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COMMENTARY

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Vaccination terminology: A revised glossary of key terms including lay person's definitions

Orlaith C. Brennan BSc[1] | John E. Moore PhD[1,2] | Peter J. A. Moore MB[3] | Beverley C. Millar PhD[1,2]

[1]School of Medicine, Dentistry and Biomedical Science, The Wellcome-Wolfson Institute for Experimental Medicine, Queen's University, Belfast, UK

[2]Laboratory for Disinfection and Pathogen Elimination Studies, Northern Ireland Public Health Laboratory, Nightingale (Belfast City) Hospital, Belfast, UK

[3]Department of Acute Internal Medicine, Antrim Area Hospital, Antrim, UK

Correspondence
John E. Moore, Laboratory for Disinfection and Pathogen Elimination Studies, Northern Ireland Public Health Laboratory, Nightingale (Belfast City) Hospital, Belfast, BT9 7AD, Northern Ireland, UK.
Email: jemoore@niphl.dnet.co.uk

Abstract

What is known and objective: There has been a paucity of vaccine and vaccine-related definitions within the scientific and medical peer-reviewed literature, particularly with the arrival of COVID-19. Therefore, it was the aim of this commentary to collate definitions to 44 vaccine- and vaccinology-related key terms, from four international and respected sources of information (where available), including (i) the World Health Organisation (WHO), (ii) the US Centers for Disease Control and Prevention (CDC), (iii) The Department of Health, Government of Australia and (iv) the European Union. In addition, it was a further aim to develop a lay person's definition to each of these 44 key terms, to act as a published and citeable reference point for pharmacists and other healthcare professionals, when communicating with patients and other public-facing stakeholders.

Comment: Definitions are important in health care in order to (i) provide concise insight on a specific topic, (ii) provide a common understanding and (iii) set reference points to allow the adoption of a standard uniform approach.

What is new and conclusion: The collation of definitions of key vaccine terms was compiled from four respected sources of information. A glossary of 44 key terms was produced to help pharmacists and other healthcare professionals explain such terms professionally, as well as to patient stakeholders in lay person's vocabulary. These lay definitions had superior readability metrics than definitions from any of the four professional sources, indicating their suitability for engagement with patient-facing stakeholders. Understanding the barriers to vaccine uptake is crucial for health professionals and policymakers to achieve improved uptake rates. This commentary has aimed at adding value to healthcare professionals and patients, by providing an up-to-date glossary of several professional definitions, from respected sources, as well as an accompanying lay definition to support the healthcare professional-patient communicative interface. Vaccines have become an important preventative tool, particularly in the context of the COVID-19 pandemic, to help mitigate disease severity and to help control the pandemic locally, nationally and internationally. Accessible and robust definitions help inform the dialogue to achieve this goal and the avoidance of *obscurum per obscurius*.

KEYWORDS
COVID-19, definitions, glossary, immunization, SARS-CoV-2, vaccination, vaccine

1 | WHAT IS KNOWN AND OBJECTIVE

The emergence of SARS-CoV-2 as the viral aetiological agent of COVID-19 disease has placed great emphasis on the role of vaccines and vaccination, as one way to help with disease prevention, as well as minimizing disease severity.[1] Several international pharmaceutical manufacturers now have emergency approval from multiple national medicines regulators to distribute COVID-19 vaccines in jurisdictions around the world.[2]

Current COVID-19 vaccination strategies have been thoroughly reviewed in seminal publications by García-Montero and colleagues,[1] as well as by Motamedi and colleagues.[2] A summary of COVID-19 vaccines which have received approval for emergency use in the UK by the UK medicines regulator, namely the Medicines and Healthcare Products Regulatory Agency (MHRA), is listed in Table 1. Several recent publications relating to COVID-19 vaccination uptake have demonstrated the importance of scientific communication in maximizing vaccine uptake.[3,4] In a survey of 25,334 respondents from 25 national samples in 12 different countries, it was demonstrated that the burden of trust largely rests with the scientific and medical community, with implications for how future COVID-19 vaccination information should be communicated to maximize uptake.[3] In another study, several factors were identified highlighting the importance of improved communication strategies for enhancing vaccine uptake rates.[4]

The global race to develop an effective vaccine for COVID-19 has created a renewed interest in the terminology used with vaccinology, with healthcare professionals, patients, academics, journalists and the wider public, in order to support effective scientific and clinical communication. With the general public, effective communication of the terminology surrounding vaccines and vaccination may help influence vaccine uptake. Practising pharmacists are often the frontline healthcare staff interfacing with other healthcare professionals over vaccines, as well as being the healthcare professional interacting with members of the public, responding to queries about the vaccine and vaccination in general. Therefore, it is important to equip pharmacists with up-to-date definitions of vaccine- and vaccination-related terminology, as well as lay person's definitions, to address the needs of these stakeholders, respectively.

Surprisingly, there has been a paucity of such definitions within the scientific and medical peer-reviewed literature, particularly with the arrival of COVID-19. Definitions are important in healthcare in order to (i) provide concise insight on a specific topic, (ii) provide a common understanding and (iii) set reference points to allow the adoption of a standard uniform approach. Previously, a glossary of 23 vaccinology terms was published in 2001,[5] but since then, there have not been any such peer-reviewed publications, with the exception of case definitions,[6,7] as well as a 2015 definition of vaccine hesitancy.[8] The Australian Academy of Science in partnership with the Australian Government Department of Health has produced a seminal public-facing publication on immunization, which contains definitions to 20 common vaccine-related terms.[9]

Therefore, it was the aim of this commentary to collate such definitions to 44 vaccine- and vaccinology-related key terms, from four international and respected sources of information, including (i) the World Health Organisation (WHO), (ii) the US Centers for Disease Control and Prevention (CDC), (iii) The Department of Health, Government of Australia and (iv) the European Union. In addition, it was a further aim to develop a lay person's definition to each of these 44 key terms, to act as a published and citeable reference point for pharmacists and other healthcare professionals, when communicating with patients and other public-facing stakeholders.

2 | COMMENT

A list of 44 key terms relating to vaccines and vaccinology was prepared, encompassing those defined previously and supplemented with contemporary vaccine-related terminology. Definitions of these terms were sought from four international respected sources of information, including (i) WHO (https://vaccine-safety-training.org/glossary.html) (n = 30 definitions), (ii) CDC (https://www.cdc.gov/vaccines/terms/glossary.html) (n = 30 definitions), (iii) Australian Government Department of Health (https://immunisationhandbook.health.gov.au/technical-terms) (n = 20 definitions) and (iv) EU (https://ec.europa.eu/health/sites/health/files/vaccination/docs/glossary_en.pdf) (n = 10 definitions).

Definitions from these sources are presented in Table 2.

The readability (i.e., the ease with which a reader can understand a written text) of these definitions was checked using the readability calculator, *Readability Test Tool*, (https://www.webfx.com/tools/read-able/), where individual vaccinology definitions were inputted to conduct a readability assessment of definitions, as previously described,[10] examining ten readability metrics, namely: Readability scores (n = 5; Flesch Reading Ease, Flesch-Kincaid Grade Level, Gunning Fog score, SMOG index, Coleman-Liau index) and Text parameters (n = 5; number of sentences, number of words, percentage of complex words, average number of words/sentence, average syllables/word), as detailed in Table 3.

Given that these four sources were not able to address all the key vaccination terms identified, lay person's definitions were constructed to all 44 key terms (Table 2). These were constructed from a

TABLE 1 Summary of COVID-19 vaccines which have received approval for emergency use in the UK by the UK medicines regulator, namely the Medicines and Healthcare Products Regulatory Agency (MHRA) (Taken from the Summary of Product Characteristics (SPC) https://products.mhra.gov.uk/)

Vaccine name	Composition	Indication	Posology
COVID−19 Vaccine Moderna dispersion for injection COVID−19 mRNA Vaccine (nucleoside modified)	One dose (0.5 ml) contains 100 micrograms of messenger RNA (mRNA) (embedded in SM−102 lipid nanoparticles). Single-stranded, 5′-capped messenger RNA (mRNA) produced using a cell-free in vitro transcription from the corresponding DNA templates, encoding the viral spike (S) protein of SARS-CoV−2.	COVID−19 Vaccine Moderna is indicated for active immunization to prevent COVID−19 caused by SARS-CoV−2 in individuals 18 years of age and older.	Individuals 18 years of age and older: COVID−19 Vaccine Moderna is administered as a course of 2 doses (0.5 ml each). It is recommended to administer the second dose 28 days after the first dose
COVID−19 Vaccine Janssen suspension for injection COVID−19 vaccine (Ad26.COV2-S [recombinant])	One dose (0.5 ml) contains: Adenovirus type 26 encoding the SARS-CoV−2 spike glycoprotein* (Ad26.COV2-S), not less than 8.92 log10 infectious units (Inf.U). *Produced in the PER.C6 TetR Cell Line and by recombinant DNA technology.	COVID−19 Vaccine Janssen is indicated for active immunization to prevent COVID−19 caused by SARS-CoV−2 in individuals 18 years of age and older.	Individuals 18 years of age and older COVID−19: Vaccine Janssen is administered as a single-dose of 0.5 ml by intramuscular injection only.
Vaxzevria, suspension for injection COVID−19 Vaccine (ChAdOx1-S [recombinant])	One dose (0.5 ml) contains: COVID−19 Vaccine (ChAdOx1-S* recombinant), not less than 2.5×10^8 infectious units (Inf.U) *Recombinant, replication-deficient chimpanzee adenovirus vector encoding the SARS-CoV−2 Spike (S) glycoprotein. Produced in genetically modified human embryonic kidney (HEK) 293 cells.	Vaxzevria is indicated for active immunization to prevent COVID−19 caused by SARS-CoV−2, in individuals ≥18 years old.	Individuals 18 years of age and older: The Vaxzevria vaccination course consists of two separate doses of 0.5 ml each. The second dose should be administered between 4 and 12 weeks after the first dose.
Comirnaty concentrate for dispersion for injection COVID−19 mRNA Vaccine (nucleoside modified)	One vial (0.45 ml) contains 6 doses of 0.3 ml after dilution. 1 dose (0.3 ml) contains 30 micrograms of COVID−19 mRNA Vaccine (embedded in lipid nanoparticles). Single-stranded, 5′-capped messenger RNA (mRNA) produced using a cell-free in vitro transcription from the corresponding DNA templates, encoding the viral spike(S) protein of SARS-CoV−2.	Comirnaty is indicated for active immunization to prevent COVID−19 caused by SARS-CoV−2 virus, in individuals 12 years of age and older.	Individuals 12 years of age and older: Comirnaty is administered intramuscularly after dilution as a course of 2 doses (0.3 ml each). It is recommended to administer the second dose 3 weeks after the first dose.

syntheses of definitions from the four sources (where available), and their readability metrics checked (Table 3).

3 | WHAT IS NEW

The collation of definitions of key vaccine terms was compiled from four respected sources of information. A glossary of 44 key terms was designed (Table 2) to help pharmacists and other healthcare professionals explain such terms to patient stakeholders in lay person's vocabulary. These terms had superior readability metrics than definitions from any of the four professional sources, indicating their suitability for engagement with patient-facing stakeholders (Table 3).

4 | CONCLUSION

Understanding the barriers to vaccine uptake is crucial for health professionals and policymakers to achieve improved uptake rates. One important concept of patient understanding is the existence of relevant definitions of key vaccine terms, as well as the readability of such patient-facing materials. In the healthcare setting, communication barriers may go undetected and the limited literacy skills of an individual are the strong predictor of overall health outcomes amongst patients.[11] If such definitions do not exist or are difficult to read, patients may fail to understand key health information, adversely impacting on their health literacy, where they may not be able to actively participate in their own healthcare decisions and ultimately their own health outcomes. This

TABLE 2 Glossary of vaccine and vaccine-related key terms and definitions

Vaccinology Term	WHO definition	CDC definition	Australian Government (Department of Health) definition	EU definition	Layperson's definition
Adjuvant	A pharmacological agent (e.g., aluminium salt, oil-in-water emulsions) that modifies the effect of other agents, such as a drug or vaccine, while having few if any direct effects when given by itself. Adjuvants are often included in vaccines to enhance the recipient's immune response to a supplied antigen, while keeping the injected foreign material to a minimum.	A vaccine component distinct from the antigen that enhances the immune response to the antigen	A substance that is added to a vaccine during production to improve the immune response to that vaccine	An adjuvant is an ingredient of a vaccine that helps create a stronger immune response in the patient's body. In other words, adjuvants help vaccines work better. Many vaccines developed today include just small components of germs, such as their proteins, rather than the entire virus or bacteria. These vaccines often must be made with adjuvants to ensure the body produces an immune response strong enough to protect the patient from the germ he or she is being vaccinated against.	A substance that is added to the vaccine to improve the immune response.
Adsorption	n/a	n/a	n/a	n/a	When a substance is joined to something else.
Antibody titre	ANTIBODY. A special protein produced by plasmocytes in response to antigens (foreign substances, e.g., bacteria or viruses). Antibodies bind with antigens on microorganisms as one of the initial steps of the body's protection against infection	The detection of antibodies in blood through a laboratory test	n/a	n/a	A test to measure the amount of antibodies in an individuals blood.
Attenuated vaccine	A vaccine prepared from living microorganisms (viruses, bacteria currently available) that have been weakened under laboratory conditions. LAV vaccines will replicate in a vaccinated individual and produce an immune response but usually cause mild or no disease.	A vaccine in which live microbe is weakened (attenuated) through chemical or physical processes in order to produce an immune response without causing the severe effects of the disease. Attenuated vaccines currently licensed in the United States include measles, mumps, rubella, varicella, rotavirus, yellow fever, smallpox, and some formulations of influenza and typhoid vaccines	ATTENUATION. The process of modifying a virus or bacterium to reduce its virulence (disease-inducing ability) while retaining its ability to induce a strong immune response (immunogenicity)	n/a	A vaccine that reduces the lethality of the virus, whilst still keeping it alive, in order to produce an immune response.
Booster	An additional vaccine dose needed to "boost" (increase) antibody levels after completion of the primary immunization, which may be a series of up to three doses.	Additional doses of a vaccine needed periodically to “boost” the immune system. For example, the tetanus and diphtheria (Td) vaccine which is recommended for adults every ten years	n/a	n/a	An extra dose of a vaccine, needed to maintain the immune response.

(Continues)

TABLE 2 (Continued)

Vaccinology Term	WHO definition	CDC definition	Australian Government (Department of Health) definition	EU definition	Layperson's definition
Carriage	BACTERIAL CARRIAGE. A bacterial infection or colonization that does not cause symptomatic disease	CARRIER. A person or animal that harbours the infectious agent for a disease and can transmit it to others, but does not demonstrate signs of the disease. A carrier can be asymptomatic (never indicate signs of the disease) or can display signs of the disease only during the incubation period, convalescence, or post convalescence. The period of being a carrier can be short (a transient carrier) or long (a chronic carrier)	Means the presence of meningococcal bacteria in the upper respiratory tract without any signs or symptoms of infection	n/a	Carrying a bacterium/virus without symptoms which may be transmitted to other people.
Clinical manifestation	n/a	n/a	n/a	n/a	A visible symptom of a disease or infection.
Clinical trial	A systematic study of a medical intervention in human subjects (including patients and other volunteers) in order to discover or verify the effects of and/or identify any adverse reaction to the intervention. Clinical trials also study the absorption, distribution, metabolism, and excretion of the products with the objective of ascertaining their efficacy and safety. Clinical trials are generally classified into Phases I to IV. Phase IV trials are studies performed after the licensure and introduction of pharmaceutical products. They are carried out to expand the evidence base of the product characteristics for which the marketing authorization was granted.	An experimental study that uses data from individual persons. The investigator specifies the type of exposure for each study participant and then follows each person's health status to determine the effects of the exposure	n/a	n/a	A trial or study that evaluates the impact of new treatments and their effects on an individual's health.
Combination (combined) vaccine	A vaccine that consists of two or more antigens in the same preparation (e.g., MMR, DTP).	A product containing components that can be divided equally into independently available routine vaccines.	2 or more vaccines given in a single dose that protects against more than 1 disease. Examples are DTPa (diphtheria-tetanus-acellular pertussis) and MMR (measles-mumps-rubella) vaccines	n/a	Two or more vaccines in one shot. This protects against more than one disease.

TABLE 2 (Continued)

Vaccinology Term	WHO definition	CDC definition	Australian Government (Department of Health) definition	EU definition	Layperson's definition
Conjugate vaccine	A vaccine in which two compounds (usually a protein and polysaccharide) have been joined together to increase the vaccine's effectiveness	The joining together of two compounds (usually a protein and polysaccharide) to increase a vaccine's effectiveness	A type of bacterial vaccine that is made by chemically linking (conjugating) a protein molecule with a tiny amount of the polysaccharide that makes up the cell coating of the bacterium. This improves the immune response to the vaccine. Examples are *Haemophilus influenzae* type b (Hib), meningococcal and pneumococcal conjugate vaccines	n/a	A vaccine that contains two components in order to try and improve the immune response.
Contamination	n/a	n/a	n/a	n/a	Making something unclean through the contact of something harmful like a bacterium/virus.
Cost-Effective	This refers to a type of economic analysis that allows comparison of different intervention options by estimating the cost per health outcome for each alternative intervention. It indicates which interventions provide the greatest impact for a given cost.	Cost-effective analysis. An economic analysis in which all costs are related to a single, common effect. Results are usually stated as additional cost expended per additional health outcome achieved. Results can be categorized as average cost-effectiveness, marginal cost-effectiveness and incremental cost-effectiveness; contrast with benefit-cost analysis (BCA)	n/a	n/a	When the benefits and usage of the vaccine are worth more than the cost.
Dead vaccine	see inactivated vaccine	n/a	n/a	n/a	A vaccine that uses a killed version of the harmful bacterium/virus that causes the disease.
Disease burden	Burden of Disease'. The impact of a disease in a defined population, usually expressed in terms of mortality or morbidity rates, or some other measure such as years of healthy life lost or disability-adjusted life years (DALYs).	n/a	n/a	n/a	The impact living with a disease/illness has on a certain population.

(Continues)

TABLE 2 (Continued)

Vaccinology Term	WHO definition	CDC definition	Australian Government (Department of Health) definition	EU definition	Layperson's definition
Effectiveness	The probability that a vaccine, when used in the field under routine vaccination circumstances, confers immunity in a population. Expressed as a per cent	The ability of an intervention or programme to produce the intended or expected results in the field.	A measure of how well a vaccine works in a defined population in "uncontrolled" or routine circumstances—for example, in a vaccination programme	Vaccine effectiveness is the probability that a vaccine confers immunity in a population when used in the field under routine vaccination circumstances. This is a "real-world" view of how a vaccine reduces disease in a population. It assesses the net balance of benefits and adverse effects of a national immunization/vaccination programme, not just the vaccine itself, under more natural conditions rather than in a controlled clinical trial.	A measure to describe how good a vaccine is at preventing a disease when distributed for use in the general public.
Efficacy	The potential of a vaccine to protect from a disease in controlled clinical trials. Expressed as a per cent.	The ability of an intervention or programme to produce the intended or expected results under ideal conditions	A measure of how well a vaccine works in a defined population in controlled or ideal circumstances—for example, in a randomized controlled trial	The potential of a vaccine to protect from a disease in controlled clinical trials, expressed as a percentage reduction of disease in a vaccinated group of people compared with an unvaccinated group	A measure to describe how good a vaccine is at preventing a disease under test conditions, for example a clinical trial.
Epidemic	The occurrence of disease within a geographical area and/or population that is in excess of what is normally expected for a given period of time	The occurrence of more cases of disease, injury or other health condition than expected in a given area or among a specific group of persons during a particular period. Usually, the cases are presumed to have a common cause or to be related to one another in some way	The spread of an infection in a community at a faster rate than is normally expected. Measles and influenza viruses are common causes of epidemics in Australia. Small epidemics are often called outbreaks	n/a	Disease occurrence in a geographical area or community.
Epidemiology	The study of the distribution and determinants of health and disease in human populations.	The study of the distribution and determinants of health-related states or events in specified populations, and the application of this study to the control of health problems	n/a	n/a	This is the study of what causes, spreads and controls health and disease within a population.
Eradication	The complete and permanent worldwide reduction to zero new cases of an infectious disease through deliberate efforts; no further control measures are required.	Permanent reduction to zero of the worldwide incidence of infection caused by a specific agent as a result of deliberate efforts; intervention measures are no longer needed. Example: smallpox.	Refers to achieving global fade-out of the infection	n/a	The complete removal of a disease.

(Continues)

TABLE 2 (Continued)

Vaccinology Term	WHO definition	CDC definition	Australian Government (Department of Health) definition	EU definition	Layperson's definition
Herd immunity	A population with a high proportion of individuals with immunity to a particular pathogen, as a consequence of immunization or infection and recovery, may confer protection from infection on the small proportion of its non-immune members because there are too few susceptible people in the 'herd' for the infection to circulate	A situation in which a sufficient proportion of a population is immune to an infectious disease (through vaccination and/or prior illness) to make its spread from person to person unlikely. Even individuals not vaccinated (such as newborns and those with chronic illnesses) are offered some protection because the disease has little opportunity to spread within the community. Also known as herd immunity.	A situation in which a large proportion of the population is immune to a disease through previous vaccination or illness. As a result, it is highly unlikely that the disease will spread from person to person. Non-immune people are indirectly protected from the disease	n/a	This happens when enough people are vaccinated or have immunity from a disease, thereby reducing the chances of someone who is not vaccinated from becoming infected.
Immunization	The process by which a person or animal becomes protected against a disease through an enhancement of their immune response. This term is different from vaccination which is a form of immunization where the body learns to recognize a particular foreign object (active immunization). Passive immunization can be provided by administering external antibodies that will temporarily help strengthen the body's response without inducing memory against a specific foreign object	The process of being made immune or resistant to an infectious disease, typically by the administration of a vaccine. It implies that you have had an immune response.	The process of inducing immunity to an infectious agent by giving a vaccine	The process whereby a person is made immune or resistant to an infectious disease, typically by the administration of a vaccine. Generally, immunization is used interchangeably with inoculation and vaccination. Technically, however, vaccination is a form of immunization (i.e., active immunization) where the body learns to recognize a particular foreign object. Passive immunization can be provided by administering external antibodies that will temporarily help strengthen the body's response without inducing memory against a specific foreign object. Immunization can also be acquired naturally, after contracting a disease	The process where an individual becomes protected against a disease caused by a bacterium/virus.

(Continues)

TABLE 2 (Continued)

Vaccinology Term	WHO definition	CDC definition	Australian Government (Department of Health) definition	EU definition	Layperson's definition
Immunity	The body's response mechanism for fighting against bacteria, viruses and other foreign substances. If a cell or tissue (such as bacteria or a transplanted organ) is recognized as not belonging to the body, the immune system will act against the "invader." The immune system is the body's way to fight external invasions.	Protection against a disease. There are two types of immunity, passive and active. Immunity is indicated by the presence of antibodies in the blood and can usually be determined with a laboratory test.	The ability of the body to fight off an infection. Immunity can result from natural infections or from vaccination.	The body's response mechanism for fighting against bacteria, viruses and other foreign substances. If a cell or tissue (such as bacteria or a transplanted organ) is recognized as not belonging to the body, the immune system will act against the "invader." The immune system is the body's way to fight external invasions.	The ability to fight off an infection caused by a harmful bacterium/virus.
Immunogenicity	The power of an antigen to induce an immune response.	n/a	The ability of a particular substance, such as a vaccine, to provoke an immune response, or the degree of response it provokes.	n/a	The power of a substance to produce an immune response. The substance can be present in a vaccine.
Inactivated vaccine	A vaccine made from microorganisms (viruses, bacteria, other) that have been killed through physical or chemical processes. These killed organisms cannot cause disease.	A vaccine made from viruses and bacteria that have been killed through physical or chemical processes. These killed organisms cannot cause disease	n/a	n/a	This vaccine uses the killed form of the disease-causing bacterium/virus.
I.,ncidence	The number of new cases (e.g., of a disease, adverse event) occurring in a defined population during a given time interval, often one year.	The number of new disease cases reported in a population over a certain period of time	n/a	n/a	This is how many new cases of disease occur within a population in a certain period of time.
Live vaccine	A vaccine prepared from living microorganisms (viruses, bacteria currently available) that have been weakened under laboratory conditions. LAV vaccines will replicate in a vaccinated individual and produce an immune response but usually cause mild or no disease.	A vaccine in which live virus is weakened (attenuated) through chemical or physical processes in order to produce an immune response without causing the severe effects of the disease. Live vaccines currently licenced in the United States include measles, mumps, rubella, varicella, rotavirus, yellow fever, smallpox, and some formulations of influenza, shingles, and typhoid vaccines. Also known as an attenuated vaccine	A vaccine containing live viruses or bacteria that are weakened (attenuated) to produce an immune response in the recipient without causing the serious effects of the disease	n/a	The vaccine uses a live form of the bacterium/virus that may be weakened.

(Continues)

TABLE 2 (Continued)

Vaccinology Term	WHO definition	CDC definition	Australian Government (Department of Health) definition	EU definition	Layperson's definition
Morbidity	Any departure, subjective or objective, from a state of physiological or psychological well-being. In this sense, sickness, illness and morbid conditions are similarly defined and synonymous.	Any departure, subjective or objective, from a state of physiological or psychological well-being	n/a	n/a	Suffering from a medical condition or disease.
Mortality rate	MORTALITY. Death. Used to describe the relation of deaths to the population in which they occur	A measure of the frequency of occurrence of death in a defined population during a specified interval of time	n/a	n/a	The number of deaths within a population in a certain period of time.
National Immunization Programme (NIP)	The organizational component of government Ministries of Health charged with preventing disease, disability and death from vaccine-preventable diseases in children and adults. NIP is used interchangeably with the Expanded Programme on Immunization (EPI) that originally focussed on preventing vaccine-preventable diseases in children	n/a	A programme in Australia that funds free vaccines for eligible people to increase immunization rates and help reduce vaccine-preventable diseases	A national vaccination/immunization programme is the organizational component of Ministries of Health charged with preventing disease, disability, and death from vaccine-preventable diseases in children and adults. A national vaccination/immunization programme is a government programme that operates within the framework of overall health policy	A programme that provides vaccines to children and adults in an effort to increase immunization rates within the population.
Pandemic	An epidemic occurring over a very large area and affecting a large number of people	An epidemic occurring over a widespread area (multiple countries or continents) and usually affecting a substantial proportion of the population.	PANDEMIC INFLUENZA. global epidemic that results when a new strain of influenza virus appears in the human population. It causes more severe disease in the population because few people have immunity to the new strain	n/a	A disease occurrence worldwide affecting a large number of people.
Prevalence	n/a	The number of disease cases (new and existing) within a population over a given time period.	Frequency or occurrence.	n/a	The proportion of a population that have a particular disease in a certain period of time.

(Continues)

TABLE 2 (Continued)

Vaccinology Term	WHO definition	CDC definition	Australian Government (Department of Health) definition	EU definition	Layperson's definition
Quarantine	n/a	The isolation of a person or animal who is suspected of having a disease in order to prevent further spread of the disease	Partial home quarantine is considered for arrivals from at-risk regions. We assume they are required to remain at home for 2 days, by which time they would be symptomatic if infected. Household members of such arrivals are free to mix with the wider community though, and are not quarantined until the arrival becomes symptomatic, at which point the entire household is isolated. We also consider quarantine of a household following the diagnosis of a household member. Household quarantine is continued until the household outbreak is over, but we permit partial compliance.	The status of starting or packaging materials, intermediate, bulk or finished products isolated physically or by other effective means whilst awaiting a decision on their release or refusal.	Isolation of someone who is suspected to have a contagious disease.
Recombinant vaccine	RECOMBINANT DNA. A vaccine technology that uses genetic material from a disease-causing organism into a live vector, often a yeast cell, in order to replicate a protein antigens of the disease-causing organism. The proteins are then purified and used as vaccine	RECOMBINANT. Of or resulting from new combinations of genetic material or cells; the genetic material produced when segments of DNA from different sources are joined to produce recombinant DNA	n/a	n/a	A vaccine that includes protein components generated from genetic material such as DNA from the target virus or bacteria.
Reproduction number	n/a	n/a	When individuals are homogeneous and mix uniformly, the reproduction number is the mean number of infections generated during the infectious period of a single infection	n/a	The number of secondary cases caused by an infection. Determines how contagious an infection is.

(Continues)

TABLE 2 (Continued)

Vaccinology Term	WHO definition	CDC definition	Australian Government (Department of Health) definition	EU definition	Layperson's definition
Reverse vaccinology	n/a	n/a	n/a	n/a	A method to develop a suitable vaccine using the bacterium/virus whole DNA to select the best substance that will induce an immune response.
Serogroups/strain	A specific genetic grouping of an organism. Many organisms, such as viral influenza, pneumococcus and meningococcus, have multiple strains that cause disease.	A specific version of an organism. Many diseases, including HIV/AIDS and hepatitis, have multiple strains	n/a	n/a	A type or variation of a bacterium/virus.
Therapeutic biologics	n/a	n/a	n/a	n/a	Used for treating disease using biological material like blood, blood components, antibodies and vaccines.
Toxoid vaccine	A vaccine made from a toxin (poison) that has been made harmless but that elicits an immune response against the toxin	TOXOID. A modified bacterial toxin that has been made nontoxic, but retains the ability to stimulate the formation of antibodies to the toxin	n/a	n/a	This vaccine uses a toxin produced by the bacterium/virus to produce an immune response.
Vaccine	A material containing live attenuated or inactivated killed microorganisms, or constituents of microorganisms, capable of eliciting protection against infection.	A suspension of live (usually attenuated) or inactivated microorganisms (e.g., bacteria or viruses) or fractions thereof administered to induce immunity and prevent infectious diseases and their sequelae. Some vaccines contain highly defined antigens (e.g., the polysaccharide of Haemophilus influenzae type b or the surface antigen of hepatitis B); others have antigens that are complex or incompletely defined (e.g., Bordetella pertussis antigens or live attenuated viruses).	A product often made from extracts of killed viruses or bacteria, or from live, weakened strains of viruses or bacteria. A vaccine can stimulate an immune response that protects against natural infection	A vaccine is a biological preparation that improves immunity to a particular disease. A vaccine typically contains an agent that resembles a disease-causing microorganism, and is often made from weakened or killed forms of the microbe, its toxins or one of its surface proteins. The agent stimulates the body's immune system to recognize the agent as foreign, destroy it, and "remember" it, so that the immune system can more easily recognize and destroy any of these microorganisms that it later encounters.	A product that teaches the body's immune system to fight a disease that it has not yet come in contact with.

(Continues)

TABLE 2 (Continued)

Vaccinology Term	WHO definition	CDC definition	Australian Government (Department of Health) definition	EU definition	Layperson's definition
Vaccine campaign	n/a	n/a	n/a	n/a	Providing and ensuring that a vaccine is received by a large number of people over a short period of time.
Vaccine failure	n/a	n/a	n/a	n/a	This occurs when the a person develops the disease, even though they have been already vaccinated for it.
Vaccine hesitancy				Vaccine hesitancy refers to delay in acceptance or refusal of vaccines despite availability of vaccination services. Vaccine hesitancy is complex and context specific varying across time, place and vaccines. It includes factors such as complacency, convenience and confidence.	A reluctance to accept a vaccine.
Vaccine schedule	n/a	n/a	n/a	A timetable with recommended ages for immunizing against particular vaccine-preventable diseases	This is a timetable of vaccines that an individual (baby, infant, adolescent adult, elderly) is to receive throughout their lifetime.
Waning	n/a	The loss of protective antibodies over time.	n/a	n/a	A decline or weakened immunity over time.

WHO (https://vaccine-safety-training.org/glossary.html)
CDC (https://www.cdc.gov/vaccines/terms/glossary.html)
Australian Government Department of Health (https://immunisationhandbook.health.gov.au/technical-terms)
EU (https://ec.europa.eu/health/sites/health/files/vaccination/docs/glossary_en.pdf)
Abbreviation: n/a, not available.

TABLE 3 Comparison of mean readability metrics of key vaccine- and vaccinology-related terms

Source	Key terms analysed	Flesch Reading Ease	Flesch-Kincaid Grade Level	Gunning Fog index	SMOG index	Coleman-Liau index	Number of sentences	Number of words	Percentage of complex words	Average number of words/sentence	Average syllables/word
WHO[a]	30	32.4	13.3	16.2	11.3	15.8	2.1	32.0	24.2	17.3	1.9
CDC[b]	30	33.3	13.0	16.6	11.5	15.7	2.0	29.6	26.3	15.9	1.9
Australian Department of Health[c]	20	35.1	12.8	16.2	11.1	15.3	1.8	28.4	25.0	16.6	1.9
EU[d]	10	25.7	15.9	18.6	12.9	17.9	2.8	52.5	26.4	20.7	2.0
Layperson's	44	46.3	10.2	12.4	8.6	13.4	1.1	14.3	18.0	13.8	1.7

[a]WHO (https://vaccine-safety-training.org/glossary.html)
[b]CDC (https://www.cdc.gov/vaccines/terms/glossary.html)
[c]Australian Government Department of Health (https://immunisationhandbook.health.gov.au/technical-terms)
[d]EU (https://ec.europa.eu/health/sites/health/files/vaccination/docs/glossary_en.pdf)

commentary has aimed at adding value to healthcare professionals and patients, by providing an up-to-date glossary of several professional definitions, from respected sources, as well as an accompanying lay definition to support the healthcare professional-patient communicative interface.

CONFLICTS OF INTEREST

None declared.

DATA AVAILABILITY STATEMENT

Data derived from public domain resources.

ORCID

John E. Moore https://orcid.org/0000-0002-5243-5108
Beverley C. Millar https://orcid.org/0000-0002-0745-8722

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