Thursday June 9, 14:00-15:15

Parallel session 3

COVID-19

Chairs: Michiel de Boer & Iris Walraven

14:00 Effectiveness of contact tracing apps for SARS-CoV-2: a systematic review of evidence (O11)
Kevin Jenniskens

14:15 Impact of the interruption of the Dutch national breast cancer screening program due to COVID-19: a modelling study (O12)
Keris Poelhekken

14:30 Impact of COVID-19 on arthroplasty surgeries in 2020 in The Netherlands (O13)
Maaike Gademan

14:45 Why do strongly urbanised areas have a higher incidence of hospitalisation with SARS-CoV-2 infection? Generating hypotheses from an ecological study using surveillance data (O14)
Bronke Boudewijns

15:00 Early detection of deterioration in COVID-19 patients using continuous measurements (O15)
Guido Peters

O11. Effectiveness of contact tracing apps for SARS-CoV-2: a systematic review of evidence.

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Objective: To systematically review evidence on effectiveness of contact tracing apps (CTAs) for SARS-CoV-2 on epidemiological and clinical outcomes

Design: Systematic review

Data sources: EMBASE (OVID), MEDLINE (PubMed), BioRxiv, and MedRxiv were searched up to June 9th 2021

Study selection: Studies, both empirical and model-based, assessing the effect of CTAs for SARS-CoV-2 on quarantine rate, reproduction number (R), total number of infections, hospitalization, mortality, and other epidemiologically and clinically relevant outcomes, were eligible for inclusion.

Data extraction: Empirical and model-based studies were both critically appraised based on dedicated quality and risk of bias assessment checklists. Data on type of study (i.e., empirical or model-based), sample size, (simulated) time horizon of outcome effects, study population, CTA type (and associated interventions), comparator, and outcomes assessed, were extracted. Key findings were extracted and narratively summarized. Specifically for model-based studies, characteristics and values of important model parameters were collected.

Results: 5123 studies were identified, of which 27 studies (five empirical, 22 model-based studies) were eligible and included in this review. All empirical studies were observational (non-randomized) studies and either at unclear or high risk of bias, mostly due to uncontrolled confounding. Risk of bias of model-based studies was considered high for 7 of 22 studies. Most studies demonstrated beneficial effects of CTAs on R, total number of infections, hospitalization, and mortality. Effect size was dependent on other model parameter values (e.g., proportion of asymptomatic individuals, testing delays), but in general a beneficial effect was observed at CTA adoption rates of 20% and over.

Conclusions: CTAs are potentially effective at reducing SARS-CoV-2 related epidemiological and clinical outcomes, though effect size depends on other model parameter values. Methodologically sound comparative empirical studies on effectiveness of CTAs are lacking and would be desirable to confirm findings from model-based studies.

O12. Impact of the interruption of the Dutch national breast cancer screening program due to COVID-19: a modelling study.

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Background: The Dutch national breast cancer screening program was interrupted for three months due to COVID-19. As a direct effect, a decrease in diagnosed cases of breast cancer was observed, but the long-term effects are still unclear. The aim of this study was, therefore, to estimate the long-term effects of this interruption on a possible delay in diagnosis and middle and large-sized screen-detected and interval breast cancers.

Methods: The previously validated micro-simulation model SiMRiSc was used to calculate the impact of the three-month interruption of the breast cancer screening program. In addition, the effects of hypothetical interruptions of six and twelve months were simulated. As a reference, a scenario without interruption was used. SiMRiSc was validated with independently derived input parameters from literature. As outcomes, interval carcinomas and size distribution of screen-detected breast cancers were considered for women at ages 55-59 and 60-64 years at time of interruption. A univariate sensitivity analysis was performed to estimate uncertainties.

Results: No significant effect was found for the three-month interruption on the number of middle- or large-sized screen-detected breast cancer in the first three screening rounds after interruption. An increase of 19% in detection rate for interval carcinomas was found in the first screening round, but in following rounds the number of interval carcinomas was comparable to a scenario without interruption. A larger increase in interval carcinomas of 38% and 78% was found for hypothetical interruptions of six and twelve months, respectively, and an increase in middle-sized tumours in the first round after interruption of 26% and 47%, respectively.

Conclusion: The interruption due to COVID-19 of the Dutch screening program did not result in an increase in large-sized breast cancers or in long-term delay in diagnosis. Only the first round after restarting the screening was affected, with an increase in interval carcinomas.

O13. Impact of COVID-19 on arthroplasty surgeries in 2020 in the Netherlands.

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Background: We estimated change in primary arthroplasty surgery rate in the Netherlands in 2020, due to COVID-19. Additionally, we evaluated whether differences were present in patient and hospital-characteristics between pre-COVID and during the COVID-19 pandemic.

Methods: All patients with a primary hip, knee or shoulder arthroplasty between 2014-2020 were extracted from the Dutch Arthroplasty Register (LROI). We calculated observed/expected (O/E) ratios to determine changes in arthroplasty rates. Using Poisson regression we estimated the number of arthroplasties per month in 2020, while taking into account changes in age and sex composition of the general Dutch population over time. The following time periods were included to compare patient mix and hospital characteristics (University/General/Orthopaedic Focus Clinics): pre-COVID (2014-March 15, 2020), 1st wave (March 16-May 24, 2020), summer period (May 25-September 20, 2020) and 2nd wave (September 26-December 31, 2020).

Results: 20% less arthroplasty surgeries (15,457) were performed than expected during the pandemic in 2020. The O/E ratio was 0.83 in hip, 0.77 in knee, and 0.78 in shoulder arthroplasties. The largest drop in the O/E ratio was seen in April 2020 (Hip:0.25, Knee:0.03, Shoulder:0.23). Relatively more patients underwent surgery in focus clinics during the summer period (15%) and 2nd wave (20%), compared to pre-COVID (9%). During the 1st wave, patients with an urgent indication (fractures/cancer) were prioritized, while the proportion of osteoarthritis patients decreased compared to the pre-COVID period (Hip:74% versus 34%; Shoulder:44% versus 20%). This did not apply to the knee population, in which the majority of performed surgeries was due to osteoarthritis (>90%) in all periods.

Conclusion: The COVID-19 pandemic had a huge impact on patients in need of arthroplasty surgery, with 20% fewer surgeries performed in 2020. Relatively more surgeries were performed in focus clinics and during the 1st wave hip and shoulder patients with more urgent indications were prioritized.

O14. Why do strongly urbanised areas have a higher incidence of hospitalisation with SARS-CoV-2 infection? Generating hypotheses from an ecological study using surveillance data.

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Background: In routine surveillance, we observed regional differences in SARS-CoV-2 incidence, related to the degree of urbanisation. To avoid bias due to testing behaviour, we investigated whether hospitalisation with SARS-CoV-2 infection was associated with degree of urbanisation and which demographic, socioeconomic and health related factors play a mediating role.

Methods: This ecological study used publicly available surveillance data on hospitalisations with SARS-CoV-2 infection and covariate data. The main outcome variable was the cumulative incidence of hospitalisations between 27 February 2020 and 20 January 2021, with municipality as the unit of analysis. We identified mediating factors using directed acyclic graphs and used a stepwise hierarchical negative binomial regression to quantify the association between degree of urbanisation and hospitalisation.

Results: The incidence of hospitalisation significantly increased with increasing degree of urbanisation [OR 1.26 hardly urbanised (p 0.002) - 1.36 extremely urbanised (p 0.006), compared to not urbanised]. This effect disappeared when adding demographic, socioeconomic and health-related variables. In the full model, age demographic; mean household size; percentage of households with children; percentages of inhabitants with a Turkish, Dutch Caribbean or Western migration history, separately; percentage of reformed religious party voters and percentage of inhabitants with obesity had a significant positive association with hospitalisation [OR 1.02-3.81]. A higher percentage of inhabitants with intermediate education level and a higher percentage of smokers were significantly associated with fewer hospitalisations [OR 0.95-0.96]. Expanded wave-specific analyses are being conducted to assess the mediating effect of vaccination coverage.

Conclusion: The association between degree of urbanisation and incidence of hospitalisations by municipality can be explained completely by mediating factors. These results would need to be confirmed by individual level analysis of linked datasets before conclusions can be drawn on the causal relation between these factors and hospitalisation risk.

O15. Early detection of deterioration in COVID-19 patients using continuous measurements.

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Background: Continuously monitoring vital signs may enable clinicians to detect patient deterioration sooner than with intermittent measurements by nurses. Furthermore, monitoring patients remotely may result in restricting nurses' exposure to infectious patients by reducing patient contact. The utility of the monitoring may depend on the monitored vital signs.
The present study aims to determine to what degree intensive care physicians are capable of assessing the health status of COVID-19 patients based on continuous measurements of heartrate and respiratory rate, and supportive intermittent measurements, compared with 4-hourly monitoring by nursing staff.

Methods: Patients admitted to the COVID-19 ward received a biosensor which continuously measured heartrate and respiratory rate, in addition to usual care. Biosensor data were not used for clinical decision making. Two intensive care physicians retrospectively assessed the continuous measurements, supported with intermittent oxygen saturation, temperature, and blood pressure measurements, independently, and indicated when clinical intervention might be needed. A third intensive care physician independently extracted clinical events from the electronic medical record (EMR) that occurred during the period that the patient was admitted for COVID-19 and was equipped with a biosensor. Primary outcomes were sensitivity and number of false positives.

Results: The first two physicians assessed data of 21 patients and, together, they indicated 62 instances where clinical intervention might be needed. The third physician extracted 72 events from the EMR where a clinical intervention took place. Out of these 72 events 14 were detected based on biosensor data (sensitivity 19.4%). In 48 out of 62 instances, no events were found in the EMR.

Conclusion: It seems that continuous measurements of heartrate and respiratory rate in addition to intermittent SpO2, temperature and blood pressure, are insufficient for clinicians to determine whether clinical intervention is needed in COVID-19 patients. Other clinical parameters are likely to play a more important role.