Types of Vaccines
(Created by Tara Haelle for AHCJ)

Live attenuated vaccines — contain weakened form of a virus or live bacteria, often grown in a non-human host until it adapts to that host and loses virulence for human hosts. Strong immune response, potentially greater safety risks (can replicate in humans and potentially revert)
Examples: MMR, chickenpox, rotavirus, shingles, nasal influenza, oral polio.

Inactivated vaccines – virus has been deactivated (or bacteria killed) with heat, radiation or chemical (eg, formaldehyde). Cannot replicate. Weaker immunity, often requires boosters.
Examples: hepatitis A, rabies, inactivated polio

Toxoid vaccines – contains deactivated toxin produced by the pathogenic bacteria. Examples: diphtheria, tetanus

Subunit vaccines – contain pieces of the pathogen (most often proteins). Examples: pertussis, most influenza vaccines

Conjugate vaccines – subunit vaccines that pair a weak antigen (often a polysaccharide, peptide or protein) the immune system overlooks with a strong antigen (usually protein) that the immune system will attack. Examples: pneumococcal, Haemophilus influenzae type b (Hib), meningitis

Recombinant vaccines – using genetic engineering, researchers take a gene that encodes a protein from the pathogen and insert it into another cell that produces the protein. Examples: hepatitis B (yeast cells produce a hep B protein), HPV (pieces of the virus’s outer shell form a virus-like particle (VLP) that does not contain viral genetic material needed for replication)

Nucleic acid (DNA/RNA) vaccines – similar to recombinant vaccines but contains only pieces of genetic material that the body’s cells pick it up and produce the protein (antigen) themselves. Uses DNA plasmid or messenger RNA, what takes the instructions from the DNA to the ribosomes (protein factory). Examples in development: Zika, SARS

Viral vector vaccine – recombinant nucleic acid vaccine that uses a harmless carrier virus containing DNA/mRNA that will encode the protein (antigen). May be replicating or non-replicating. Carrier virus examples: adenovirus, cytomegalovirus, vaccinia virus (smallpox), lentivirus, retrovirus. No approved human vaccines but several veterinary ones.

Vaccine administration/delivery methods: oral, nasal, intramuscular injection, intradermal injection, subcutaneous injection (fat between skin and muscle), skin patch, microneedle array