Technical Glossary

This glossary defines key terms used in ACE's work that inform health technology assessments (HTAs), funding recommendations made by MOH advisory committees, and clinical guideline development.

A	
Absolute risk reduction (ARR)	A reduction in the likelihood of an event or outcome occurring because of a treatment or another intervention (sometimes called the *risk difference*). For example, if a treatment reduces the absolute risk of death from 0.25 (25%) to 0.10 (10%), the ARR is 0.15 (15%), that is, 25% minus 10%.
ACE Clinical Guidance (ACG)	Formally known as *Appropriate Care Guides,* ACGs provide evidence-based recommendations to inform specific areas of clinical practice and serve as a reference tool for clinical decision-making. Each ACG is developed in collaboration with a multidisciplinary group of local clinical experts.
ACE Clinical Update Service (CUES)	ACE CUES is an educational visiting service run by ACE for healthcare professionals. Through face to face meetings with healthcare professionals, ACE staff deliver clinical updates based on the best available evidence. ACE CUES provides a convenient and efficient way for healthcare professionals to stay up to date with the latest developments in clinical practice.
Acute	A medical condition that comes on suddenly and lasts for a limited time.
Acute care	Healthcare given to a patient in hospital, usually for a brief but severe episode of illness, trauma, or during recovery from surgery.
Adverse effect	An unintended effect that is harmful or unwanted, and suspected to be related to, or caused by, a drug, treatment or intervention. See also *Side effect*.
Adverse event	Any unintended event associated with the use of a drug, treatment or intervention, regardless of whether it has caused the event.
AGREE II instrument	The Appraisal of Guidelines for Research and Evaluation (AGREE) instrument evaluates the process of practice guideline development and the quality of reporting. The instrument has been developed by a group of international guideline developers and researchers, the AGREE Collaboration. The AGREE II instrument is the refined version replacing the original instrument.

Allocation concealment	A process used to prevent (conceal) advanced knowledge of what intervention group participants will be assigned to in a randomised controlled trial. The process prevents researchers from (unconsciously or otherwise) influencing which participants are assigned to a given intervention group.
Analysis	The process of looking for patterns in information to identify cause and effect or answer specific questions, such as whether a treatment works. There are 2 types of analysis. **Quantitative analysis** looks for patterns in the form of numbers. **Qualitative analysis** looks for patterns of meaning, feeling or beliefs.
Applicability	How well an observation or the results of a study or review are likely to hold true in a particular setting.
Appraisal	A formal assessment of the quality of research evidence and its relevance to the topic under evaluation.
B	
Base case	The results of an economic evaluation obtained using the most likely or preferred set of assumptions and input values.
Best available evidence	The strongest, best-quality research evidence available on the topic being investigated.
Bias	Systematic (as opposed to random) deviation of the results of a study from the 'true' results, which is caused by the way the study is designed or conducted.
Biological medicine	Biological medicines, also known as *biologics*, are made from living sources (such as humans, animals and bacteria). They are used to treat cancer, diabetes, auto-immune diseases and other conditions.
Biosimilar or biosimilar product	A biological therapeutic product demonstrated to be similar, in physicochemical characteristics, biological activity, safety and efficacy to the first biological medicine approved for use (also known as a reference biologic). Biosimilars become available once the patent on the reference biologic expires. They are used to treat the same conditions and are taken in the same way as reference biologics.
Blinding (or masking)	A way to prevent researchers, healthcare professionals and participants in a clinical trial from knowing which study group each participant is assigned to, so they cannot influence the results. The purpose of 'blinding' or 'masking' is to protect against bias.
Budget impact analysis (BIA)	A budget impact analysis (BIA) is used to assess how much it will cost the government to fund a health technology for a particular group of patients over a specific period of time. The budget (or financial) impact is usually calculated using a budget impact model, over a period of 3 to 5 years, at a national level. Unlike cost-effectiveness analyses which assess the value for money of a

	health technology, BIA assesses whether a health technology is affordable. ACE conducts BIA to inform funding recommendations made by MOH advisory committees.
C	
Canadian Agency for Drugs and Technologies in Health (CADTH)	A national organisation in Canada that conducts health technology assessments and provides healthcare decision-makers at a federal, provincial, and territorial level with evidence to help inform decisions about the optimal use of health technologies.
Cancer Drug List (CDL)	A list of cancer treatments that are eligible for claims under MediShield Life and MediSave.
Carer	An informal caregiver (non-healthcare professional) who looks after family members, partners, or friends in need of help because they are ill, frail or have a disability.
Case-control study	An observational study to find out the possible cause(s) of a disease or condition. This is done by comparing a group of patients who have the disease or condition (cases) with a group of people who do not have it (controls) but who are otherwise similar (in baseline characteristics). This means the researcher can look for aspects of their lives that differ to see if they may have caused the condition.
Case series	Reports of several patients with a given condition, usually covering the course of the condition and the response to treatment. There is no comparison (control) group of patients.
Cell, tissue, gene therapy product (CTGTP)	Substances containing or consisting of: 1. Autologous or allogeneic human cells or tissues 2. Viable animal cells or tissues or 3. Recombinant nucleic acids (i.e., modified DNA or RNA as carriers of a therapeutic gene) that are administered for the diagnosis, treatment or prevention of any human disease or medical condition. Examples include human demineralised bone, cell therapy products, stem cell derived products, tissue engineered products, gene therapies, xenogeneic based products, and regenerative medicines.
Chronic	A condition that persists for a long time or constantly reoccurs.
Clinical effectiveness	Effectiveness trials (pragmatic trials) measure the degree of beneficial effect under “real world” clinical settings. Study designs of an effectiveness trial are formulated based on conditions of routine clinical practice and on outcomes essential for clinical decisions.
Clinical efficacy	Clinical efficacy trials (explanatory trials) determine whether a health intervention produces the expected result under ideal or controlled circumstances.
Clinical expert	A person with specialised medical education and/or substantial relevant experience in treating a specific condition(s) who

	provides ACE with advice on current local clinical standards, treatment practices and guidelines.
Clinical importance or significance	A benefit from treatment that is important to patients and healthcare professionals. Examples include prolonging life expectancy, a reduction in symptoms, less pain, or improved breathing.
Clinical practice guideline (CPG)	A document that describes and recommends procedures for the diagnosis, treatment, and management of a health condition. It is developed to help doctors decide on the best course of action for the patient, taking into account the patient's needs and views. Clinical practice guidelines are ideally based on the best available evidence for each aspect of healthcare as well as agreement between experts and stakeholders.
Clinical trial	A study to determine whether a treatment is safe and effective. It is conducted in a group of patients, usually after laboratory testing and studies in healthy volunteers have been completed.
Clinical utility	The value, relevance, or usefulness of a health technology in clinical practice or patient care.
Co-dependent technologies	Health technologies that are dependent on each to achieve their intended purpose or enhance their effect. Their use is combined (either sequentially or simultaneously) and the benefits of both technologies should be assessed together (rather than assessing each technology separately).
Cohort study	In a cohort study, a researcher selects a group (cohort) of non-diseased people and follows them over time to determine if they develop a disease/outcome. The cohort is selected based on exposure status, including both people who have been exposed to a particular factor under investigation, and those who have not. The main characteristic in a cohort study is that the study proceeds from cause to effect.
Comorbidity	Another disease or condition that a person has in addition to the disease or condition being treated or studied.
Companion diagnostic	A test used to help match a patient to a specific drug or therapy. For example, a companion diagnostic may identify whether a patient's tumour has a specific gene change or biomarker that is targeted by the drug. This helps determine if the patient should receive the drug or not. Companion diagnostic tests can also be used to find out whether serious side effects may occur from treatment or how well a treatment is working.
Company-led submission	An evidence submission supplied by a company about their drug or other health technology that is used to inform funding deliberations by MOH advisory committees. The submission includes evidence about how well the treatment works and its value for money.
Comparator	A comparator is an alternative intervention used to treat a health condition. The typical comparator used for a health technology

	assessment (HTA) is standard (usual) care, which is the health technology currently used in Singapore to treat the health condition. The comparator can also be no intervention (for example, best supportive care).
Composite outcome	A prespecified outcome of a trial or study that is made up of at least two or more distinct components and is recorded as occurring for a participant when any one of the components is experienced. Combining two or more components into a single composite outcome leads to higher event rates and increased statistical precision that enables the trial to include fewer patients, be less costly, and be completed in a more timely manner.
Confidence interval (CI)	A way of expressing how certain we are about the findings from a study, using statistics. It gives a range of results that is likely to include the 'true' value for the population. A wide confidence interval indicates a lack of certainty about the true effect of the test or treatment. A narrow confidence interval indicates a more precise estimate.
Conflict of interest	An interest that might conflict, or be perceived to conflict, with a person's duties and responsibilities while contributing to ACE's work. Clinical experts, patient experts and committee members are required to declare any potential interests so that the information they provide to ACE can be assessed in a transparent manner.
Confounding	In a study, confounding occurs when the effect of an intervention on an outcome is distorted because of an association between the population, intervention or outcome and another factor (the 'confounding variable' or 'confounder') that can influence the outcome independently of the intervention under investigation. For example, a study of heart disease may look at a group of people who exercise regularly and a group who do not exercise. If the ages of the people in the two groups are different, then any difference in heart disease rates between the two groups could be because of age rather than exercise. Therefore, age is a confounding factor.
Consumer	A person who uses a healthcare resource. All patients are consumers, but not all consumers are patients.
Contraindication	Anything (including a symptom or medical condition) that is a reason for a person to not receive a particular treatment or procedure because it may be harmful. For example, having a bleeding disorder is a contraindication for taking aspirin because aspirin may cause excess bleeding.

Control group	A group of people in a study who do not have the intervention or test being studied. Instead, they may have the standard intervention (sometimes called 'usual care') or a dummy intervention (placebo). The results of the control group are compared with those for the intervention group (the group receiving the intervention being tested). Ideally, the people in the control group should be as similar as possible to those in the intervention group, to make it easier to detect differences in the results that are due to the intervention.
Co-payment	The amount that a patient pays for a medicine after subsidies have been applied.
Cost-effectiveness	How well a technology works in relation to how much it costs. Also known as *value for money*.
Cost-effectiveness analysis (CEA)	One of the tools used to carry out an economic evaluation. An analysis that assesses the cost of achieving a benefit by different means. The benefits are expressed in non-monetary terms related to health, such as symptom-free days, heart attacks avoided, deaths avoided or life years gained (that is, the number of years by which life is extended as a result of the intervention). Options are often compared on the cost incurred to achieve 1 outcome (for example, cost per death avoided).
Cost-minimisation analysis (CMA)	One of the tools used to carry out an economic evaluation. Cost-minimisation analysis compares the costs of different interventions that provide the same benefits. If they are equally effective, only the costs are compared and the cheapest intervention will provide the best value for money.
Cost price	Price at which companies sell their technologies to the hospitals.
Cost saving	An amount of money that is saved or not spent.
Cost-utility analysis (CUA)	One of the tools used to carry out an economic evaluation. The benefits of an intervention are assessed in terms of quality and duration of life, and are expressed as quality-adjusted life years (QALYs). See also *Utility*.
Critical appraisal	Reviewing a study or evidence base to judge the quality of the methods used and the reliability of the conclusions.
Cross sectional study	A study design that involves surveying a population about an exposure, or condition, or both, at one point in time. It can be used for assessing the prevalence of a condition in the population.
D	
Data	Information collected through research, including written information, numbers, sounds and pictures.

Data collection (prospective and retrospective)	Prospective data collection in a research study refers to when the health or characteristic of participants is monitored (or "followed up") for a period of time, from present to future, with events recorded as they happen. Challenges arise when a significant number of participants drop out from the study. Retrospective data collection in a research study refers to when data is collected in the present to gather information on the health or characteristic of participants during a specified period in the past (i.e., data collection looks backward). This method typically relies on a review of existing records or patient recall and has some limitations such as risk of incomplete data or recall bias.
Decision tree	A graphical representation of a decision, including options, uncertain events, and their outcomes.
Decision-analytic model	A model of how decisions are or should be made. This could be one of several models or techniques used to help people to make better decisions (for example, when considering the trade-off between costs, benefits and harms of diagnostic tests or interventions).
Diagnosis	The process of identifying a disease or condition using tests, or by studying the symptoms.
Diagnostic accuracy	Diagnostic accuracy measures the ability of a test to detect a condition when it is present and detect the absence of a condition when it is absent.
Digital health	The use of information and communication technologies in medicine and other health professions to manage health conditions and health risks, and to promote wellness. It includes wearable devices, mobile health, telehealth, electronic health records, electronic prescriptions, and access to trusted data.
Direct costs	The value of all goods, services and other resources consumed in providing healthcare. There are two types of direct costs: direct healthcare costs and direct non-healthcare costs. Direct health care costs include the costs of clinician consultations, hospital services, treatments etc involved in the delivery of healthcare. Direct non-healthcare costs are incurred in connection with healthcare, such as care provided by family members and transportation to and from the site of care.
Disability-adjusted life year (DALY)	A measure of the impact of a disease or injury in terms of healthy years lost. DALYs are calculated as the sum of the Years of Life Lost (YLL) due to premature mortality and the Years Lost due to Disability (YLD) for people living with the health condition or its consequences.

Discounting	Costs and (sometimes) benefits incurred today have a higher value than costs and benefits occurring in the future. Discounting health benefits reflects individual preference for benefits to be experienced in the present rather than the future. Discounting costs reflects individual preference for costs to be experienced in the future rather than the present.
Discrete event simulation	A method that can be used to model the course of a disease (for example, to predict disease progression for the purposes of cost-effectiveness analysis).
Disease-free survival (DFS)	The time from when treatment is finished until the recurrence of disease (or death) after undergoing curative-intent treatment.
Dominance	A health economics term. When comparing tests or treatments, an option that is both more effective and lower in cost 'dominates' the alternative.
Drug	A product or preparation that is used to treat, prevent, or cure a medical condition. This term is often interchangeable with *medicine*, *medication*, or *pharmaceutical*.
E	
Economic analysis	Study or analysis of the cost of using and distributing health or social care resources.
Economic evaluation	An economic evaluation is used to assess the cost effectiveness of health technologies. This is done by comparing the costs and benefits of a new technology with the existing standard of care to determine If it is worth funding. Economic evaluations are used to inform and support funding decisions; they are not supposed to replace the clinical judgement of healthcare professionals. There are several types of economic evaluation: cost-benefit analysis, cost-consequence analysis, cost-effectiveness analysis, cost-minimisation analysis and cost-utility analysis. They use similar methods to define and evaluate costs, but differ in the way they estimate the benefits of the intervention.
Economic modelling	Health economic modelling is a tool used to compare the costs and benefits of new and existing health technologies. It is a key component of the health technology assessment (HTA) process and supports decision-makers allocate limited healthcare resources to achieve the best possible outcomes for patients. Modelling is usually done for one or more of the following reasons: clinical trials are of insufficient duration; outcomes are reported differently in the trials; no trials exist; trials do not contain all relevant comparators; cost and resource information is not included in trials.
Effect size	The size of the effect of an intervention. Many methods are used to quantify the effect size including relative risk and odds ratio (for dichotomous or binary outcomes), or standardised mean

	difference or weighted mean difference (for continuous variables (such as pain scores or height).
Effectiveness	How well a test, treatment or procedure works in real-world conditions.
Efficacy	The benefit of a test, treatment or procedure achieved under controlled conditions, such as in a clinical trial.
Efficiency	The extent to which the maximum possible benefit is achieved out of the available resources.
Emerging health technology	A drug, device or procedure that is not commonly used yet. An example is a drug that is still being tested in clinical trials and does not have regulatory approval for use yet.
Epidemiology	The study of the diseases that exist in a population, and the risk factors that help or prevent their spread.
Equivalence	When there is sufficient evidence to conclude that two alternative health technologies are non-inferior to each other.
Evaluation report	A review of clinical and economic evidence about how well health technologies work and how much value for money they provide. ACE's evaluation reports inform funding recommendations made by MOH advisory committees. They are written by the ACE technical team with inputs from local clinical and patient experts, and heath technology companies.
Evidence-based medicine	The use of scientific and medical research evidence to guide decisions in healthcare. The evidence is used by doctors and other healthcare professionals to inform decisions on diagnosis, management, and treatment of patients under their care.
Expert group	A group of people (such as doctors or patients) who are experts about a particular medical condition and provide advice to ensure that ACE's evaluations and guidance documents are accurate, reflect local clinical practice, and are relevant to patients.
Extrapolation	The application of results to a wider population than what was studied. In economic modelling, this is the practice of inferring outcomes beyond a trial period based on assumptions applied to outcome values seen during the trial period.
F	
False negative	When the statistical analysis of a trial detects no difference in outcomes between a treatment group and a control group when in fact a true difference exists. This is also known as a Type II error.
False positive	When the statistical analysis of a trial detects a difference in outcomes between a treatment group and a control group when in fact there is no difference. This is also known as a Type I error.
Focus group	A small group of people brought together to talk about a specific topic. It is a good way to find out how people feel or think about an issue, or to come up with possible solutions to problems.

Follow up	Observation over a period of time of a person, group or defined population to observe changes in health status, or health-related variables.
G	
Gene therapy	Gene therapy is used to correct genetic problems to treat or cure a disease or condition. When a gene mutation (a permanent change in the DNA sequence) causes a protein to be missing or faulty, gene therapy may be able to restore the normal function of that protein.
Generic drug	A drug created to be the same as an already marketed brand-name drug in dosage form, safety, strength, route of administration, quality, performance characteristics, and intended use.
Generic name	The general non-proprietary name of a drug or device.
GN-26/27 Special Access Route (SAR)	Special access routes overseen by the Health Sciences Authority (HSA) may be used to enable qualified practitioners to access unregistered medical devices for use in their patients. **GN-26** allows individual licensed practitioners to seek approval for the import and supply of unregistered medical devices for use on their patients. **GN-27** allows healthcare facilities licensed under the Private Hospitals and Medical Clinics Act (PHMCA) / Healthcare Services Act (HCSA) to seek approval for the import and supply of unregistered medical devices for use on their patients.
Gold standard	A method, procedure or measurement that is widely accepted as being the best available to test for or treat a disease. Also known as *reference standard*.
GRADE	Grading of Recommendations Assessment, Development and Evaluation - a systematic and explicit approach to grading and presenting the quality of evidence and the strength of recommendations.
Grading (of evidence)	A means of indicating the quality of evidence.
Grandfathering	Continuing to provide funding for a patient who was already receiving a health technology before recommendations were made for it to no longer be funded. Patients are usually grandfathered until they have completed their course of treatment.
Grey literature	Literature that has not been formally published in sources such as books or journal articles.
Guidance	A document which outlines funding recommendations for a health technology made by MOH's advisory committees. The document includes a summary of the rationale for the funding recommendation, and the key clinical and economic evidence which informed the committee's deliberations.

H	
Hazard ratio	A ratio of the hazards in the treatment and control groups (i.e., hazard in intervention group divided by the hazard in the control group). The term is broadly equivalent to relative risk but is used when the risk is not constant with respect to time. If, however, the assumption is made that the risks remain in proportion between population groups in a study, then although the hazards may alter over time, the hazard ratio between groups remains constant. Hazard ratios are frequently used to estimate the treatment effect for time-to-event endpoints, such as overall survival and progression-free survival, as well as for time to composite outcomes, such as a major adverse cardiac event (MACE; death, myocardial infarction, coronary revascularisation, stroke, or hospitalisation due to heart failure).
Health-related quality of life (HRQoL)	The physical, social and mental effects of an illness that are relevant and important to an individual's wellbeing. They are measured to see how they affect a person's day to day life.
Health Sciences Authority (HSA)	The national regulatory body which assesses the clinical efficacy and safety of health technologies before they are granted approval for use in Singapore.
Health technology	Any form of intervention to improve health, such as drugs, devices, medical equipment and procedures relating to healthcare and its services, including prevention, diagnosis, and treatment of a condition.
Health technology assessment (HTA)	A scientific research methodology to inform policy and clinical decision-making on the relative value of new health technologies (such as drugs, devices and medical services) compared to existing standards of care. It is conducted using explicit analytical frameworks, drawing on clinical, epidemiological and health economic information to determine how best to allocate limited healthcare resources to new technologies.
Heterogeneity	In the context of meta-analysis, heterogeneity refers to dissimilarity between studies. It can be due to the use of different statistical methods (statistical heterogeneity), or evaluation of different types of patients, treatments, or outcomes (clinical heterogeneity). Heterogeneity may make pooling of data in meta-analysis unreliable or inappropriate. Heterogeneity of treatment effects (HTEs) refers to variation in effectiveness, safety (adverse events), or other patient responses observed across a patient population with a particular health problem or condition. This variation may be associated with such patient characteristics as genetic, sociodemographic, clinical, behavioural, environmental, and other personal traits, or personal preferences.

Horizon scanning	A process to track different information sources (such as clinical trial registries, regulatory approvals, and market research reports) to identify health technologies which could be potential topics for HTA in the future. While horizon scanning is most often used to identify new technologies that are not available in Singapore yet, it can also help determine which current technologies may be superseded by newer ones in clinical practice.
I	
Incidence	The number of new cases of a disease among a certain group of people during a specific period of time.
Incremental cost-effectiveness ratio (ICER)	The relative value of new technologies is compared to existing standards of care using the incremental cost-effectiveness ratio (ICER). It is defined by the difference in cost between two possible interventions, divided by the difference in their effect.
Indication	A medical condition, disease or disorder that is the reason for starting clinical management.
Indirect comparison	An analysis that compares interventions that have not been compared directly in a head-to-head, randomised trial.
Indirect costs	Costs that are not directly related to the provision of healthcare (also known as 'productivity losses'). These include the costs of loss of work due to absenteeism (from illness or attending medical appointments) disability or death, impaired productivity at work and lost or impaired leisure activity. Indirect costs are not usually included in base case analyses but can be considered in sensitivity and scenario analyses.
Informed choice	A choice made by a person who understands the information available about a test or treatment, as well as its risks and benefits.
Intention-to-treat (ITT) analysis	An analysis of data for all participants in a trial, based on the group they were initially (and randomly) allocated to. This is regardless of whether or not they dropped out, fully adhered to the treatment or switched to an alternative treatment. ITT analyses are often used to assess clinical effectiveness because they mirror actual practice (i.e., "real world" analysis), when not everyone adheres to the treatment, and the treatment people have may be changed according to how their condition responds to it.
Intervention	A treatment, surgical procedure, diagnostic test or psychological therapy.
Intramuscular injection	An injection used to deliver a medication deep into the muscles. This allows the bloodstream to absorb the medication quickly.
Intravenous (IV)	A way of giving a drug or other substance through a needle or tube inserted into a vein. Also known as IV.

K	
Kaplan-Meier (KM) curve	A graphical representation of the survival rates of a group of patients over a period of time. It is a non-parametric estimate of survival that does not make any assumptions about the underlying distribution of data. It is used to estimate survival from data that are censored, truncated or have missing values.
L	
Level of evidence	The level of evidence (sometimes called hierarchy of evidence) is a system used to rank clinical trials or studies based on the methodological quality of their design, validity, and applicability to patient care.
Life-year (LY)	An outcome measure calculated by multiplying the number of affected individuals by the number of years each individual is expected to live.
Likelihood ratio	A comparison of the proportion of positive or negative test results in those with the disease to the proportion in those without the disease. The likelihood ratio for a positive test result is sensitivity/(1 minus specificity). The likelihood ratio of a negative test result is (1 minus sensitivity)/specificity.
Literature review	A summary of published information (from books, journal articles etc.) on a particular topic. A literature review may be a general overview and interpretation of the research or a more formal review (such as a systematic review) of all published studies on a specific topic.
M	
Markov modelling	A decision-analytic technique that characterises the prognosis of a group by assigning group members to a fixed number of health states and then modelling transitions among the health states.
Means testing	A method used to calculate the subsidies that a patient will receive for healthcare based on their household income and other factors, to ensure lower-income households receive more than higher-income households.
Medical device	All products, except medicines, used in healthcare to diagnose, prevent, monitor, or treat illness or disability. For example, a device might be a pacemaker, knee replacement, X-ray machine or blood pressure monitor. In Singapore, a device is defined as something used for human beings for the purpose of: ▪ diagnosis, prevention, monitoring, treatment or alleviation of disease ▪ diagnosis, monitoring, treatment, alleviation of or compensation for an injury or disability, and ▪ investigation, replacement, or modification of the anatomy or of a physiological process.

Medical implant	Medical implants are devices or tissues that are placed inside or on the surface of the body. In Singapore, an implant is defined as any medical device which is intended by its product owner: ▪ to be wholly introduced into a human body, or to replace human epithelial surface or the surface of a human eye, by surgical intervention, and to remain in place after the surgical intervention; or ▪ to be partially introduced into a human body by surgical intervention, and to remain in place for at least 30 days after the surgical intervention and includes any such medical device that is wholly or partially absorbed by the human body, epithelial surface or eye.
Medical service	A service that provides healthcare or treatment to a patient. People use medical services to diagnose or treat disease or injury; to improve or maintain their health; or even to obtain information about their health status and prognosis. Also known as *health service.*
Medical Services Advisory Committee (MSAC)	A committee that makes recommendations and gives advice to the Australian Health Minister about which medical devices and services should be subsidised by the government on the Medical Benefits Schedule (MBS).
Medical social worker (MSW)	Medical social workers (MSWs) assist patients transition from the hospital back into the community. They can also provide counselling for patients and caregivers to help them overcome difficulties relating to their condition and treatment; and discuss financial assistance options with eligible patients to help cover their treatment costs and other practical needs arising from their condition.
Medical technology	Medical technologies include all equipment, tools, and devices which are used to diagnose and treat a patient. They can vary from a simple bandage, dental floss, thermometer, catheter or wheelchair to complex MRI scan machines, ultrasound devices and surgical robots.
Medical Technology Subsidy List (MTSL)	A list of medical implants that are subsidised in public healthcare institutions when they are used in line with specific clinical criteria.
Medication Assistance Fund (MAF)	The Medication Assistance Fund (MAF) helps people pay for moderate- to high-cost drugs prescribed in public healthcare institutions that are considered clinically necessary. Drugs listed on the MAF are only subsidised for specific conditions and patients must meet clinical criteria to be eligible for subsidy. Patients receive 40-75% subsidy for drugs listed on the MAF based on means testing.
MediFund	MediFund provides a safety net for patients who face financial difficulties with their remaining bills after receiving government

	subsidies and drawing on other means of payment including MediShield Life, MediSave, and personal savings.
MediSave	MediSave is a national medical savings scheme that helps people set aside part of their income so that they can pay for hospitalisation, day surgery and certain outpatient expenses, when required. MediSave can be used for someone's own healthcare needs, or to help cover healthcare costs for their dependent family members.
MediShield Life	MediShield Life is a national health insurance plan which helps to pay for large hospital bills, medical implants, and certain expensive outpatient treatments, such as dialysis and cancer drugs. All Singapore citizens and permanent residents are covered under MediShield Life and are required to pay annual premiums.
Meta-analysis	A statistical method which combines data from several studies on the same test, treatment, or other intervention to calculate an overall estimate of effect.
Minimal clinically important difference (MCID)	The smallest change in a treatment outcome that people with the condition would identify as important (either beneficial or harmful), and that would lead a person or their clinician to consider a change in treatment.
Mixed treatment comparison (MTC)	A statistical approach used to analyse a network of evidence with more than two interventions which are being compared indirectly, and at least one pair of interventions compared both directly and indirectly.
MOH advisory committee	A committee that makes recommendations to the Ministry of Health (MOH) on whether health technologies (such as drugs, vaccines, and medical devices) should be funded in Singapore. There are two main advisory committees. The MOH Drug Advisory Committee (DAC) makes recommendations on drugs, gene therapies, and vaccines, and the MOH Medical Technology Advisory Committee (MTAC) makes recommendations on devices, diagnostics, and medical services.
Morbidity rate	The number of cases of an illness, injury or condition within a given time (usually a year). It can also refer to the percentage of people with a particular illness, injury, or condition within a defined population.
Mortality rate	The proportion of a population that dies within a particular period of time. The rate is often given as a certain number per 1000 people.
N	
National Institute of Health and Care Excellence (NICE)	An organisation that conducts health technology assessments and provides national guidance and advice to improve health and social care in England.

Negative predictive value (NPV)	The likelihood that a person who has a negative test result indeed does not have the disease, condition, biomarker, or mutation in the gene being tested.
Network meta- analysis (NMA)	The simultaneous synthesis of evidence of all pairwise comparisons across more than two interventions.
Non-inferiority	When an evaluated technology is no worse (in terms of clinical effectiveness) than its comparator.
Number needed to harm (NNH)	A measure of how many patients need to have a treatment or be exposed to a risk factor for one of them to have a bad outcome. Ideally, this number should be as high as possible because the larger the number, the less often bad outcomes occur. The NNH is the inverse of absolute risk reduction. For example, if 100 people receive a treatment and two of them experience an adverse effect, the number needed to harm is 50 (i.e., 100/2 = 50).
Number needed to treat (NNT)	The number of patients who need to receive the treatment for one of them to get the positive outcome in the time specified. The closer the NNT is to 1, the more effective the treatment. The NNT is 100 divided by the absolute risk reduction (ARR) expressed as a percentage. For example, if the ARR is 5%, the NNT is 100/5=20.
O	
Observational study	A non-experimental study design in which the researcher observes the natural course of events (i.e., the research does not allocate participants to an intervention or control group), e.g., cohort studies and case-control studies).
Odds ratio (OR)	Compares the odds (probability) of something happening in one group with the odds of it happening in another. An odds ratio of 1 shows that the odds of the event happening (for example, a person developing a disease or a treatment working) is the same for both groups. An odds ratio of greater than 1 means that the event is more likely in the first group than the second. An odds ratio of less than 1 means that the event is less likely in the first group than in the second group.
Opportunity cost	The opportunity cost of investing in an intervention is the value of the benefits generated by other healthcare programmes that are displaced by its introduction. This may be best measured by the health benefits that could have been achieved had the money been spent on the next best alternative healthcare intervention.
Organisational feasibility	An assessment of the potential impact on healthcare institutions (e.g. hospitals) if a health technology is used in clinical practice. This includes determining if existing systems or protocols need to be amended, or additional staff training is required to support the adoption of the health technology.
Outcome	An effect produced by, or because of, an intervention (such as a test or treatments). It can be a clinical sign (such as blood

	pressure level), a disease or condition (such as stroke), a complication or side effect, or another measure of health (such as quality of life). Outcomes may be immediate, short-term or long-term. Ideally, studies should consider outcomes that are important and meaningful to patients.
Overall survival (OS)	The time from when a patient is randomised to receive a specific intervention in a clinical trial until they die.
P	
P-value	The p value is a statistical measure that indicates whether or not an effect is statistically significant. For example, if a study comparing 2 treatments found that 1 seems to be more effective than the other, the p value is the probability of obtaining these results by chance. By convention, if the p value is below 0.05 (that is, there is less than a 5% probability that the results occurred by chance), it is considered that there probably is a real difference between treatments. If the p value is 0.001 or less (less than a 1% probability that the results occurred by chance), the result is seen as highly significant. However, a statistically significant difference is not necessarily clinically significant. For example, drug A might relieve pain and stiffness statistically significantly more than drug B. But, if the difference in average time taken is only a few minutes, it may not be clinically significant. See 'minimal clinically important difference (MCID)'. If the p value shows that there is likely to be a difference between treatments, the confidence interval describes how big the difference in effect might be.
Palliative care	Care given to maintain or improve the quality of life for a patient who has a progressive disease with little or no chance of cure.
Parametric survival curve	Trial data that are graphed to show how long patients survived for based on a parametric distribution.
Partitioned survival analysis	A mathematical model used to represent the movement of a patient cohort between health states over time. In contrast to Markov models, a partitioned survival analysis does not explicitly allocate patients into health states but calculates the proportion of patients in each health state over time, typically based on parametric survival curves. This type of analysis is often used to model cancer treatments.
Patient assistance programme (PAP)	A way for pharmaceutical companies to make high-cost drugs more affordable for patients with low household incomes by providing them at a reduced price, or for free in certain public hospitals if patients meet specific eligibility criteria (usually based on means testing).
Patient-centred healthcare	Care that is respectful of and responsive to individual patient preferences, needs, and values. Patient centeredness is created

	by engaging, informing, and actively listening to patients at every point in their care journey.
Patient engagement	Active, meaningful, authentic, and collaborative interaction between patients and other stakeholders. At ACE, we recognise the unique experiences, values, and expertise that patients can provide. Our processes enable patients to suggest topics for ACE to evaluate, provide input into ACE's technical evaluations to inform funding decisions, and co-develop educational resources to encourage shared decision-making between patients and their doctors about their healthcare needs.
Patient experience	Information about a patient's personal knowledge living with a disease or condition. It includes perspectives, needs and priorities related to (but not limited to) the symptoms of their condition and its natural history; the impact of the condition on their daily activities and quality of life; their experience with treatments; which health outcomes are most important to them; and their preferences for new treatments.
Patient expert	A person who shares their lived experience, views, and perspectives about a specific condition and/or health technology to inform ACE's work.
Per protocol analysis	An analysis of the trial data that only uses information from participants who adhered perfectly to the clinical trial instructions as stipulated in the study protocol (i.e., an "ideal world" analysis). This type of analysis seeks to establish clinical efficacy and answers the question of 'can the treatment work?'
Pharmaceutical Benefits Advisory Committee (PBAC)	A committee that makes recommendations and gives advice to the Australian Health Minister about which drugs and medicinal preparations should be subsidised by the government on the Pharmaceutical Benefits Schedule (PBS).
Phase I, II, III, IV studies	Different phases of clinical trials are run to develop a new treatment. Phase I involves using healthy human volunteers to check the safety of the treatment. In phases II-IV, patients with the condition that the researchers are interested in are given the treatment and the optimal dose is determined. Researchers study these patients to see whether the treatment works, how long the effects last and whether there are any adverse effects.
PICO (population, intervention, comparator, and outcome) framework	A structured approach for developing evaluation questions that divides each question into 4 components: the population (the population being studied); the intervention (which treatment is being used); the comparator(s) (current alternative treatment options); and the outcomes (measures of how effective the intervention is).
Pivotal trial	A clinical trial or study that is intended to provide the ultimate evidence and data that regulatory authorities use to determine

	whether to approve a new health technology. Also known as a *registration trial.*
Placebo	A fake (dummy) or inactive treatment given to patients in the control group of a clinical trial. It is indistinguishable from the actual treatment (which is given to patients in the experimental group). Placebos are tools to maintain blinding during the course of a trial. The aim is to determine what effect the experimental treatment has had over and above any placebo effect caused because someone has had (or thinks they have had) treatment.
Population	A group of people with a common defined set of characteristics, such as the same medical condition or geographic area of residence. The population for a clinical trial is all the people the test or treatment is designed to help (e.g. adults with diabetes). The group of people taking part in a clinical trial need to be representative of the whole population of interest.
Positive predictive value (PPV)	The likelihood that someone with a positive test result truly has the disease or gene being tested for.
Precision medicine	Optimising healthcare (particularly diagnosis and treatment) for patients based on their molecular or genetic traits which are likely to influence their response to a healthcare intervention.
Pre-post testing	A quasi-experimental study in which the same assessment measures are given to participants both before and after they have received a treatment or been exposed to a condition, to determine if there are any changes that could be attributed to the treatment or condition. Also known as a *before and after design*.
Pre-test probability	The proportion of people in a population at risk who have the disease at a specific time or time interval (i.e., it is the probability before a diagnostic test is performed that a patient has the disease).
Prevalence	How common a disease or condition is within a population, either at a point in time or over a given period of time (it includes new and existing cases).
Price volume agreement (PVA)	A form of risk-sharing arrangement, where a company agrees to pay a rebate to the government on a portion of sales in excess of a specified threshold or volume.
Primary care	Healthcare delivered outside hospitals. It includes a range of services provided by doctors, nurses and other healthcare professionals and allied health professionals such as dentists, pharmacists, and opticians.
Primary outcome	The result(s) of most interest to researchers conducting a clinical trial.
PRISMA flowchart	A flowchart that is used to document the process of screening and selecting studies retrieved for a systematic review.

Probabilistic sensitivity analysis (PSA)	Type of sensitivity analysis in which probability distributions are specified for parameters (e.g., outcomes, costs, or utilities) to capture uncertainty around the true parameter value. By simulating the consequences of random drawings from these distributions, it enables judgements to be formed about the robustness of decisions in relation to each parameter.
Prognosis	The expected health outcome for a person in the future, taking into account their current condition or symptoms.
Progression-free survival (PFS)	The time from when a patient is randomised to receive a specific intervention in a clinical trial, to the date when symptoms get worse (clinical relapse) or the patient dies.
Propensity score matching	A propensity score is the probability that participants with certain characteristics will be assigned to the treatment groups (as opposed to the control group). The scores can be used to reduce or eliminate selection bias in observational studies by balancing covariates (the characteristics of participants) between treated and control groups. Propensity score matching attempts to balance the confounding factors across treatment groups to make them comparable. A matched set consists of at least one participant in the treatment group and one in the control group with similar propensity scores.
Prophylaxis	Prophylaxis describes procedures and treatments that prevent something from happening. Vaccines and birth control are examples of prophylaxis.
Proprietary name	The brand name given by the company to a drug or device it produces.
Prospective study	A type of longitudinal study where researchers follow and observe a group of participants over a period of time to gather information and record the development of outcomes. Also known as a *prospective cohort study*.
Q	
Qualitative research	Qualitative research explores people's beliefs, experiences, attitudes, behaviour, and interactions. It asks questions about how and why. For example, why people want to stop smoking, rather than asking how many people have tried to stop. It generates non- numerical data, such as a person's description of their pain rather than a measure of pain. Qualitative research techniques (such as focus groups and written surveys) may be used to find out the views and experiences of clinicians and patients to help inform ACE's technical evaluations.
Quality-adjusted life year (QALY)	A measure of the state of health of a person or group in which the benefits, in terms of length of life, are adjusted to reflect the quality of life. One quality-adjusted life year (QALY) is equal to 1 year of life in perfect health.

	QALYs are calculated by estimating the years of life remaining for a patient after they have had an intervention and weighting each year with a quality-of-life score (on a 0 to 1 scale, where 1 represents perfect health).
Quality of evidence	The extent to which someone can be confident that an estimate of effect is correct, and any biases have been minimised. See *GRADE.*
Quantitative research	Research that generates numerical data or data that can be converted into numbers.
Quasi-randomisation	When participants are allocated to different arms of a clinical trial (to receive a health technology, or placebo, for example) using a method of allocation that is not truly random.
R	
Randomisation	Assigning people in a research study to different groups without taking any similarities or differences between them into account. For example, it could involve using a random numbers table or a computer-generated random sequence. It means that each individual (or each group in the case of cluster randomisation) has the same chance of being assigned to the control group or the intervention group.
Randomised controlled trial (RCT)	A study where similar people are randomly assigned to two (or more) groups to test a specific drug, treatment or other intervention. One group (the experimental group) has the intervention being tested, the other group (the comparison or control group) has an alternative intervention, a dummy intervention (placebo) or no intervention at all. The groups are followed over time to see how effective the experimental intervention was. Outcomes are measured at specific times and any difference in response between the groups is assessed statistically.
Real world data	Data relating to patient health status and/or the delivery of health care routinely collected from a variety of sources including electronic health records, medical claims, billing or insurance data, product or disease registries, or patient-generated data.
Real world evidence	Clinical evidence regarding the usage and potential benefits or risks of a health technology derived from analysis of real world data. Real world evidence can be generated by different study designs or analyses, including but not limited to pragmatic trials and retrospective or prospective observational studies. Real world evidence complements data from clinical trials by generalising the trial findings to the local population.
Reference case	The Reference Case is the set of preferred methods that ACE follows when conducting an economic evaluation. The purpose of

	the Reference Case is ensure that all of ACE's evaluations are conducted using consistent methods.
Reference standard	An independently applied test that is compared with the proposed diagnostic test to ascertain its accuracy. Reference standards are used to verify true negatives and true positives.
Relative risk (RR)	The probability of an event occurring in the intervention group compared with the probability of the same event occurring in the control group, described as a ratio. If both groups face the same level of risk, the relative risk is 1. A relative risk of 2 means that participants in the intervention group would be twice as likely to have the event happen. A relative risk of less than 1 means the outcome is less likely in the intervention group. Relative risk is sometimes referred to as risk ratio. It will be very similar to the odds ratio when events are rare.
Retrospective study	A study in which researchers select groups of patients that have had an exposure to a disease or risk factor or have already been treated and then analyse data from the events the patients have experienced. These studies look backwards in time to examine the relationship between the exposure and the outcome.
Risk factor	Any aspect of a person's lifestyle, environment or pre-existing health condition that may increase their risk of developing a specific disease or condition.
Risk-sharing arrangement (RSA)	An arrangement agreed between a company and the Singapore government that adequately monitors identified risks (or undesired events such as cost-ineffective use or greater-than-expected use) of a drug that has been recommended for funding. The arrangement ensures that the financial impact of any risks are shared between the company and the government if they occur.
S	
Safety	A measure of the probability of an adverse outcome occurring while using a health technology for a particular condition.
Scope	A document that describes the framework for a technology evaluation, and outlines the population, intervention, comparator(s) and outcomes that will be included.
Screening	Detection of a disease, abnormality, or associated risk factors in asymptomatic people. Examples include using Pap smears to screen for cervical cancer, or mammography to detect abnormalities in breast tissue.
Selling price	The price that a health technology is offered to a patient before any subsidy or insurance coverage is applied.
Sensitivity	The ability of a test to detect a disease or condition when it is truly present. Sensitivity is the proportion of all diseased patients who have a positive test.

Sensitivity analysis	A way to explore uncertainty in the results of comparative studies and economic evaluations. There may be uncertainty because data are missing, estimates are imprecise or there is controversy about methodology. Sensitivity analysis can also be used to see how applicable results are to other settings. The analysis is repeated using different assumptions to examine their effect on the results.
Side effect	An effect of a drug (or intervention) that is additional to the main intended effect. It could be good, bad or neutral. For example, a side effect of an antidepressant might be drowsiness. That could be a beneficial effect if a person with depression has problems sleeping, but not if they are trying to drive. See also *Adverse effect*.
Singapore Medical Device Register (SMDR)	Most medical devices whether manufactured locally or imported, must be registered with the Health Sciences Authority (HSA) and included on the Singapore Medical Device Register (SMDR) before they can be supplied in Singapore, except for Class A low-risk medical devices, which are exempted from product registration.
Single arm study	In a single arm or non-randomised study, all participants with a specific condition are given a health technology and followed over time to observe their response and measure outcomes of interest. This type of study is common in Phase 1 and 2 testing.
Social value judgements	MOH advisory committees make funding recommendations for different health technologies based on the best available evidence. Sometimes the available evidence is not of good quality or can be incomplete, so the committees have to make value judgements. Social value judgements take account of patients' and the public's expectations, preferences, culture, and ethical principles.
Specificity	The ability of a test to exclude the presence of a disease or condition when it is truly not present. Specificity is the proportion of non-diseased patients who have a negative test.
Stakeholder	An individual or organisation with an interest in a project that ACE is working on, or a topic that ACE is evaluating for funding.
Standard (routine) care	A currently accepted and widely used treatment for a disease or condition.
Standard deviation (SD)	A measure of the spread, scatter, or variability of a set of measurements. Usually used with the mean (average) to describe numerical data.
Standard Drug List (SDL)	The Standard Drug List (SDL) contains low- to moderate-cost drugs that are essential for the management of common medical conditions. Drugs on the SDL are subsidised by 50% for all conditions that they are approved to treat. Patients from lower to middle income households may receive a higher subsidy of up to 75%.

Standardised mean difference (SMD)	A measure of effect used for continuous outcomes (such as symptom scores or height) rather than dichotomous/binary outcomes (such as death). The mean differences in outcome between the groups being studied are standardised by an estimate of the standard deviation of the measurements in the study to account for differences in scoring methods for each outcome.
Statistical significance	A statistically significant result is one that is assessed as being due to a true effect rather than random chance. Significance is often reported at a 5% level (P <0.05) which means that the observed result would occur by chance in only 1 in 20 similar studies. See *P value*.
Study population	People who are the subjects of a research study.
Subcutaneous injection	An injection using a needle that delivers a treatment into the tissue layer between the skin and the muscle.
Subgroup analysis	An analysis to find out if a treatment is more clinically effective or cost effective in one group of people (for example, who are a particular age or have certain symptoms) than another.
Subsidised Vaccine List (SVL)	A list of vaccines recommended in the National Childhood Immunisation Schedule (NCIS) and the National Adult Immunisation Schedule (NAIS) that are subsidised by the government if they are administered in public hospitals, polyclinics, or CHAS GP clinics.
Surrogate outcome	Outcomes that are measured in the short-term that predict longer- term patient focused outcomes or prognosis. For example, lowering blood pressure reduces the likelihood of death from stroke.
Systematic review	A review that summarises the evidence found on a specific research topic according to a predefined protocol, using systematic and explicit methods to identify, select and appraise the quality of relevant studies, and to extract, analyse, collate and report their findings.
T	
Time horizon	The time period over which the main differences between interventions in effects and the use of resources are expected to be experienced, taking into account the limitations of the supporting evidence.
Time trade-off (TTO)	A method of estimating health preferences using a choice between two options. Each option has a certain outcome. One option is the amount of time in the health state being rated and the other is perfect health for a lesser amount of time. The amount of time in the perfect health state is varied until the person choosing finds the options of equal value.

Table of Surgical Procedures (TOSP)	A list of procedures which can be claimed under MediSave and/or MediShield Life. TOSP codes focus on the intent and outcome of the surgical procedure, regardless of the surgical access route and/or the technology used. Any procedures not listed are not claimable.
U	
Unmet need	A condition that is not effectively managed by currently available therapy.
Utility	In health economics, a 'utility' is the measure of the preference or value that an individual or society gives a particular health state. It is generally a number between 0 (representing death) and 1 (perfect health). The most widely used measure of benefit in cost-utility analysis is the quality-adjusted life year, which combines quality of life with length of life. Other measures include disability- adjusted life years (DALYs) and healthy year equivalents (HYEs).
V	
Vaccine	A medicine that trains the body's immune system so that it can fight a disease it has not come into contact with before. Vaccines are designed to prevent disease, rather than treat a disease once you have caught it.
Validity	Whether a test or study actually measures what it aims to measure. **Internal validity** shows whether a study or test is appropriate for the question (e.g. whether a study of exercise among gym members measures the amount of exercise people do at the gym, not simply whether people join the gym). **External validity** considers how much the results of a study hold true in non-study situations such as in everyday clinical practice. It may also be referred to as the *generalisability* of study results to non-study populations. For example, the external validity of a study that took place in Spain may be questioned if the results were applied to people in Singapore.
Value-based pricing (VBP)	A process where ACE negotiates prices with companies to ensure that the prices of health technologies that have been recommended for funding reflect their value in Singapore's context.
W	
Weighted mean difference (WMD)	A measure of effect size used for continuous outcomes (such as symptom scores or height) rather than dichotomous/binary outcomes (such as death). The mean differences in outcome between the groups being studied are weighted to account for different sample sizes and variable precision between studies.

Willingness to pay (WTP)	The maximum amount of money an individual would pay to achieve a benefit or to avoid certain events, representing the monetary value they place on the health outcome.

Updated: May 2023.