Main COVID-19 vaccines

Vaccine	Manufacturing name	Single or combined	How it works	Method of administration	Eligibility
Nirmatrelvir and Ritonavir	Paxlovid	Combined	Nirmarelvir stops virus from growing and spreading. Ritonavir helps nirmatrelvir from being broken to perform function (National Health Service, 2023), ***In depth explanation:*** Paxlovid is a protease enzyme inhibitor. It prevents the virus making copies within the human cell (viral replication). Normally, proteases cleave sites in the viral polyprotein where a chemical called pyrrolidone is replaced by an amino acid glutamine. This helps divide the viral polyprotein. Nirmatrelvir binds directly to the amino acid cysteine (Cys145) present in the catalytic binary site in M pro protease 306. This site also contains the amino acid histidine. The binding of Nirmatrelvir to cysteine forms sulfides. Nirmatrelvir provides a g-lactam ring that uses glutamine amino acid residue in the multiprotein site (Marzi *et al.,* 2022). Ritonavir decreases metabolism of nirmatrelvir to maintain concentrations of Nirmatrelvir in the plasma via the CYP3A cytochrome enzymes (liver enzymes) to inactivate the virus (Marzi *et al.,* 2022).	Tablets	Within 5 days of starting symptoms. 18 years and above. Amongst the highest risk group. Nirmatrelvir is prescribed at the first symptom, and patients do not require to be hospitalized

			Ritonavir is also a HIV-1 protease inhibitor. This helps prevent resistance against HIV retrovirus.		
Sotrovimab	(Xevudy)	Single	A monoclonal antibody which is a type of synthetic protein that function similar to human antibodies. The aim is to stick the antibody to spike protein of virus and neutralise it to avoid it entering the lungs which may lead to infection (National Health Service, 2023) ***In depth explanation.*** It is produced in Chinese Hamster Ovary (CHO) cells by recombinant DNA technology. The drug targets the spike protein that the virus uses to attach to cells. This is especially at amino acid in the spike protein position 337, 340 and 356. This blocks the virus from entering, replication and producing new viruses in the body. This helps to overcome infection (European Medicines Agency, n.d.)	It is given intravenously via drip commonly the arm at the hospital or local medical centre for over 30 minutes. One dose required. Dose: 500 mg	This is offered if Paxlovid does not work nor suitable. Prevents reinfection from COVID-19 four weeks. Patients aged 12 and above and weighing at least 40 kg
Molnupiravir	Lagevrio	Single	It stops COVID-19 from growing and spreading and prevent more severe symptoms (National Health Service, 2023) *In depth explanation:* Molnupiravir is a small molecular prodrug of the circulating metabolite and nucleoside derivative *N*-hydroxycytidine (NHC). NHC is commonly removed from the body via the kidneys by metabolising pyrimidines: cytidine and uridine. This mixes with nucleoiside.	Taken orally Capsule Twice a day for 5 days.	To start within five days of symptoms starting. Highest risk group. Must have attempted with

			NHC is taken up inside cells and phosphorylated (addition of phosphate) to form NHC-triphosphate (NHC-TP). NHC-TP competes with other to join and attacks the enzyme RNA viral RNA polymerase. This helps prevent replication of SARS-CoV-2 (Marzi *et al*., 2022; Maas *et al.,* 2024) Molnupiravir then enters the elongating RNA strand. It can substitute for cytidine or uridine. It can then complementarily pair with guanosine if cytidine or uridine if adenosine in the RNA template. Instead of terminating, Molnupiravir elongates/lengthens and produces more RNA templates that contain Molnupiravir. The RNA polymerase then uses the Molnupiravir-containing RNA templates for replication. This increases the number of errors across viral genome in RNA synthesis, it can negatively affect viral replication of and non-infectious viruses. This is called viral error induction (Maas *et al.,* 2024). More errors observed at 800 mg dose which is why it is chosen dose (Maas *et al*. 2024)		Paxlovid or Remdesivir before offered this treatment.