or yoga.
  - Relaxation therapies.
  - Cognitive behaviour therapy (CBT) (in patients at increased risk of ASCVD or with established ASCVD).
- Consider referral to a clinical psychologist or therapist for any patients who are resistant to change or present with more complex problems [9] [**L1, RGA**].

9 Monitoring and Follow-Up

9.1 Monitoring Pharmacological Treatment

Patients should be followed up in a primary/generalist care setting and have their treatment and status reviewed on at least an annual basis [**R-GDG**].

9.1.1 Monitoring Statin Therapy

For patients being treated with statins [1–3] :

- Provide annual medication reviews.
    - Liver function tests:
    - Measure within 3 months of starting treatment, and again at 12 months – there is no need to measure thereafter unless clinically indicated.
- Do not routinely exclude patients with transaminase levels that are raised, but are <3 times the upper limit of normal, from statin therapy.
- Do not routinely monitor creatine kinase in asymptomatic patients taking a statin, but compare creatine kinase levels against baseline, if muscle symptoms develop.
- Assess fasting lipids after 4-12 weeks of starting treatment:
    - Discuss adherence and timing of dose.
    - Optimise adherence to diet and lifestyle measures.
    - Follow-up every 4-12 weeks thereafter until target LDL-C reductions are achieved.
    - Thereafter annual review of lipid levels is considered acceptable.

9.1.2 Monitoring Antihypertensive Therapy

After the initiation of antihypertensive drug therapy, it is important to see the patient at 2-4 week intervals to evaluate the effects on BP and to assess possible side effects [39,40] [**L2**]:

- Some medications will have an effect within days or weeks but a continued delayed response may occur during the first 2 months.
- Once the target is reached, a visit interval of a 3-6 months is reasonable [25] .

If the BP remains elevated despite treatment, at a minimum, the following aspects of management should be reassessed [25] :

- Non-adherence to treatment of the use of other medications.
- Undiagnosed secondary hypertension.
- Treatment resistance due to sleep apnoea.
- Undisclosed use of alcohol or recreational drugs.
- Unrecognised high salt intake.
- 'White coat' hypertension.
- Volume overload.
- Technical factors e.g. inappropriate cuff size, uncalibrated equipment.

NB: Most hypertensive patients require the combination of at least two drugs to achieve BP control. Monotherapy is only effective in a limited number of hypertensive patients [39,40] .

9.2 Ongoing ASCVD Risk Assessment

9.2.1 Primary Prevention of ASCVD

In patients aged over 40 years, *without* clinical ASCVD and in whom medication has not been started, perform an ASCVD risk assessment using the Pooled Cohort Equations, every 4-6 years [2–4] .

NB: Any significant changes in family history or knowledge of family history might necessitate a repeat of risk assessment [5,6] .

If the patient's ASCVD risk is at a level where intervention is recommended but pharmacological treatment is declined, advise that their ASCVD risk should be reassessed again in the future and record their choice in their medical notes [1].

9.2.2 Secondary Prevention of ASCVD

In patients with clinical ASCVD, reassess ASCVD risk using an overall assessment of risk factors, rather than the ACC/AHA Pooled Cohort Equations [2,3] . Regular risk assessment support adherence to treatment and is recommended at regular follow-up visits [2,3] .

10 Key Considerations for Patient Preferences

Patient preferences refer to patient perspectives, beliefs, expectations, and goals for health and life, and to the steps employed by individuals in assessing the potential benefits, harms, costs, and limitations of the management options in relation to one another. Patients may have preferences when it comes to defining their problems, identifying the range of management options and selecting or ranking the outcomes used to compare these options.

It is important for healthcare professionals to develop an understanding of the patient as an individual and the unique way in which each person experiences a condition and its impact on their life.

The following recommendations are therefore made for physicians and other healthcare professionals regarding general principles of patient care in Qatar:

- **Respect Patients:** Treat patients with respect, kindness, dignity, courtesy and honesty. Ensure that the environment is conducive to discussion and that the patient's privacy is respected, particularly when discussing sensitive, personal issues. Ask the patient how they wish to be addressed and ensure that their choice is respected and used.

- **Maintain Confidentiality:** Respect the patient's right to confidentiality and avoid disclosing or sharing patients' information without their informed consent. In this context, students and anyone not directly involved in the delivery of care should first be introduced to the patient before starting consultations or meetings, and let the patient decide if they want them to stay.

- **Clarify Third-Party Involvement:** Clarify with the patient at the first point of contact whether and how they like their partner, family members or carers to be involved in key decisions about their care or management and review this regularly. If the patient agrees, share information with their partner, family members or carers.

- **Obtain Informed Consent:** Obtain and document informed consent from patients, in accordance with MOPH policy and guidance.

- **Encourage Shared Decision Making:** Ensure that patients are involved in decision making about their own care, or their dependent's care, and that factors that could impact the patient's participation in their own consultation and care including physical or learning disabilities, sight, speech or hearing impairments and problems with understanding, reading or speaking English are addressed.

- **Disclose Medical Errors:** Disclose errors when they occur and show empathy to patients.

- **Ensure Effective Communication:** Explore ways to improve communication including using pictures, symbols or involving an interpreter or family members. Avoid using medical jargon. Use words the patient will understand and confirm understanding by asking questions.

- **Ensure Continuity of Care:** Provide clear and timely sharing of patient information between healthcare professionals especially at the point of any transitions in care.

11 Performance Measures

A list of performance measures is given in the table below. Healthcare organisations are encouraged to monitor service performance using the indicator definitions below [41] .

Number	Numerator	Denominator
ASC01	The number in the denominator who were initiated on statin therapy.	The number of patients diagnosed with ASCVD in the last 12 months.
ASC02	The number in the denominator who have had a lipid level and liver transaminases measured at initial assessment and 3 months after initiating treatment.	The number of patients diagnosed with ASCVD in the last 12 months, who are initiated on High Intensity Statin Therapy.

Table 11.1: Performance Measures [41] .

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Appendix: Detailed Description of the Literature Search

A systematic search for existing literature on ASCVD risk assessment and management was performed in the period June 20th – June 30th, 2020.

All existing references were evaluated and where necessary and applicable, the latest version of the specific manuscript was used to update the guideline and replace the older reference. The search for clinical practice guidelines on ASCVD risk assessment and management was performed in the *PubMed* database and websites of relevant organisations and societies including the *American Diabetes Association*, the *Supreme Council of Health (Qatar),* the *Joint British Societies,* the *Institute for Clinical Systems Improvement,* and the *Scottish Intercollegiate Guidelines Network*. The present guideline is primarily based on *UK NICE*, the *European Society for Cardiology,* and the *American College of Cardiology/American Heart Association* guidelines and is supplemented with other relevant studies.

Peer-reviewed scientific publications were found in PubMed and via *Google Scholar* Internet search engine. Non-peer reviewed studies were identified in *bioRxiv*. Books were checked on *Amazon* and via *Google* and *Google Scholar* search engines.

The included publications were identified using the terms "*ASCVD*" and specified with the following terms in combinations:

Guideline, definition, prevalence, risk factor, risk assessment, prevention, secondary, primary, treatment, management, lipid, statin, ezetimibe, antihypertensive, ACE inhibitor, antiplatelet, aspirin, clopidogrel, ticagrelor, lifestyle, diet, alcohol, exercise, psychosocial, monitoring, prevention, follow-up.

Figure A.1 on the next page demonstrates graphically the results of the search and application of exclusion criteria.

View Pathway

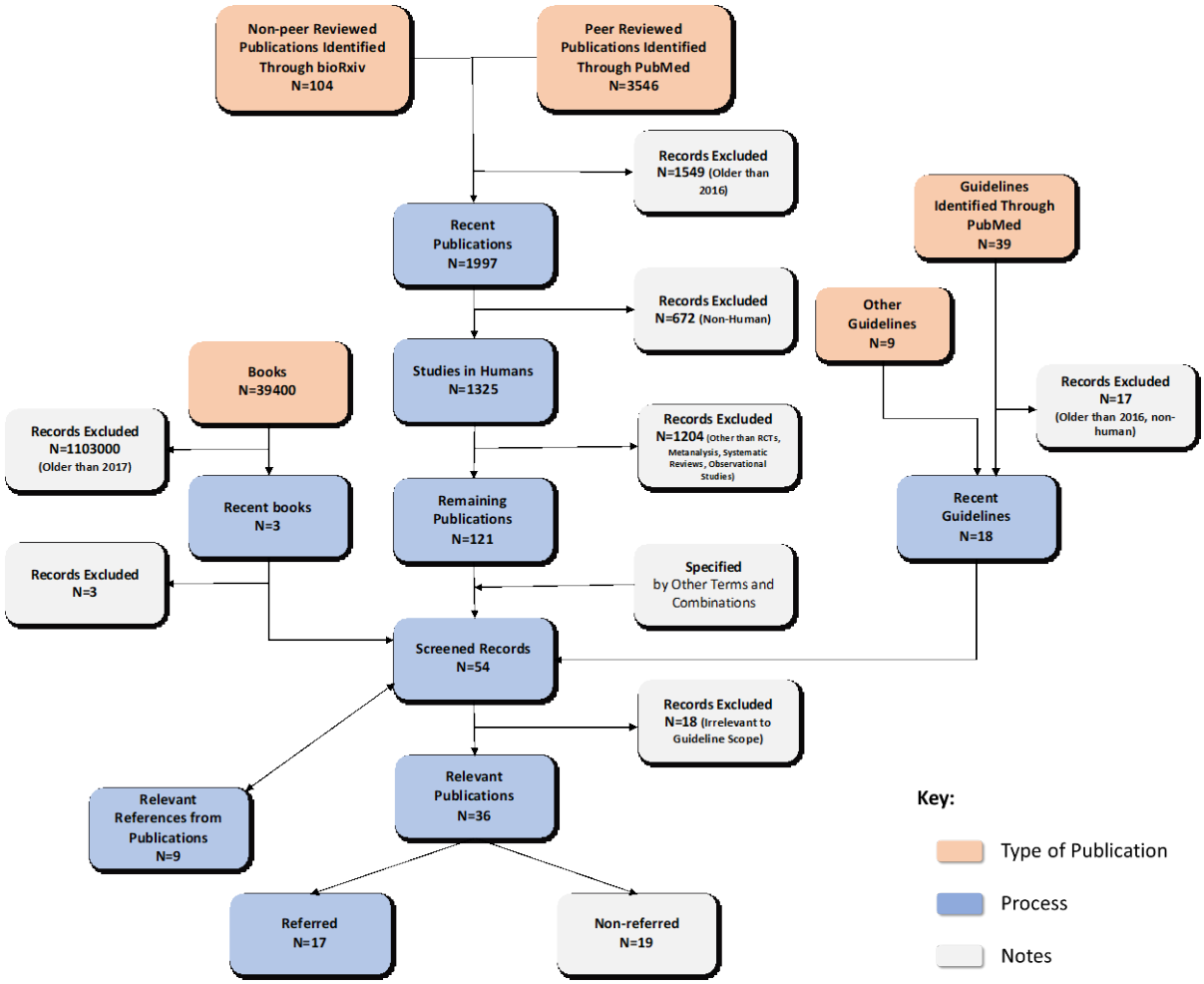

Fig A.1: Literature search results and application of exclusion criteria.

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- **Dr Rasha Bushra Nusr**, *Quality Improvement Senior Specialist, MOPH.*
- **Dr Rasmeh Ali Salameh Al Huneiti**, *Guideline & Standardisation Specialist, MOPH.*
- **Dr Bushra Saeed**, *Quality Improvement Coordinator, MOPH.*
- **Dr Mehmood Syed,** *Project Clinical Lead.*
- **Dr Samuel Abegunde,** *Physician Executive.*
- **Dr Natalia Siomava,** *Senior Medical Writer.*
- **Ms Rouba Hoteit,** *Medical Writer.*

Please use the following email address to provide feedback on this guideline:
clinicalguidelines@moph.gov.qa