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A Control Chart for signal detection in the Covid-19 pandemic

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Abstract

The spread of the SARS-Cov-2 virus since the late 2019 has been problematic to follow and have often surprised epidemiologists and statisticians in their efforts to predict its future course

Objective: Interventions such as recommended social distancing or other restrictions requires a thorough follow up of the development of the pandemic. Inspired by Improvement Science we have developed a control chart that is simple to use and provides an understanding for the variation in the development of the infection in a Swedish context.

Methods: We use traditional quality improvement methods, however applied to the very different situation of a pandemic of the Covid-19 type, where there is a large variation between the infectiousness of different individuals with superspreading individuals and superspreading events. Methods from traditional quality improvement (stratification and control charts) are successfully utilized even if the context is quite different. Indeed, the process is driven by assignable causes! A simple filtering is utilized to find a process characteristic.

Conclusions: The filtering of the process reveals a few assignable causes. It makes it possible to react on signals from local communities to inform regional or national decision makers to understand the course of the pandemic. It strengthens earlier observations of superspreading. The Poisson assumption usually employed does not seem to hold. It should be mentioned that the Omikron variant of the SARS-CoV-2 virus may have changed the rules of the game.

Keywords

Epidemiology, Shewhart control Charts, Covid-19 pandemic, SARS-Cov-2 virus, decision making, confirmed cases, Statistical Process Control, Improvement Science

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