Navigating through administrative data to evaluate real-world effectiveness of COVID-19 vaccines in Malaysia: The RECoVaM experience

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ABSTRACT

Summary: Real-world effectiveness studies are important for monitoring the performance of COVID-19 vaccination strategies and informing COVID-19 prevention and control policies. The Real-World Effectiveness of COVID-19 Vaccine under the Malaysian National COVID-19 Immunisation Program (RECoVaM) analysed effectiveness of a range of homologous primary, as well as heterologous and homologous booster COVID-19 vaccines, which comprised of BNT162b2 (mRNA), CoronaVac (inactivated) and AZD1222 (viral vectored), against SARS-CoV-2 infection and severe COVID-19. Nationally comprehensive administrative data at both individual- and aggregate-levels were consolidated for each analysis. These were the Malaysia national COVID-19 vaccinations register (MyVAS), COVID-19 cases line listing, intensive care unit (ICU) admissions register, deaths line listing, supervised test registry (SIMKA), and the MySejahtera check-ins-based automated contact tracing registry (AutoTrace). RECoVaM adopted several observational study designs. Exposure periods were carefully calibrated to account for the structure of Malaysia's COVID-19 data, and epidemiological context, to estimate vaccine effectiveness. Importantly, RECoVaM also compared effectiveness measures during both the Delta-dominant, and Omicron-dominant periods. Effectiveness estimates for primary vaccinations showed a reduction in risk of SARS-CoV-2 infections by 87 – 91%, and symptomatic infections by 85 – 89%, as well as ICU admission by 82 – 84% among COVID-19 cases, and death by 86 – 88% among COVID-19 cases. All vaccine platforms were effective in reducing risk against ICU admission and death. Subsequently, significant waning of protection was demonstrated against COVID-19 infection among BNT162b2 (90.8 to 79.3%) and CoronaVac (74.5 to 30.4%) recipients 3 to 5 months post-primary vaccinations. Protection against ICU admission for CoronaVac waned (56.0 to 28.7%) and was more substantial among the elderly (aged 60 years and above). The estimates of marginal Vaccine Effectiveness (mVE) for boosters showed that recipients of booster doses were at least 90% less likely to be infected with COVID-19 relative to primary BNT162b2 vaccination during the Delta-dominant period. In both Delta and Omicron-dominant periods, homologous BNT162b2 boosting offered the highest protection against infection relative to primary BNT162b2 vaccination. This is followed by heterologous boosting with either AZD1222 or BNT162b2 for recipients primed with CoronaVac or AZD1222, and finally homologous boosting with AZD1222 and CoronaVac. The mVE estimates for all booster combinations in the Omicron-dominant period was about half that of Delta. Vaccination with a primary COVID-19 vaccines were effective in reducing COVID-19 infection but wanes after 3-5 months. Additional booster doses were more effective than primary series alone in preventing COVID-19 infection but demonstrated an interplay of immune evasion during the Omicron-dominant period. Homologous BNT162b2 boosting aside, and heterologous boosting appeared to be more protective than homologous boosting. Although vaccination is still protective against severe infection, ongoing community transmission could facilitate viral mutation. Next generation, multivalent vaccines aimed at stemming transmission, are warranted.