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COVID-19-smitte, testing og statistikk

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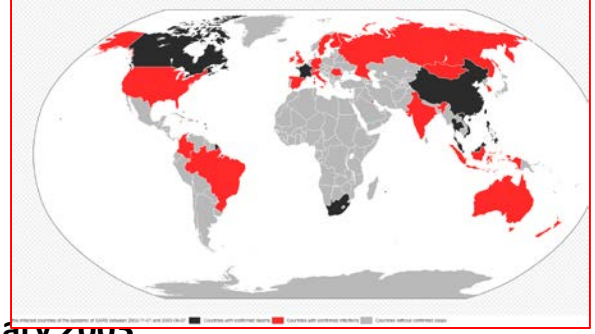
Tillegg – 19.3

Tema	Diagnostikk	Link til original artikkel med data på sensitivitet / spesifisitet / PPV / NPV
Endodoni	Klinisk Røntgen	• Diagnostic Accuracy of 5 Dental Pulp Tests: A **Systematic** Review and Meta-analysis • Diagnostic Accuracy of Cone-beam Computed Tomography and Conventional Radiography on Apical Periodontitis: A **Systematic** Review and Meta-analysis
Generell helse	Røntgen	• Osteoporose: The accuracy of panoramic radiography as a screening of bone mineral density in women: a **systematic** review
Implantat	Klinisk	• The diagnosis of peri-implantitis: A **systematic** review on the predictive value of bleeding on probing
Kariologi	Klinisk Prøver Røntgen	• Do undergraduate dental students perform well detecting and staging caries and assessing activity by visual examination? A **systematic** review and meta-analysis • Adjunct methods for caries detection: a **systematic** review of literature • Radiographic caries detection: A **systematic** review and meta-analysis
Kirurgi	Røntgen	• Predictive Value of Panoramic Radiography for Injury of Inferior Alveolar Nerve After Mandibular Third Molar Surgery
Kjeveortopedi	Digitaliser	• Diagnostic accuracy and measurement **sensitivity** of digital models for orthodontic purposes: A **systematic** review
Oral Cancer	Prøver	• CYFRA 21-1 and MMP-9 as salivary biomarkers for the detection of oral squamous cell carcinoma: a **systematic** review of diagnostic test accuracy • Role of salivary transcriptomics as potential biomarkers in oral cancer: A **systematic** review
Periodontologi	Prøver Prøver Røntgen	• Diagnostic **sensitivity and specificity** of host-derived salivary biomarkers in periodontal disease amongst adults: **Systematic** review • Accuracy of single molecular biomarkers in gingival crevicular fluid for the diagnosis of periodontitis: A **systematic** review and meta-analysis • Accuracy of imaging methods for detection of bone tissue invasion in patients with oral squamous cell carcinoma
Traume	Røntgen	• Radiographic diagnosis of root fractures: a **systematic** review, meta-analyses and sources of heterogeneity

Forhistorien til dagens situasjon – SARS-pandemien 2002-2003



2002

- 16.11, an outbreak of **severe acute respiratory syndrome (SARS)** began in China's Guangdong province, bordering Hong Kong.
- China notified the World Health Organization (WHO) outbreak on **10 February 2003**, reporting 305 cases including 105 health-care workers and five deaths.
- Later it reported that the outbreak in Guangdong had peaked in mid-February 2003. However, this appears to have been incorrect because subsequently, 806 cases of infection and 34 deaths were reported.
- Early in the epidemic, the Chinese Government discouraged its press from reporting on SARS, delayed reporting to WHO, and initially did not provide information to Chinese outside Guangdong province, where the disease is believed to have originated.
- A WHO team travelling to Beijing was not allowed to visit Guangdong province for several weeks, which raised international criticism.

2003 Januar

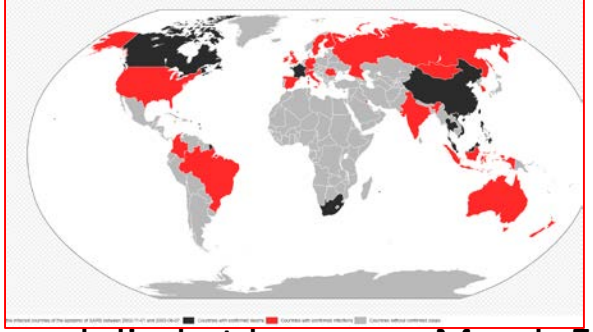
31.1 The first super-spreader checked-in to the Sun Yat-sen Memorial Hospital in Guangzhou, where he infected 30 nurses and doctors. The virus soon spread to nearby hospitals

Mars

15.3 **WHO issued a heightened global health alert about a mysterious pneumonia with a case definition of SARS** after cases in Singapore and Canada were identified. The alert included a rare emergency travel advisory to international travelers, healthcare professionals, and health authorities.

Modifisert fra kilde: wikipedia

Erfaringer i Toronto & Canada



2003

23.2 an elderly woman returned to **Toronto** from Hong Kong and died at home on March 5, after infecting her son, who subsequently spread the disease to the local hospital and died on March 13.

12.4 In **Toronto,** three more people died of SARS, bringing the Canadian death toll to 13.

23.4 WHO issued travel advisories against Beijing, **Toronto**, and Shanxi Province.

30.4 WHO lifted the SARS travel warning for **Toronto**

24.5 a new cluster of about 20 suspected patients was reported in **Toronto**.

29.5 more than 7,000 people were instructed to quarantine themselves in **Canada** by authorities seeking to control the potential spread of the SARS outbreak.

23.6 Hong Kong was removed from WHO's list of 'Affected Areas', while **Toronto**, Beijing, and Taiwan remained

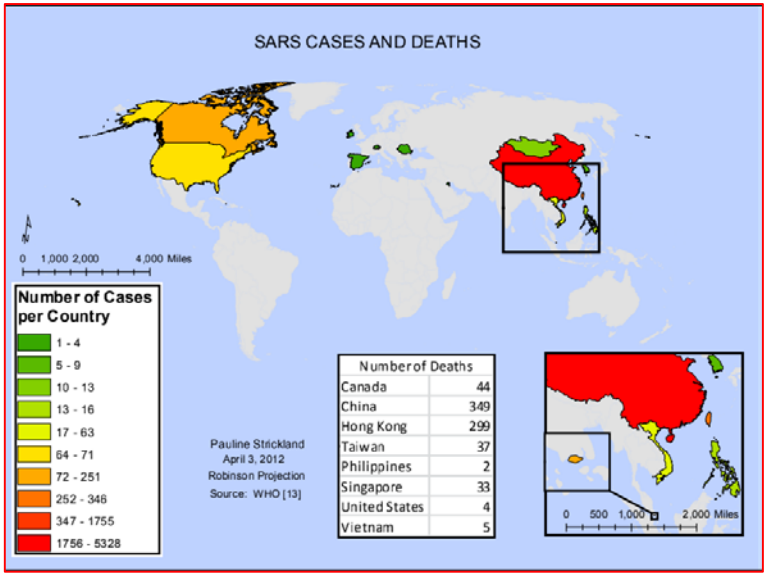
Modifisert fra kilde: wikipedia

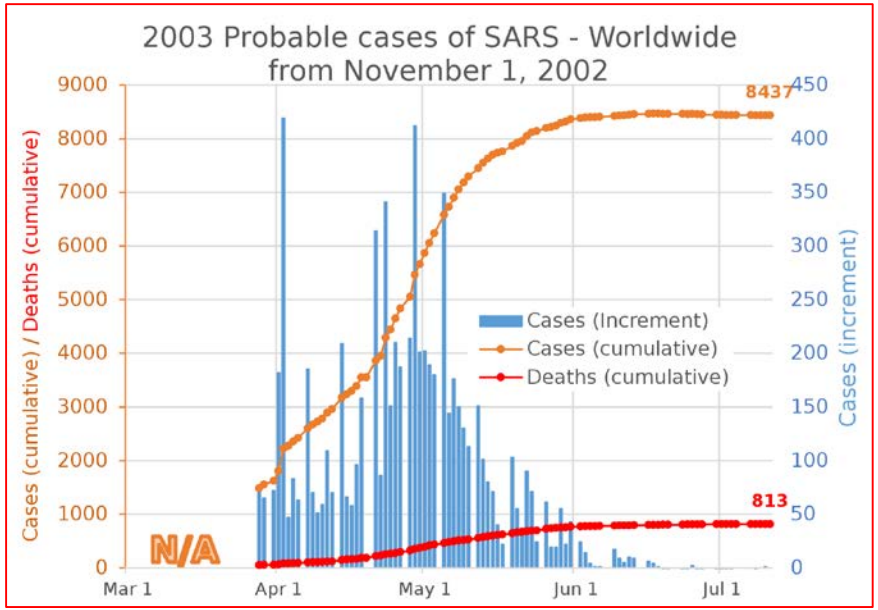
SARS

2002-2003

Probable cases of SARS by country and territory,
1 November 2002 – 31 July 2003[2]

Country or region	Cases	Deaths	Fatality (%)
China[a]	5,327	349	6.6
Hong Kong	1,755	299	17.0
Taiwan[b]	346	73[3][4]	21.1
Canada	251	43	17.1
Singapore	238	33	13.9
Vietnam	63	5	7.9
United States	27	0	0
Philippines	14	2	14.3
Thailand	9	2	22.2
Germany	9	0	0
Mongolia	9	0	0
France	7	1	14.3
Australia	6	0	0
Malaysia	5	2	40.0
Sweden	5	0	0





Kilde: WHO (wikipedia)

SARS 2002-2003 – pandemien og erfaringene gjort innen odontologi

"Reinforce the currently applied infection control measures"
Budskapet i Toronto i 2005 da jeg overtok stillingen her som Head of Prosthodontics:

Conclusions and Clinical Implications. Researchers believe that a combination of factors, including the universal infection control measures that the dental community has implemented and/or the low degree of viral shedding in the prodromal phase of SARS, may have obviated the spread of the disease in dental settings. The dental community should reflect on this outbreak to reinforce the currently applied infection control measures.

DOI: 10.14219/jada.archive.2004.0405

CLINICAL PRACTICE

Severe acute respiratory syndrome and dentistry
A retrospective view

LAKSHMAN P. SAMARANAYAKE, B.D.S., D.D.S., F.R.C.Path., F.H.K.C.Path., F.C.D.S.H.K., M.I.Biol.; MALIK PEIRIS, M.B.B.S., Ph.D., F.R.C.Path., F.H.K.C.Path.

Microbial threats continue to emerge, reemerge and persist. Some organisms are newly recognized pathogens that have existed for centuries (for example, *Helicobacter pylori*, which causes gastric ulcers). Others are old organisms that have learned new tricks (for example, multidrug-resistant tubercle bacilli). A third category consists of totally new organisms.[1]

The dental community must be constantly aware of impending infectious threats that may challenge the current

This last group of alarming new infectious agents that are virulent and deadly have emerged in rapid succession during the last few years. Some of these, such as the Ebola virus infection,[2] are still smoldering in some remote corners of the world,[3] while others, such as the H5N1 (and H7N7) influenza A bird flu virus and the West Nile virus infec-

ABSTRACT

Background. Severe acute respiratory syndrome, or SARS, which has created panic in Asia and in some parts of North America, is the first epidemic of the new century. Although it has been well-contained, sporadic cases continue to emerge.

Objectives. The authors trace the emergence of the SARS outbreak from southern China and its spread worldwide, discuss the viral etiology of the infection and its clinical features, and review the infection control guidelines issued during the outbreak by the health authorities in Hong Kong, the Centers for Disease Control and Prevention, the World Health Organization and the American Dental Association. They also review the prospects for a new outbreak and preventive measures.

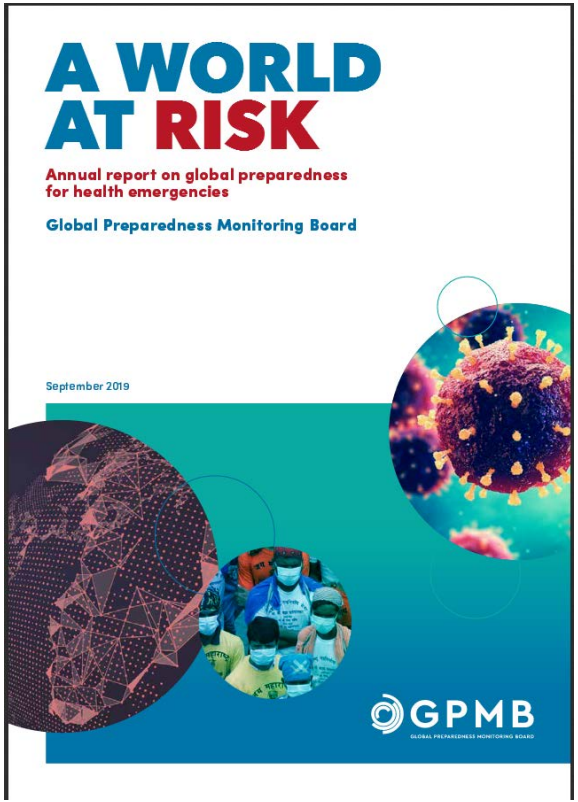
Overview. The disease, which is caused by a novel coronavirus termed the "SARS coronavirus," or SARS-CoV, essentially spreads through droplet infection and affects people of any age. It has a mortality rate ranging from 10 to 15 percent. A major hallmark of this disease has been the rate at which it has affected health care workers through nosocomial transmission; in some countries, up to one-fourth to one-third of those infected were in this category. However, no dental health care worker has been affected by SARS in a nosocomial or dental setting.

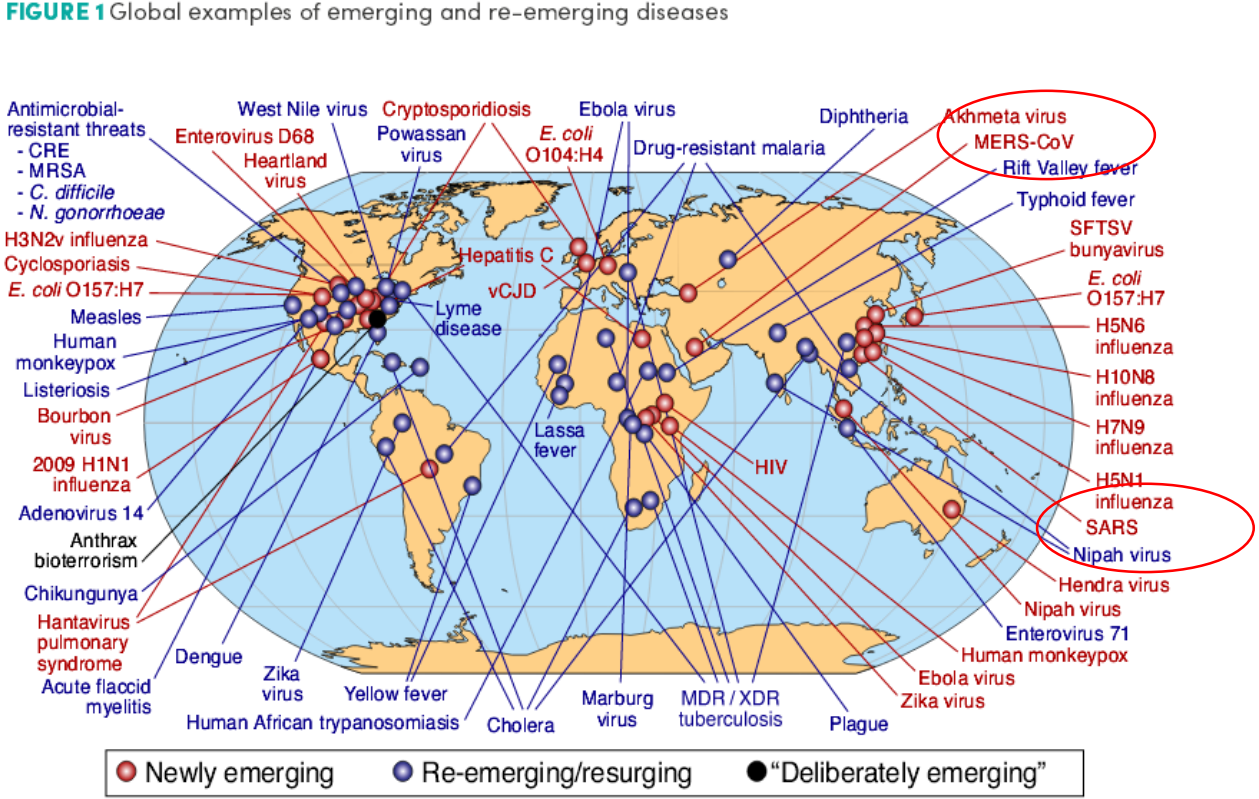
Conclusions and Clinical Implications. Researchers believe that a combination of factors, including the universal infec-

MEN: "COVID-19 is shedding 1,000-plus times more virus than SARS patients emitted during peak shedding. COVID-19 can often present as a common cold-like illness. SARS-CoV-2 can actively replicate in the upper respiratory tract, and is shed for a prolonged time after symptoms end, including in stool"

https://doi.org/10.1101/2020.03.05.20030502

Internasjonal beredskap for pandemier har vært prioritert





https://apps.who.int/gpmb/assets/annual_report/GPMB_annualreport_2019.pdf

Internasjonal beredskap for pandemier har satset mye på å utvikle vaksiner

https://cepi.net/

Norge er, og har vært, sentralt i internasjonal vaksinefremstilling

Realistisk tar utvikling og utprøving av ny vaksine mange måneder

Ved gryende pandemier må man derfor forsøke tidlig å dempe smitte

Lærdomen fra SARS-pandemien:

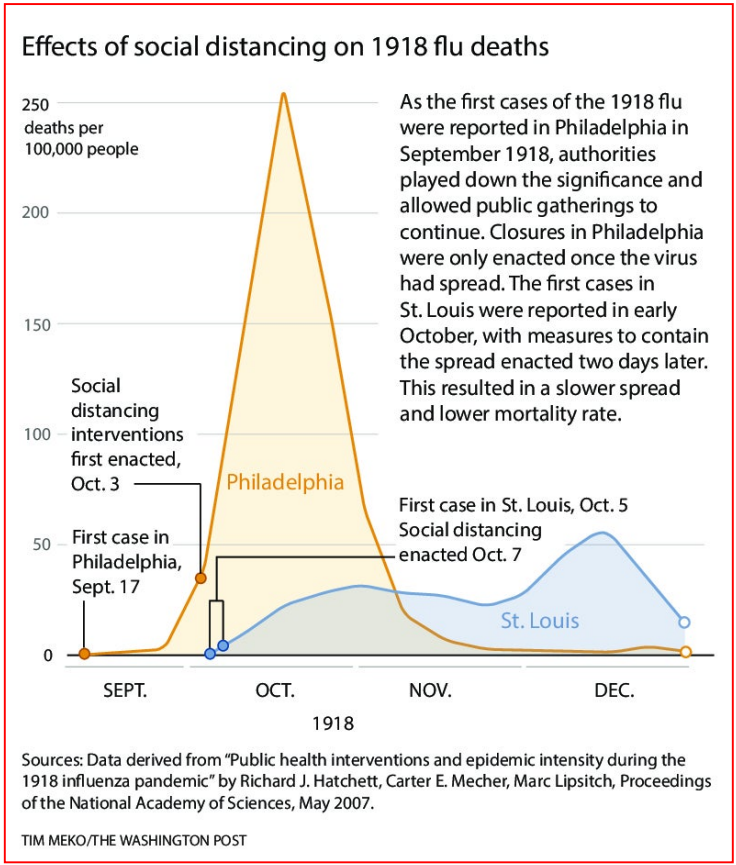
- Tiltak ble satt inn for seint pga mangelfull rapportering i den tidlige smittefasen
- De første datamodellene ble feil (av same årsak): resultat: shit in – shit out

Strategi for COVID-19

Norge valgt: Antatt effektivt tiltak mot smitte-spredning: Tidlig "**social distancing**" (har vist en effekt empirisk)

Effektmål: Antall alvorlig syke & døde

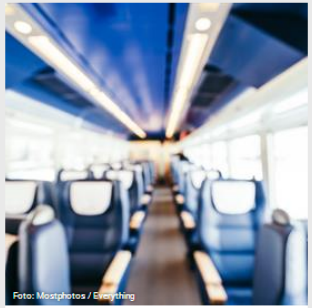
Surrogat effektmål: Insidens (antall nye smittetilfeller/tidsenhet (i en definert populasjon))



Derfor:

Retningslinjene er utarbeidet med bakgrunn i vårt hovedmål for vår håndtering av hendelsen:

Å bidra til den nasjonale dugnaden for å stoppe spredning



Omfattende tiltak for å hindre spredning av koronaviruset

Tiltak for å hindre spredning av koronaviruset og for å opprettholde nødvendige helse- og omsorgstjenester.

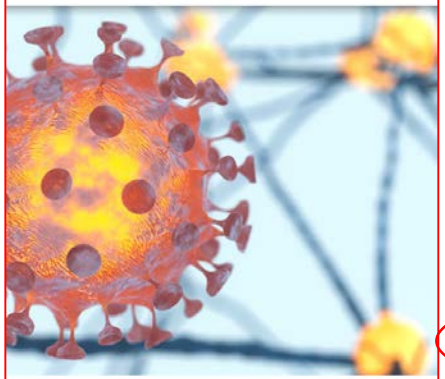
Smitte og inkubasjonstid

Hvordan viruset smitter og hva du kan gjøre for å unngå smitte.

Selektert:

- UBergen
- Helsenorge.no
- FHI
- UiT
- NTNU

UiT Norges arktiske universitet



Informasjon vedrørende koronaviruset

Informasjon for befolkningen

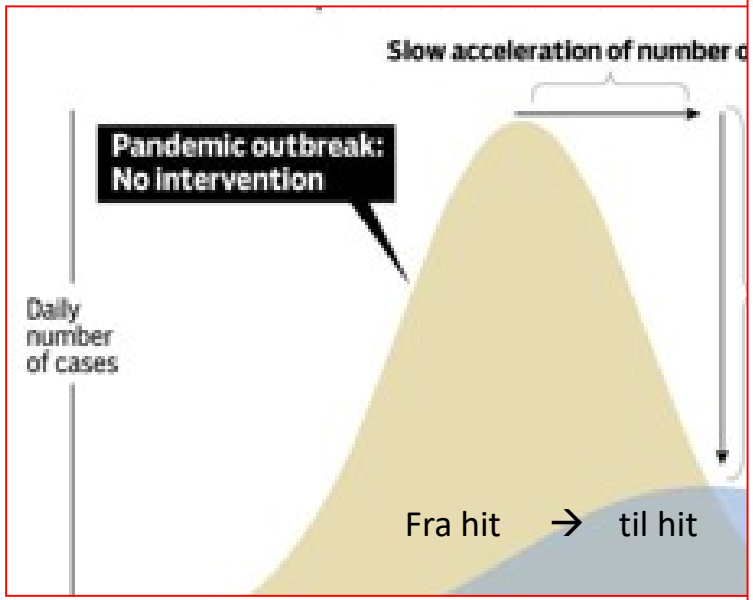
Du finner informasjon og konkrete råd om koronaviruset på disse sidene og helsenorge.no

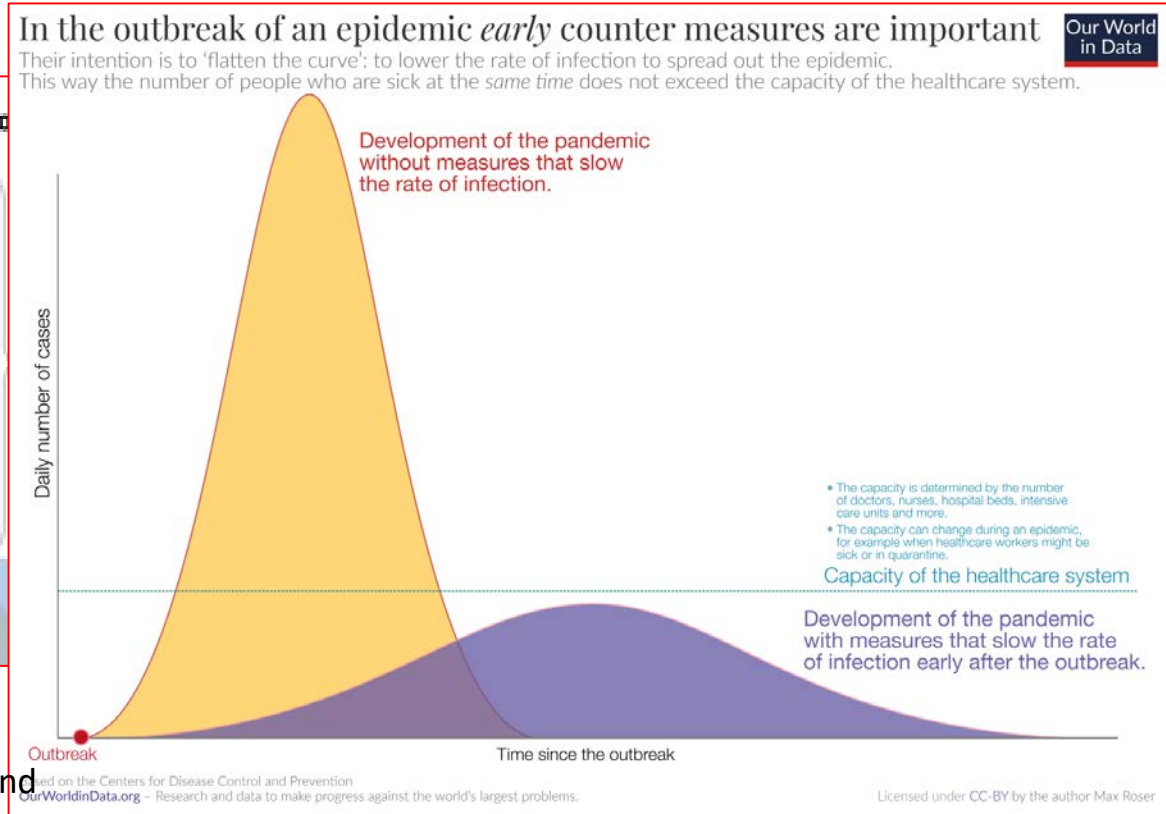
Dersom du ikke finner svar på det du lurer på, kan du ringe informasjonstelefonen på **815 55 015** som har åpent hverdager 08-18 og helger 09-16.

Har du behov for akutt helsehjelp, ring fastlegen din. Hvis du ikke kommer i kontakt med fastlegen, ring legevakten på 116117. Ved fare for liv og helse, ring 113.

Hvordan forebygge smitte?

Mål: Ved å begrense muligheten for overføring av smitte, vil andelen av smittede som antas å bli alvorlige syke kunne motta bedre pleie og omsorg*



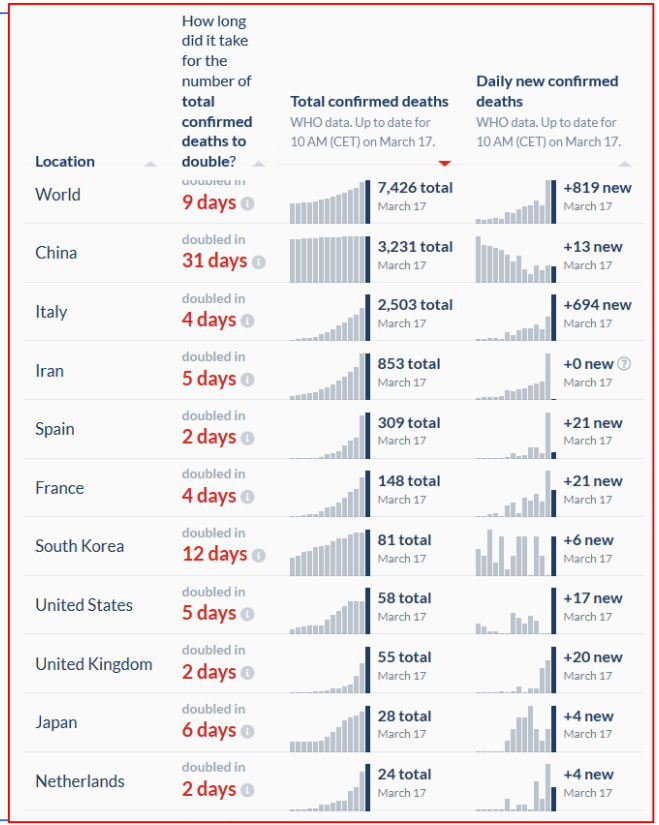


*Ikke universelt applisert –
"herd immunity" blir vurdert som tiltak i noen land

Hvordan kan vi bedømme om tiltakene har effekt?

Hvilke tall utover insidens trenger man for datamodellering?

Datamodeller – hvilke tall trenger man?



Location	How long did it take for the number of **total confirmed deaths to double?**	**Total confirmed deaths** WHO data. Up to date for 10 AM (CET) on March 17.	**Daily new confirmed deaths** WHO data. Up to date for 10 AM (CET) on March 17.
World	doubled in 9 days	7,426 total March 17	+819 new March 17
China	doubled in 31 days	3,231 total March 17	+13 new March 17
Italy	doubled in 4 days	2,503 total March 17	+694 new March 17
Iran	doubled in 5 days	853 total March 17	+0 new March 17
Spain	doubled in 2 days	309 total March 17	+21 new March 17
France	doubled in 4 days	148 total March 17	+21 new March 17
South Korea	doubled in 12 days	81 total March 17	+6 new March 17
United States	doubled in 5 days	58 total March 17	+17 new March 17
United Kingdom	doubled in 2 days	55 total March 17	+20 new March 17
Japan	doubled in 6 days	28 total March 17	+4 new March 17
Netherlands	doubled in 2 days	24 total March 17	+4 new March 17

Utover bedømning av intervensjons-effekt (social distancing)

For å kunne bedre forstå:

Primær-etiologiske faktorer
Mulige kofaktorer, og deres betydning
Kunnskap om sykdoms-dynamikk
Bedret ressurs-planlegging
Finne en effektiv behandling (?)

Grafer fra: https://ourworldindata.org/coronavirus#testing-for-covid-19

(photo by Robert Atanasovski/AFP via Getty Images)

David Fisman uses data and computer modelling to predict spread of COVID-19

When it comes to the tipping point for the spread of COVID-19, University of Toronto epidemiologist **David Fisman** said: "We may have passed it."

March 06, 2020

By Geoffrey Vendeville

From the Series

Breaking Research

Annen data, eksempelvis, svabring av overflater innen offentlig transport

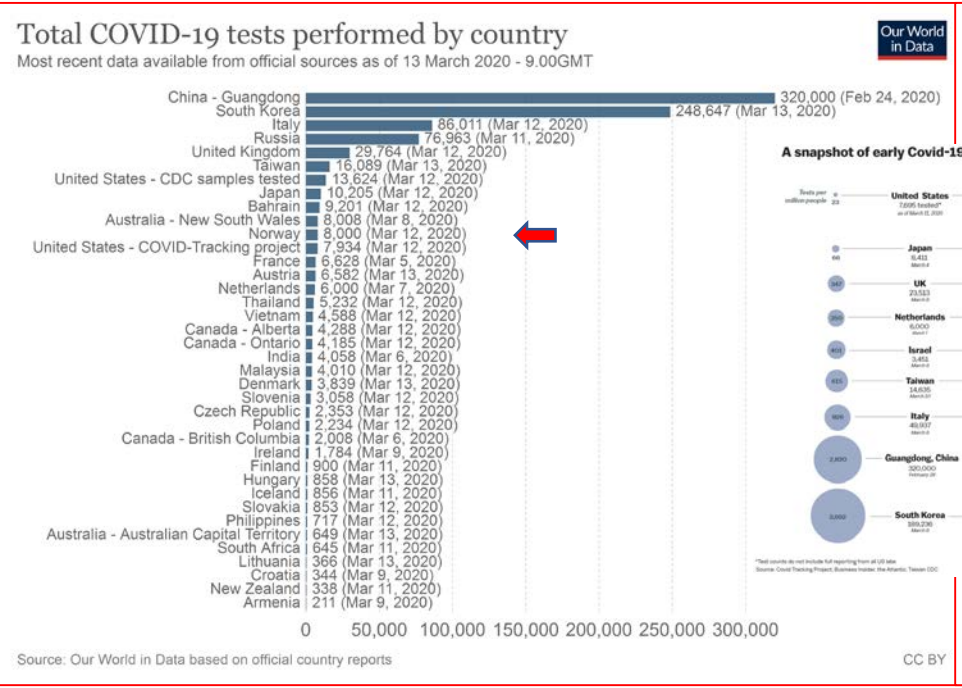
Datamodellering – hvilke tall trenger man

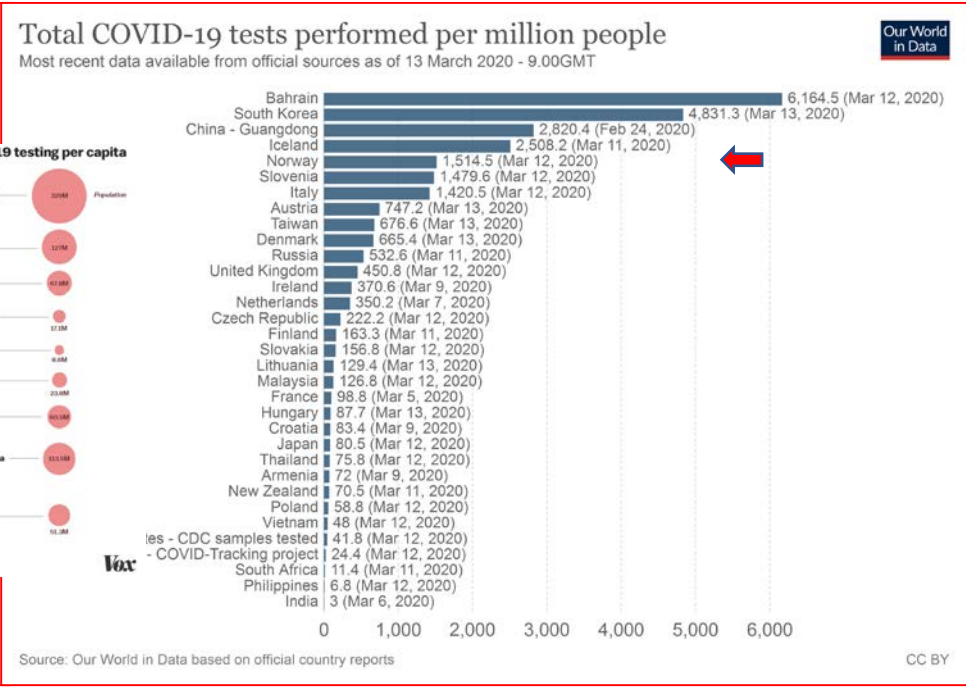
Testing av (friske) individer,

Individer med symptomer
og /eller

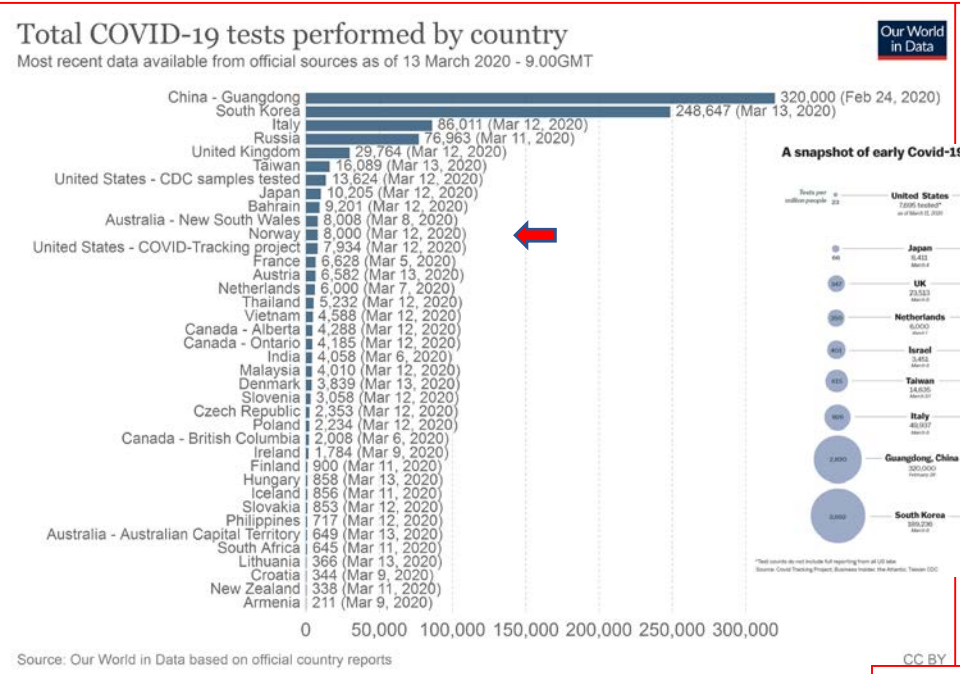
Pasienter med komorbid tilstand

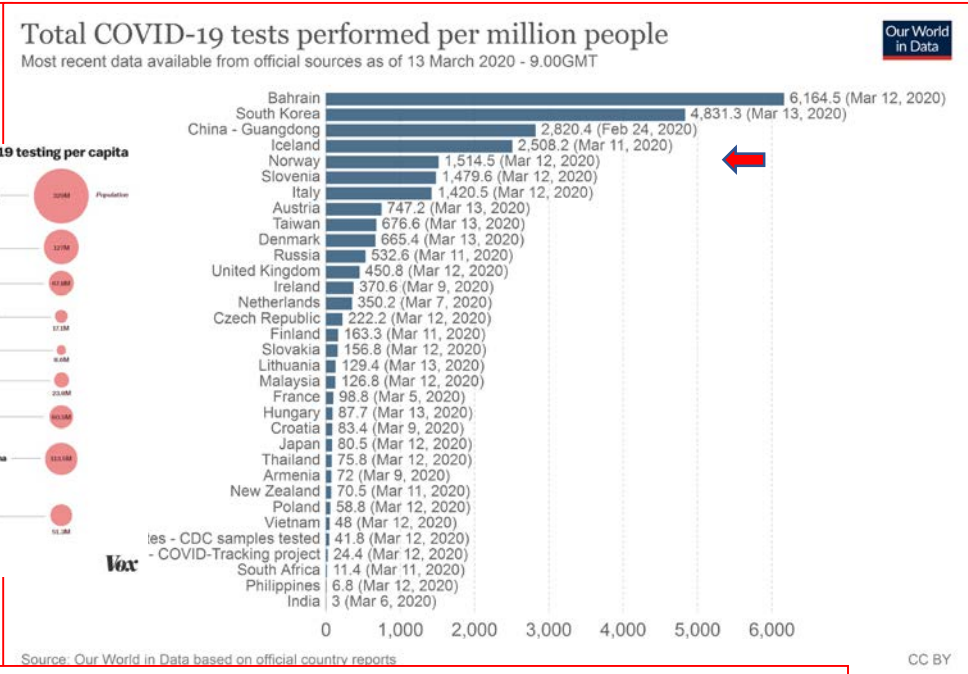
Antall tester (NB! Friske og/eller pasienter)





Antall tester (NB! Friske og/eller pasienter)





Det benyttes ulike typer PCR tester
Tall på test sensitivitet og spesifisitet er ukjent

Kilde: https://www.who.int/emergencies/diseases/novel-coronavirus-2019/technical-guidance/laboratory-guidance

Summary table of available protocols

Country	Institute	Gene targets
China	China CDC	ORF1ab and N
Germany	Charité	RdRP, E, N
Hong Kong SAR	HKU	ORF1b-nsp14, N
Japan	National Institute of Infectious Diseases, Department of Virology III	Pancorona and multiple targets, Spike protein
Thailand	National Institute of Health	N
US	US CDC	Three targets in N gene
France	Institut Pasteur, Paris	Two targets in RdRP

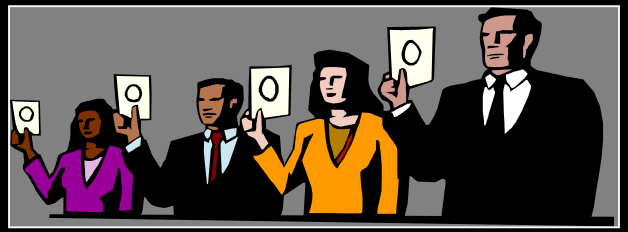
Diagnostic Tests

Types of diagnostic tests used in clinical practice

- **Predictive tests**
  - Identify individuals at risk/ not at risk of developing a specific condition
  - Only useful if techniques exist for preventing the development or transmission of the condition
- **Screening tests**
  - Identify individuals with a condition or category of condition
  - Screening tests cannot replace the patient history and physical examination
- **Discriminatory tests**
  - For differential diagnosis - of little use if the result does not influence treatment or outcome
- **Monitoring tests**
  - To describe changes in the condition underlying pathology or primary symptom
  - Variable measured should dosely reflect the change in the process and/or effects of therapy

The diagnostic universe

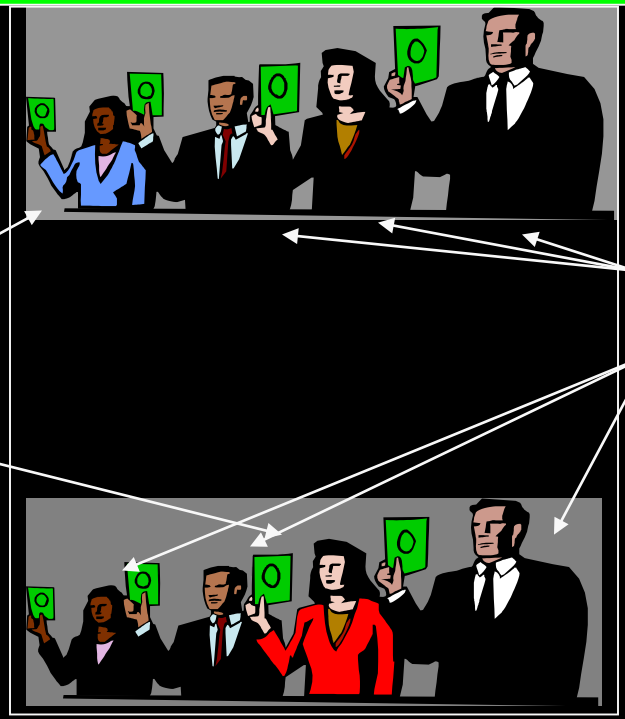
Test result indicates positive



True positive

False positive

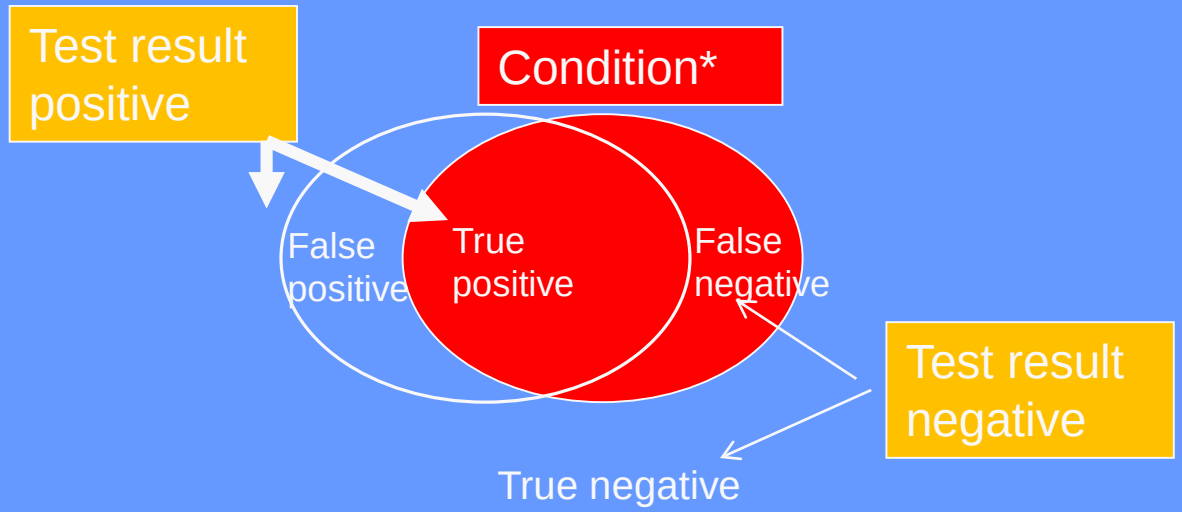
Test result indicates negative



False negative

True negative

The diagnostic universe



* e.g., disease, pre-clinical sign, pregnancy

Assessment of the efficacy of a diagnostic test

Parameter	Description
Sensitivity	Ability to identify patients in a patient population
Specificity	Ability to identify non-patients in an asymptomatic population
Positive predictive value	Ability of a diagnostic test to identify a patient correctly, given that the test is positive
Negative predictive value	Ability of a diagnostic test to identify a non-patient correctly, given that the test is negative
Measurement validity	The accuracy of a measurement technique when compared with a known standard
Measurement reliability	The variability of the measurements over time and in different environments
Diagnostic validity	The ability to separate those with the condition from those without the condition

Sensitivity and Specificity

- Sensitivity
  - Probability that a subject with the condition will test positive
- Specificity
  - Probability that a subject without the condition will test negative

2 x 2 Tables

	Condition Present	Condition Absent	
Test Positive	a	b	a+b
Test Negative	c	d	c+d
	a+c	b+d	a+b+c+d

True positive (TP)	False positive (FP)
False negative (FN)	True negative (TN)

Sensitivity

	Condition Present	Condition Absent	
Test Positive	215	16	231
Test Negative	15	114	129
	230	130	

$$\frac{215}{230} = 93\%$$

True positive (TP)	False positive (FP)
False negative (FN)	True negative (TN)

Sensitivity = $\frac{a}{a+c}$

Specificity

	Condition Present	Condition Absent	
Test Positive	215	16	231
Test Negative	15	114	129
	230	130	

True positive (TP)	False positive (FP)
False negative (FN)	True negative (TN)

Specificity = $\frac{d}{b+d}$

$\frac{114}{130}$ = 87%

Positive and Negative Predictive Values

True positive (TP)	False positive (FP)
False negative (FN)	True negative (TN)

- Positive Predictive Value
  - probability of those testing/screening positive actually having the condition
- Negative Predictive Value
  - probability of those testing/screening negative NOT actually having the condition

Highly relevant when you know the prevalence of the condition in the population

Positive Predictive Value

	True positive (TP)	False positive (FP)
	False negative (FN)	True negative (TN)

	Condition Present	Condition Absent	
Test Positive	215	16	231
Test Negative	15	114	129
	230	130	

$$\frac{215}{231} = 93\%$$

Positive predictive value = a / a+b

Negative Predictive Value

	Condition Present	Condition Absent	
Test Positive	215	16	231
Test Negative	15	114	129
	230	130	

True positive (TP)	False positive (FP)
False negative (FN)	True negative (TN)

$$\frac{114}{129} = 88\%$$

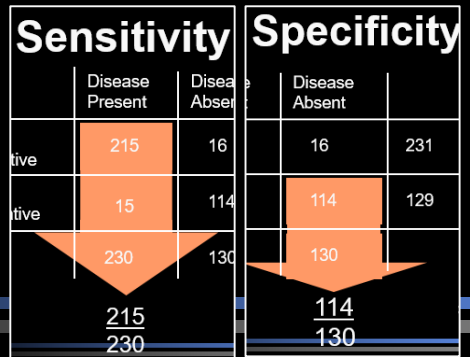
Negative predictive value = d/b+d

True positive (TP)	False positive (FP)
False negative (FN)	True negative (TN)

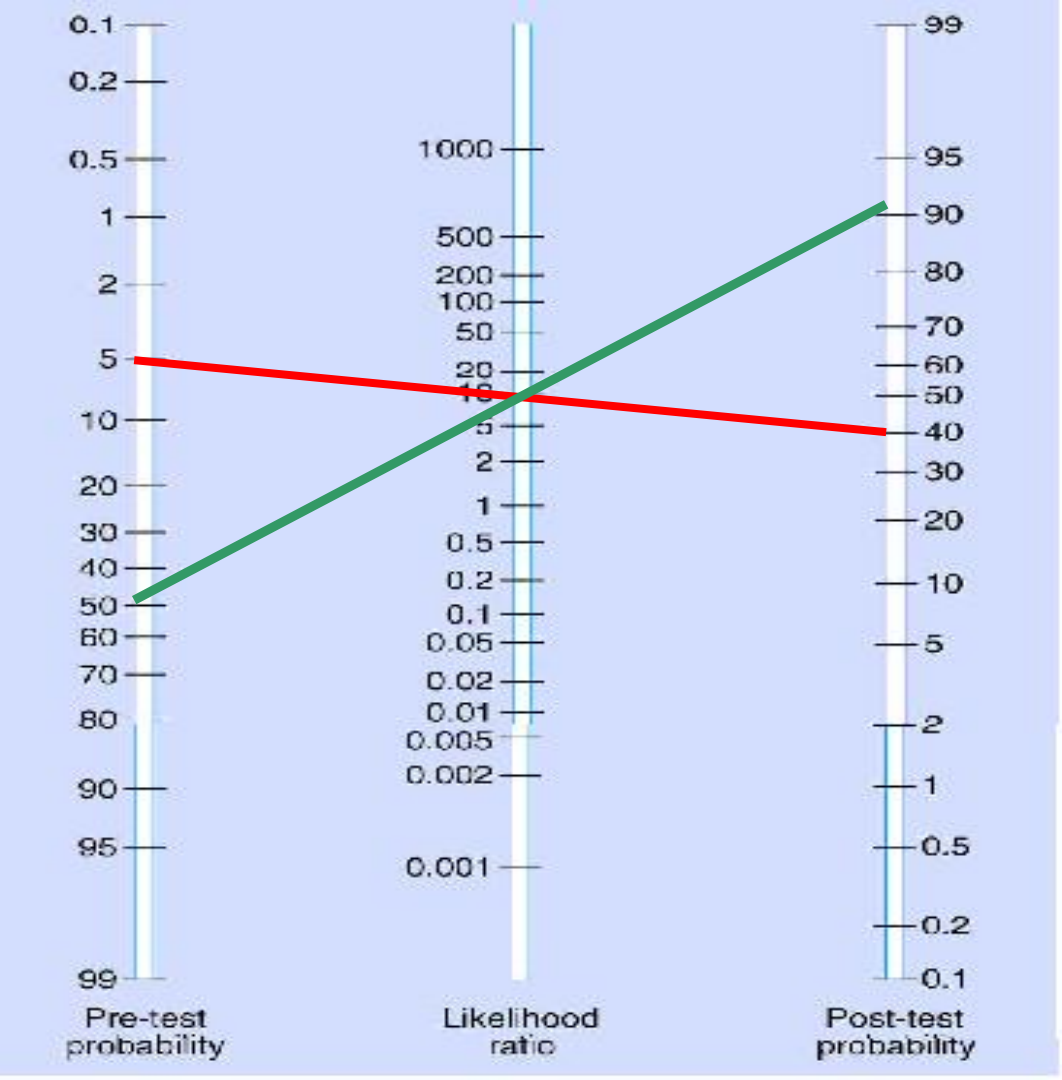
Likelihood Ratio

Indicates the value of the test for increasing certainty about a positive diagnosis

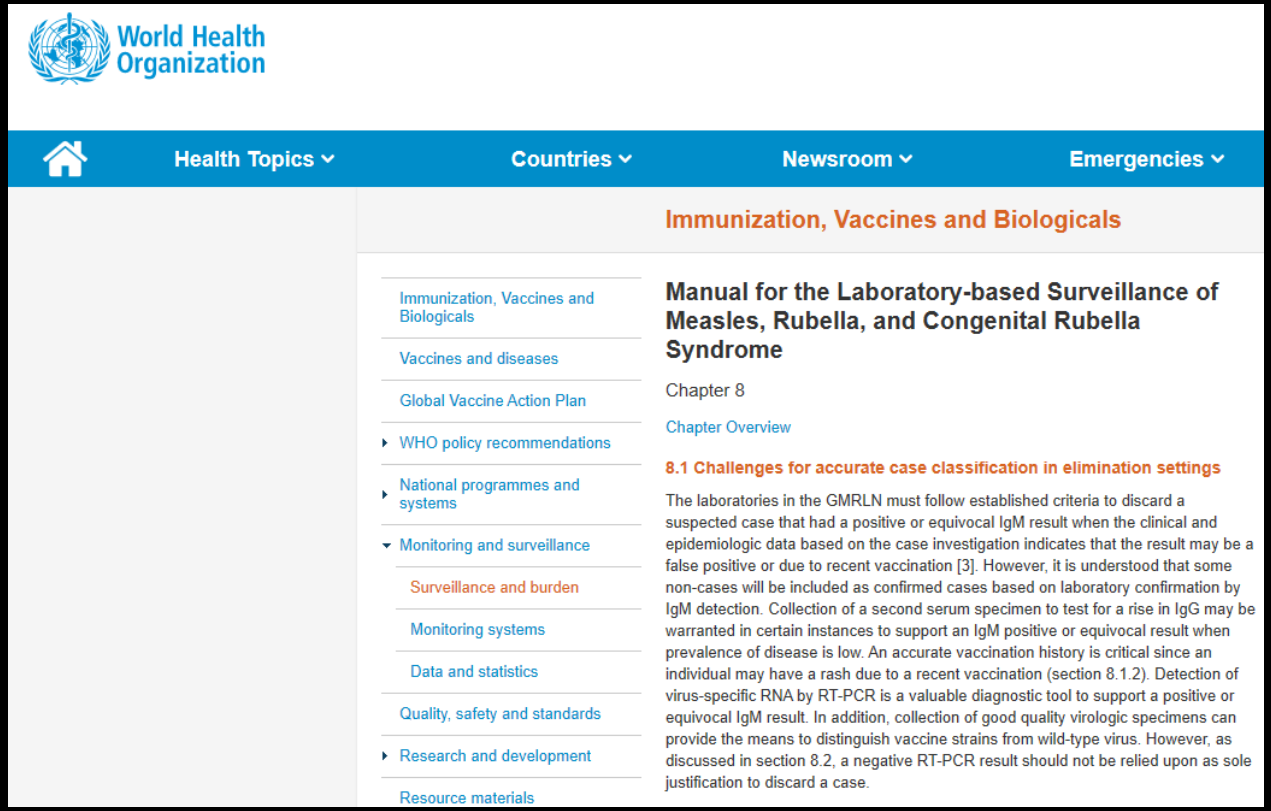
$$\frac{\text{Sensitivity}}{1 - \text{Specificity}} = \frac{215 / 230}{1 - 114/130} = 8$$



Likelihood ratio nomogram



Mer om betydningen av NPV og PPV re. tolkning av funn



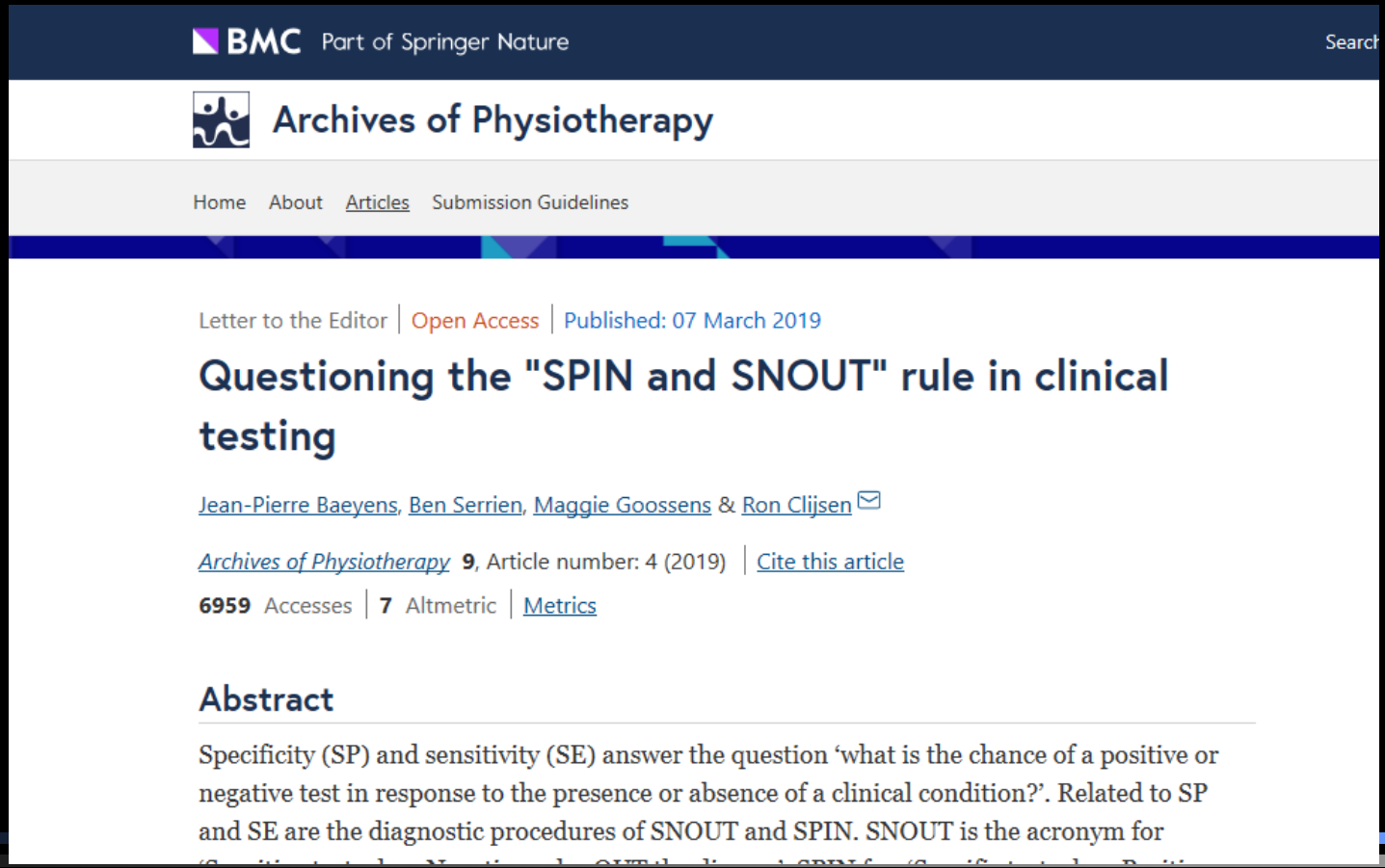
https://www.who.int/immunization/monitoring_surveillance/burden/laboratory/manual_section8.1/en

Hvis en test har høy sensitivitet og testen er negativ
«Snipp, snapp, snute, du er ute!!» (AKA engelsk «snout»)

Hvis en test har høy spesifisitet og testen er positiv
«Begynn å spinne - du er positiv» (AKA engelsk «spin»)

Tenk e.g., graviditets-test – falsk positiv / falsk negativ kan gi ulik respons, avhengig av intensjonen med å utføre testen.

Mer om SNOUT og SPIN



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Letter to the Editor | Open Access | Published: 07 March 2019

Questioning the "SPIN and SNOUT" rule in clinical testing

Jean-Pierre Baeyens, Ben Serrien, Maggie Goossens & Ron Clijsen

Archives of Physiotherapy **9**, Article number: 4 (2019) | Cite this article

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Abstract

Specificity (SP) and sensitivity (SE) answer the question 'what is the chance of a positive or negative test in response to the presence or absence of a clinical condition?'. Related to SP and SE are the diagnostic procedures of SNOUT and SPIN. SNOUT is the acronym for

En anbefalt Online diagnostisk-test kalkulator

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https://www.medcalc.org/calc/diagnostic_test.php

Free statistical calculators

Diagnostic test evaluation calculator

Instructions: enter the number of cases in the diseased group that test positive (*a*) and negative (*b*); and the number of cases in the non-diseased group that test positive (*c*) and negative (*d*).

Disease prevalence

If the sample sizes in the positive (Disease present) and the negative (Disease absent) groups do not reflect the real prevalence of the disease, you can enter the disease prevalence (expressed as a percentage) in the corresponding input box.

Next click the **Test** button.

	Disease				
Test	**Present**	**n**	**Absent**	**n**	**Total**
Positive	True Positive	a=95	False Positive	c=5	**a + c = 100**
Negative	False Negative	b=5	True Negative	d=95	**b + d = 100**
Total		**a + b = 100**		**c + d = 100**	

Disease prevalence

If the ratio of cases in the Disease Present and Disease Absent groups does not reflect the disease prevalence, enter:

disease prevalence (%): 10

Test

Results

Statistic	Value	95% CI
Sensitivity	95.00%	88.72% to 98.36%
Specificity	95.00%	88.72% to 98.36%
Positive Likelihood Ratio	19.00	8.08 to 44.70
Negative Likelihood Ratio	0.05	0.02 to 0.12
Disease prevalence (*)	10.00%	
Positive Predictive Value (*)	67.86%	47.29% to 83.24%
Negative Predictive Value (*)	99.42%	98.64% to 99.75%
Accuracy (*)	95.00%	91.00% to 97.58%

	Disease				
Test	**Present**	**n**	**Absent**	**n**	**Total**
Positive	True Positive	a=95	False Positive	c=5	**a + c = 100**
Negative	False Negative	b=5	True Negative	d=95	**b + d = 100**
Total		**a + b = 100**		**c + d = 100**	

Disease prevalence

If the ratio of cases in the Disease Present and Disease Absent groups does not reflect the disease prevalence, enter:

disease prevalence (%): 1

Test

Results

Statistic	Value	95% CI
Sensitivity	95.00%	88.72% to 98.36%
Specificity	95.00%	88.72% to 98.36%
Positive Likelihood Ratio	19.00	8.08 to 44.70
Negative Likelihood Ratio	0.05	0.02 to 0.12
Disease prevalence (*)	1.00%	
Positive Predictive Value (*)	16.10%	7.54% to 31.11%
Negative Predictive Value (*)	99.95%	99.88% to 99.98%
Accuracy (*)	95.00%	91.00% to 97.58%

PPV: probability of those testing/screening positive actually having the condition
NPV: probability of those testing/screening negative NOT actually having the condition

Eksempler p[
PCR-tester

COVID-19 IgM/IgG Rapid Test*

BioMedomics has developed and launched one of the world's first rapid point-of-care lateral flow immunoassays for the diagnosis of coronavirus infection. The test has been used widely by the Chinese CDC to combat infections and is now available globally. This test detects both early marker and late marker, IgM/IgG antibodies in human finger-prick or venous blood samples.

Roche 15.3 cobas sars-CoV-2-analysen

[Potential false-positive rate among the 'asymptomatic infected individuals' in close contacts of COVID-19 patients].
Zhonghua Liu Xing Bing Xue Za Zhi 2020; 41(4):485-488 ZL

Abstract

Objective:

As the prevention and control of COVID-19continues to advance, the active nucleic acid test screening in the close contacts of the patients has been carrying out in many parts of China. However, the false-positive rate of positive results in the screening has not been reported up to now. But to clearify the false-positive rate during screening is important in COVID-19 control and prevention.

Methods:

Point values and reasonable ranges of the indicators which impact the false-positive rate of positive results were estimated based on the information available to us at present. The false-positive rate of positive results in the active screening was deduced, and univariate and multivariate-probabilistic sensitivity analyses were performed to understand the robustness of the findings.

Results:

When the infection rate of the close contacts and the sensitivity and specificity of reported results were taken as the point estimates, the positive predictive value of the active screening was only 19.67%, in contrast, the false-positive rate of positive results was 80.33%. The multivariate-probabilistic sensitivity analysis results supported the base-case findings, with a 75% probability for the false-positive rate of positive results over 47%.

Conclusions:

In the close contacts of COVID-19 patients, nearly half or even more of the 'asymptomatic infected individuals' reported in the active nucleic acid test screening might be false positives.

CDC Centers for Disease Control and Prevention
CDC 24/7: Saving Lives, Protecting People™

Coronavirus Disease 2019 (COVID-19)

CDC > Coronavirus Disease 2019 (COVID-19) > Laboratories

- Coronavirus Disease 2019 (COVID-19)
- How to Prepare
- Symptoms & Testing
- If You Are at Higher Risk
- If You Are Sick
- Frequently Asked Questions
- Travel
- Cases & Latest Updates
- Schools, Workplaces & Community Locations
- Healthcare Professionals

Frequently Asked Questions on COVID-19 Testing at Laboratories

1. Where do **public health laboratories** get access to testing kits to detect the virus that causes Coronavirus Disease 2019 (COVID-19)?

a. CDC provides the test kits for public health laboratories (PHLs) to perform real-time RT-polymerase chain reaction (rRT-PCR) detection of the SARS-CoV-2 virus (the virus that causes COVID-19) in respiratory specimens. CDC received Emergency Use Authorization (EUA) from the Food and Drug Administration (FDA) on February 4, 2020 for use of this rRT-PCR test to detect the virus in upper and lower respiratory specimens. These test kits are available through the International Reagent Resource (IRR) . For over ten years, CDC has provided test kits and reagents to PHLs through the IRR. This resource was established to support state and local public health laboratories, Department of Defense laboratories, and other qualified laboratories participating in public health surveillance and studies. Clinical and commercial laboratories conducting COVID-19 testing access test reagents from commercial reagent manufacturers which have received EUA from the FDA. Genomic RNA material for validation purposes can be obtained from BEI Resources as indicated in question 7 below.

2. What is the CDC's International Reagent Resource (IRR)?

ARUP LABORATORIES Test Information Business Solutions Res

Home › Infectious Disease › ARUP's Response to Coronavirus Disease 2019 (COVID-19)

ARUP's Response to Coronavirus Disease 201

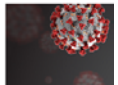
Live Chat with Client Services

Overview Availability Test Specifics FAQs Resources

Last Update: March 14, 2020 at 2:35 p.m. MT.

Overview

On March 12, 2020, ARUP Laboratories began offering ARUP clients a test for coronavirus disease 2019 (COVID-19), and demand for the test is quickly approaching capacity due to nationwide supply shortages.



IRR International Reagent Resource

Home Catalog Quick Links Register About

About » IRR

Quick Links
- IRR
- Quality Control
- Requesting Reagents
- Resource Links
- Contact Us
- FAQs

IRR

The International Reagent Resource (IRR) was established by the Centers for Disease Control and Prevention (CDC) to reagents, tools and information for studying and detection of Influenza Virus. The IRR acquires, authenticates, and produces re carry out basic research and develop improved diagnostic tests, vaccines, and detection methods.

Public health labs also use the reagents across the globe for the surveillance of newly emerging strains of Influenza, such as Influenza (H1N1) and (H5N1). By centralizing these functions within the IRR, access to and use of these materials in the scientific and public health community is monitored and quality control of the reagents is assured.

The International Reagent Resource is managed under contract by American Type Culture Collection (ATCC).

Please login to search the catalog for all available items. Scientists must be registered with IRR to request materials.

Google-søk 18.3 kl. 10.00

Hovedoppslag

Ny koronaanalyse hastegodkjent i USA. Nå kommer den til Norge

Dagens Medisin

For 1 dag siden

Pressemelding

Pressemelding - Radio N…

Ny test kan gi kjappere koronasvar

Forskning.no

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diagnostics.roche.com › landing-page

General-Information–coba

For 7 timer siden - On March 12, 202

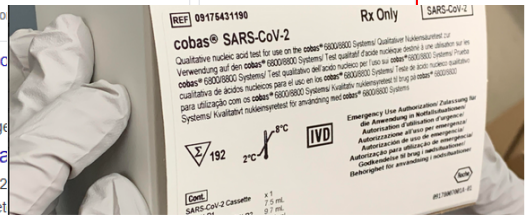
the **cobas® SARS-CoV-2** Test to det

diagnostics.roche.com › products › pa

cobas® SARS-CoV-2 Test

For 3 dager siden - The **cobas ® SA**

quality results for clinical decision-ma



Den nye testen for koronaviruset har i løpet av kort tid blitt godkjent for nødbruk ved helsekriser som den verden nå står ov

Foto: Roche

LEGEMIDLER

Ny koronaanalyse hastegodkjent i USA. Nå kommer den til Norge

En SARS-CoV-2 analyse, som påviser koronavirus, er tildelt såkalt «FDA Emergency Use»-godkjenning og vil bli tilgjengelig i Norge.

Publisert: 2020-03-16 13.14
Siri Gulliksen Tømmerbakke

PUBLISERT Mandag 16. mars 2020 - 14:16

Det er legemiddelselskapet Roche som står bak den nye såkalte cobas sars-CoV-2-analysen, som nå er blitt hurtiggodkjent i USA.

Testen kan tas i bruk i markeder som godtar CE-merket, og Norge er dermed omfatte

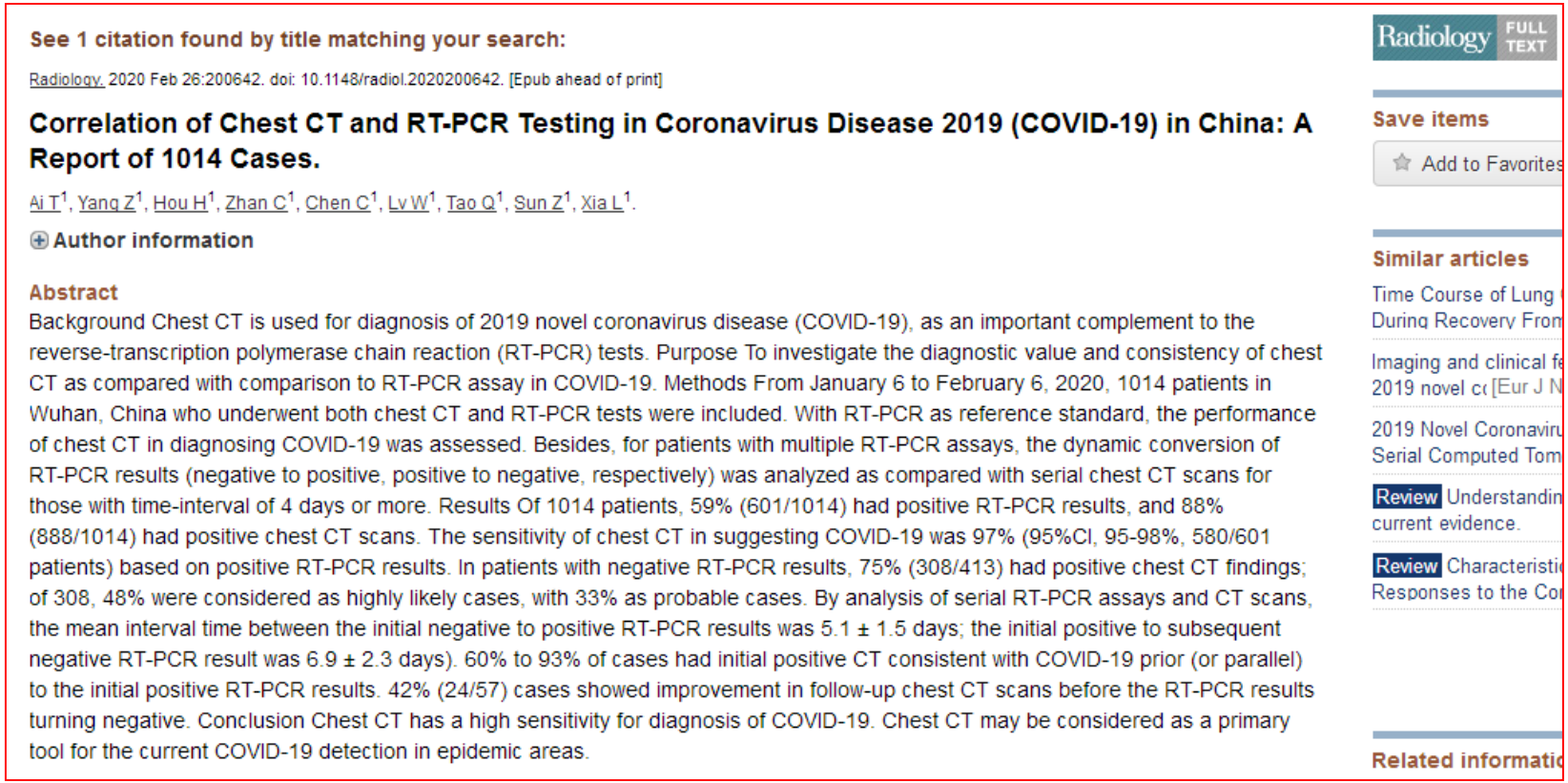
Oslo universitetssykehus (OUS) har en testmaskin i bruk allerede og får ytterligere en til uka. Én havner også på Ahus og kanskje én i Stavanger, opplyser Folkehelseinstituttet (FHI) til NTB.

Kapasiteten vil dermed øke betraktelig, siden hver maskin kan gjennomføre 1440 tester i døgnet.

– Roche fremskyndet utviklingen av testen for å møte et økende behov for testing av pasienter for slik å kunne bidra til å hindre ytterligere spredning av viruset i en så tidlig fase som mulig, sier administrerende direktør Daniel Malarek i Roche Diagnostics Norge i en pressemelding.

https://www.dagensmedisin.no/artikler/2020/03/16/ny-koronaanalyse-hastegodkjent-i-usa.-na-kommer-den-til-norge/

For testing av pasienter finnes flere alternativer, e.g.



See 1 citation found by title matching your search:

Radiology. 2020 Feb 26:200642. doi: 10.1148/radiol.2020200642. [Epub ahead of print]

Correlation of Chest CT and RT-PCR Testing in Coronavirus Disease 2019 (COVID-19) in China: A Report of 1014 Cases.

Ai T[1], Yang Z[1], Hou H[1], Zhan C[1], Chen C[1], Lv W[1], Tao Q[1], Sun Z[1], Xia L[1].

⊕ Author information

Abstract

Background Chest CT is used for diagnosis of 2019 novel coronavirus disease (COVID-19), as an important complement to the reverse-transcription polymerase chain reaction (RT-PCR) tests. Purpose To investigate the diagnostic value and consistency of chest CT as compared with comparison to RT-PCR assay in COVID-19. Methods From January 6 to February 6, 2020, 1014 patients in Wuhan, China who underwent both chest CT and RT-PCR tests were included. With RT-PCR as reference standard, the performance of chest CT in diagnosing COVID-19 was assessed. Besides, for patients with multiple RT-PCR assays, the dynamic conversion of RT-PCR results (negative to positive, positive to negative, respectively) was analyzed as compared with serial chest CT scans for those with time-interval of 4 days or more. Results Of 1014 patients, 59% (601/1014) had positive RT-PCR results, and 88% (888/1014) had positive chest CT scans. The sensitivity of chest CT in suggesting COVID-19 was 97% (95%CI, 95-98%, 580/601 patients) based on positive RT-PCR results. In patients with negative RT-PCR results, 75% (308/413) had positive chest CT findings; of 308, 48% were considered as highly likely cases, with 33% as probable cases. By analysis of serial RT-PCR assays and CT scans, the mean interval time between the initial negative to positive RT-PCR results was 5.1 ± 1.5 days; the initial positive to subsequent negative RT-PCR result was 6.9 ± 2.3 days). 60% to 93% of cases had initial positive CT consistent with COVID-19 prior (or parallel) to the initial positive RT-PCR results. 42% (24/57) cases showed improvement in follow-up chest CT scans before the RT-PCR results turning negative. Conclusion Chest CT has a high sensitivity for diagnosis of COVID-19. Chest CT may be considered as a primary tool for the current COVID-19 detection in epidemic areas.

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Conclusion Chest CT has a high sensitivity for diagnosis of COVID-19. Chest CT may be considered as a primary tool for the current COVID-19 detection in epidemic areas

Testing i Norge

Dagsoversikter fra FHI

Testaktiviteten til og med 14. mars
Rapporterte prøver ved landets laboratorier fra utbruddets start: 13748 personer
Laboratoriene rapporterer antall gjennomførte tester i Norge hver tirsdag til referanselaboratoriet ved FHI. Det betyr at en gang i uken får man en oversikt over testaktiviteten i hele landet.

COVID-19
Dagsrapport
søndag 15. mars 2020

FHI Folkehelseinstituttet

Dette er en daglig rapport fra Folkehelseinstituttet om Koronavirussituasjonen (covid-19) i Norge inkludert en oppdatering fra Norden og resten av verden.

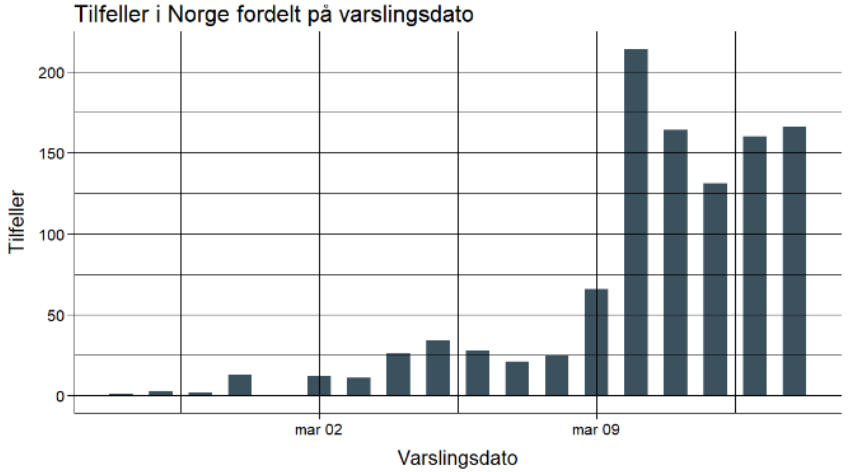
Dagsrapporten omfatter alle nye tilfeller meldt fram til kl 24.00 dagen før.

Rapporten er generert 15.03.2020 kl 08:27. Tallene er midlertidige og kan bli endret.

Norge

Basert på informasjon om varslede tilfeller i Norge (utbruddsregisteret).

- Det er nå totalt 1 077 tilfeller, hvorav 166 tilfeller er rapportert fra kl 00.00 til kl 24.00 den 14.03.2020.



Testingen som blir utført i Norge

Folkehelseinstituttet er Nasjonalt referanselaboratorium for koronavirus med alvorlig utbruddspotensiale.

Laboratoriet har tilgjengelig analyse for påvisning av Sarbeco betakoronavirus (E-gen analyse) og bekreftende analyser spesifikt for SARS-CoV-2 (RdRp-gen analyse).

Laboratorier som tester for SARS-CoV-2

I tillegg til referanselaboratoriet ved FHI utfører følgende laboratorier tester for SARS-CoV-2 (uten at det er behov for bekreftelse av negative resultater ved referanselaboratoriet):

AHUS
OUS-Ullevål
Sykehuset Østfold-Kalnes
Haukeland Universitetssykehus
Stavanger Universitetssjukehus
Molde sjukehus
St. Olavs Hospital
Beredskapslaboratoriet ved FHI
Sykehuset Vestfold
Fürst medisinsk laboratorium
Sørlandet Sykehus Kristiansand
Universitetssykehuset Nord-Norge
Sykehuset Innlandet Lillehammer
Unilabs Laboratoriemedisin
Førde Sentralsjukehus

Listen over laboratorier oppdateres fortløpende.

Flere laboratorier har satt opp analyse og er i prosess med validering, disse er ennå ikke forespurt eller er ikke klar til å stå på listen ennå.

Informasjon til mikrobiologiske laboratorier om diagnostikk av SARS-CoV-2

Gitt at testene utført i Norge er kalibrerte mot FHI kan tallene mellom ulike landsdeler sammenliknes.

Imidlertid er det mer usikkerhet med å sammenlikne mellom ulike land pga

ulike test-metoder

ulike test-populasjoner

Norge (Kriteriene har endret seg over de siste ukene) per. 15.3. gjelder:

- Pasienter
  - med akutt innsettende luftveisinfeksjoner
  - i alle helsinstitusjoner med akutt luftveisinfeksjon
- Ansatte i helsetjenesten med pasientnært arbeid in l.v.infeksjoner
- Individer
  - med akutt l.v.infeksjon som har vært i nærkontakt med smittet
  - tilhørende en spesielt utsatt gruppe, selv med milde symptomer
  - Akutt l.v.infeksjon med minst ett av sympt. Feber, hoste,kortpust

1212	101	3
testet og bekreftet smittet totalt	nye smittede bekreftet i dag	døde totalt

I går: **117** nye

Norge

Fylker | Kommuner

FYLKE	BEKREFTET SMITTET	PER 1 000 INNBYGGER
Oslo	281	0,41
Rogaland	150	0,31
Agder	86	0,28
Viken	317	0,26
Innlandet	78	0,21
Vestland	116	0,18
Vestfold og Telemark	64	0,15
Trøndelag	68	0,15
Troms og Finnmark	19	0,08
Møre og Romsdal	20	0,08
Nordland	9	0,04
Ukjent	4	0,00
Totalt	**1212**	

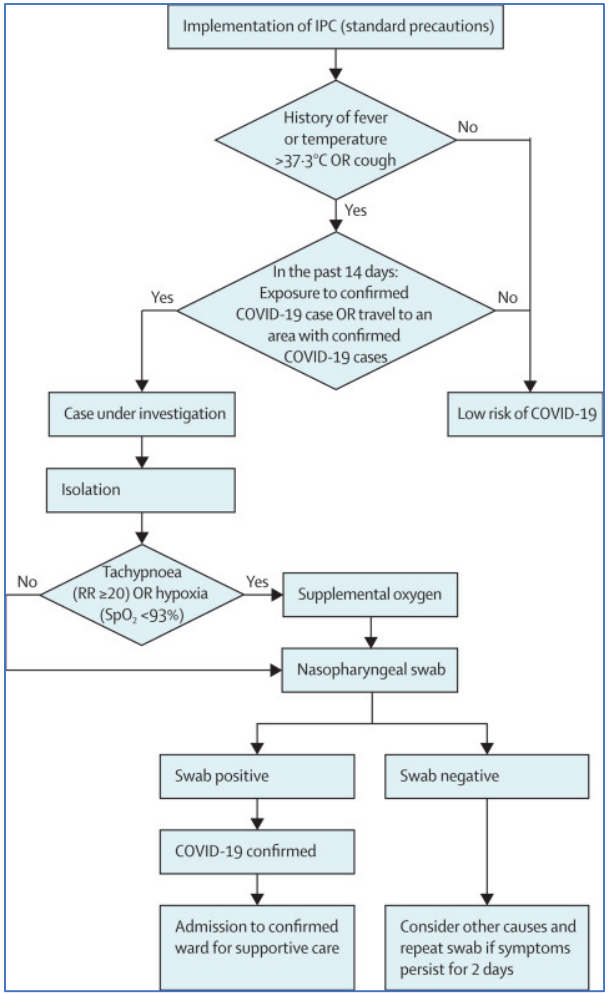
THE LANCET
Respiratory Medicine

CORRESPONDENCE | ONLINE FIRST

Adoption of COVID-19 triage strategies for low-income settings

Rodgers R Ayebare • Robert Flick • Solome Okware • Bongomin Bodo • Mohammed Lamorde

Published: March 11, 2020 • DOI: https://doi.org/10.1016/S2213-2600(20)30114-4



Hvor mange er egentlig blitt smittet ?

- The total number of COVID-19 cases is not known by any research, governmental or reporting institution. There are several reasons why the total number is not known:
- Whilst for some the symptoms are very severe, for a large share of the population the symptoms are mild. In such cases, individuals may be unaware that they are infected with COVID-19, and therefore not examined and diagnosed by a physician.[1,2]
- The second reason that the confirmed cases are only a fraction of the total number is that many countries are struggling to test a large number of cases. Not every individual that ought to be tested is able to.

1. Read JM, Bridgen JR, Cummings DA, Ho A, Jewell CP. Novel coronavirus 2019-nCoV: early estimation of epidemiological parameters and epidemic predictions. medRxiv. 2020;2020.01.23.20018549.
2. WHO (2020). Report of the WHO-China Joint Mission on Coronavirus Disease 2019 (COVID-19). Available online at: https://www.who.int/docs/default-source/coronaviruse/who-china-joint-mission-on-covid-19-final-report.pdf

BioMedomics
TESTS FOR LIFE

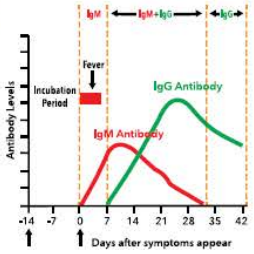
INFECTIOUS DISEASE

COVID-19

Rapid **IgM-IgG Combined Antibody** test for Coronavirus

BioMedomics' new rapid test provides accurate COVID-19 infection diagnosis in 15 minutes.

It is widely accepted that IgM provides the first line of defense during viral infections, follwedby the generation of adaptive, high affinity IgG responses for long term immunity and immunological memory. Therefore testing of COVID-19 IgM and IgG antibodies is an effective method for the rapid diagnosis of COVID-19 infection. Furthermore, detection of COVID-19 IgM antibodies tends to indicate a recent exposure to COVID-19, whereas detection of COVID-19 IgG antibodies indicates a later stage of infection. Thus, this combined antibody test could also provide information on the stage of infection.



4 Simple Steps

1 Collect blood sample

2 Add blood sample to sample well

3 Place 2-3 drops of buffer in sample well

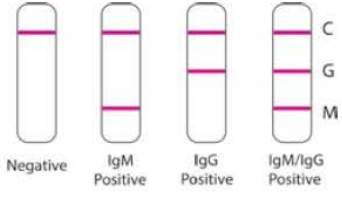
4 Read results after 15 minutes

Comparison With PCR Nucleic Acid Tests

	PCR Nucleic Acid Tests	*BioMedomics IgM/IgG Rapid Test*
Turnaround Time	> 1 Hour	15 Minutes
Facility Requirement	PCR Laboratory	No special facilities needed
Operation	Requires trained technicians	Whole blood, serum, or plasma
	Requires expensive equipment	Test can be used anywhere
	Complicated operation	No specialized training required
	Prone to False Negatives	Results are clear and easy to read
Transport/Storage	Requires cold-chain	Room Temperature
Clinical Value	Commonly used, gold standard	Highly specific, can detect "silent infections"

- *Easy to use*
- *Works with whole blood, serum, and plasma*
- *Tests for 2 antibodies*
- *4 simple steps, results in 15 minutes*
- *No special equipment needed*
- *No sample transport required*

Results



BioMedomics | www.BioMedomics.com | info@BioMedomics.com

At-Home Corona Virus Test Kit AVAILABLE NOW -- Test Results in 15 Minutes

From:  **Brandon Hensinger -- The Living Sales Manual**

Philadelphia , PA

Tuesday, March 17, 2020

Yikon Genomics Inc has announced the availability of an At-Home Screening Kit for Detection of IgM/IgG Antibody to SARS-CoV-2. The screening test uses a simple finger stick procedure to test the presence of the aforementioned antibodies in the blood stream, making it possible to detect current or recent viral infections of COVID-19. The kit is available for individual purchase or for bulk orders.

With a sensitivity of 95.04% and a specificity of 100%, this Kit can be used to confidently screen for the antibodies. The validation results indicate that the test kits can accurately assist with the diagnosis of new coronavirus infections and are not affected by hepatitis B virus (HBV), influenza A (Flu A), influenza B virus (Flu B), and respiratory syncytial virus (RSV).

"We are relieved to be able to provide this kit to people across the world in response to the Corona Virus pandemic," expresses Brandon Hensinger, Global Vice President of Yikon Genomics. "We hope that this test can improve the number of patients getting screened, and also can provide peace of mind to people throughout the world"

The kit can be purchased at www.TheCoronaVirusTestKit.com .

Yikon Genomics is a global genetic laboratory, responsible for introducing innovative solutions in reproductive genetics, oncology, life sciences, and more. They are most recently responsible for the launch of the world's first clinical non-invasive PGT-A.

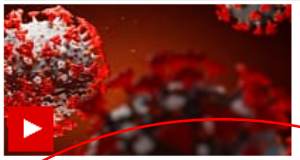
###

Droppet sex i et halvt år

Hurtigruteskip fylt med leger

corona

- Levering av pakker og post skal gå som normalt



SE: Dette m

vite om viru

Slik reagerer kroppen din på corona-viruset

Forskerteamet jobber også med å sammenligne en hurtigtest fra et tysk firma med standardtesten. Hurtigtesten gjennomføres ved å ta en liten blodprøve fra fingertuppen, og reagerer på eventuelle antistoffer i blodet.

– Dessverre ligger sensitiviteten på kun 33 prosent, ved en relativt god spesifisitet på 93 prosent. Det betyr at når testen gir utslag, er covid-19 påvist, men når den ikke gir utslag, da kan pasienten likevel være smittet. Altså slår ikke hurtigtesten ut på to tredjedeler av de smittede, sier den tyske virologen.

Tysk professor:

- Vi har oppdaget nye symptomer

Verden ble advart

coronaviruset verden rundt

33% sensitivitet / 93% spesifisitet

https://www.medcalc.org/calc/diagnostic_test.php

	Disease				
Test	**Present**	**n**	**Absent**	**n**	**Total**
Positive	True Positive	a=33	False Positive	c=7	a + c = **40**
Negative	False Negative	b=67	True Negative	d=93	b + d = **160**
Total		a + b = **100**		c + d = **100**	

Disease prevalence

If the ratio of cases in the Disease Present and Disease Absent groups does not reflect the disease prevalence, enter:

disease prevalence (%): 50

Test

Results

Statistic	Value	95% CI
Sensitivity	33.00%	23.92% to 43.12%
Specificity	93.00%	86.11% to 97.14%
Positive Likelihood Ratio	4.71	2.19 to 10.15
Negative Likelihood Ratio	0.72	0.62 to 0.84
Disease prevalence (*)	50.00%	
Positive Predictive Value (*)	82.50%	68.64% to 91.03%
Negative Predictive Value (*)	58.13%	54.49% to 61.67%
Accuracy (*)	63.00%	55.91% to 69.70%

	Disease				
Test	**Present**	**n**	**Absent**	**n**	**Total**
Positive	True Positive	a=33	False Positive	c=7	a + c = **40**
Negative	False Negative	b=67	True Negative	d=93	b + d = **160**
Total		a + b = **100**		c + d = **100**	

Disease prevalence

If the ratio of cases in the Disease Present and Disease Absent groups does not reflect the disease prevalence, enter:

disease prevalence (%): 10

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Sensitivity	33.00%	23.92% to 43.12%
Specificity	93.00%	86.11% to 97.14%
Positive Likelihood Ratio	4.71	2.19 to 10.15
Negative Likelihood Ratio	0.72	0.62 to 0.84
Disease prevalence (*)	10.00%	
Positive Predictive Value (*)	34.38%	19.57% to 53.01%
Negative Predictive Value (*)	92.59%	91.51% to 93.54%
Accuracy (*)	87.00%	81.53% to 91.33%

	Disease				
Test	**Present**	**n**	**Absent**	**n**	**Total**
Positive	True Positive	a=33	False Positive	c=7	a + c = **40**
Negative	False Negative	b=67	True Negative	d=93	b + d = **160**
Total		a + b = **100**		c + d = **100**	

Disease prevalence

If the ratio of cases in the Disease Present and Disease Absent groups does not reflect the disease prevalence, enter:

disease prevalence (%): 1

Test

Results

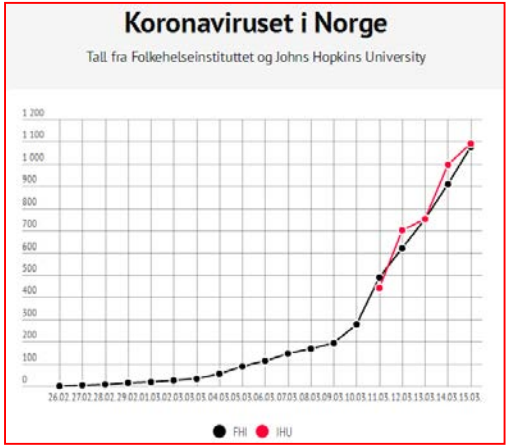
Statistic	Value	95% CI
Sensitivity	33.00%	23.92% to 43.12%
Specificity	93.00%	86.11% to 97.14%
Positive Likelihood Ratio	4.71	2.19 to 10.15
Negative Likelihood Ratio	0.72	0.62 to 0.84
Disease prevalence (*)	1.00%	
Positive Predictive Value (*)	4.55%	2.16% to 9.30%
Negative Predictive Value (*)	99.28%	99.16% to 99.38%
Accuracy (*)	92.40%	87.81% to 95.67%

PPV: probability of those testing/screening positive actually having the condition
NPV: probability of those testing/screening negative NOT actually having the condition

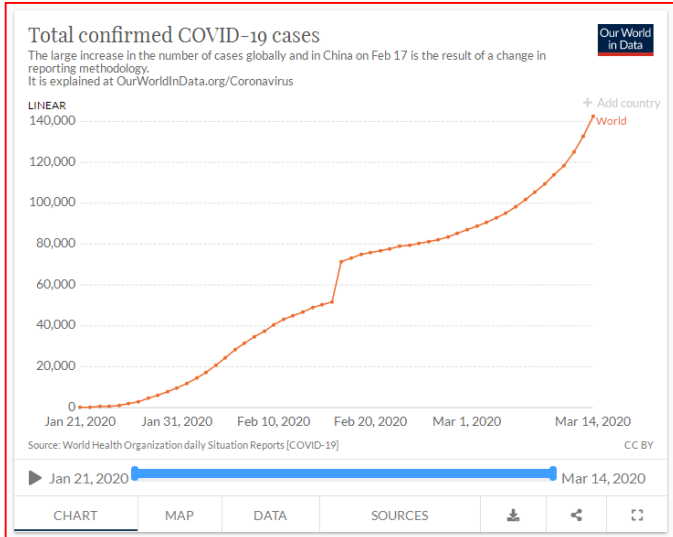
COVID-19 globalt blir kontinuerlig monitorert av WHO

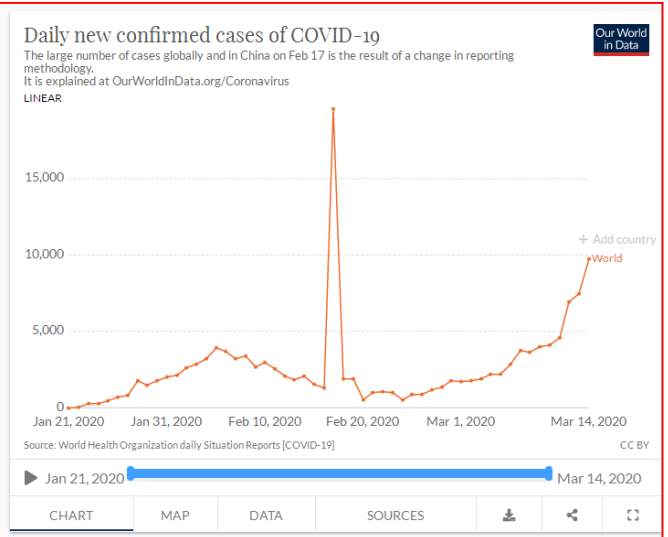
https://www.who.int/emergencies/diseases/novel-coronavirus-2019/situation-reports

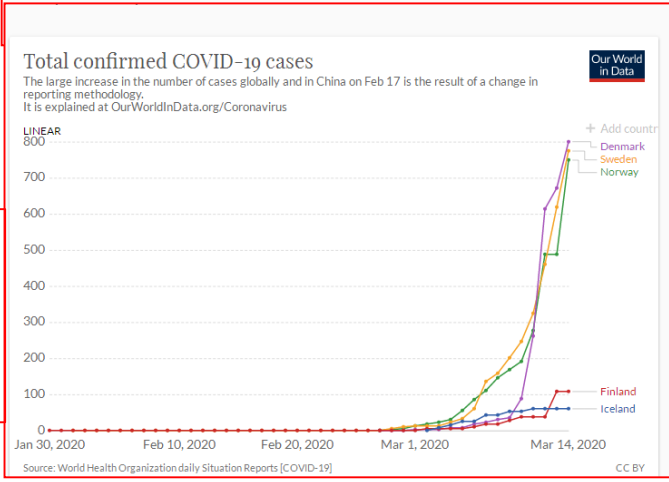
Insidens globalt & i Norden

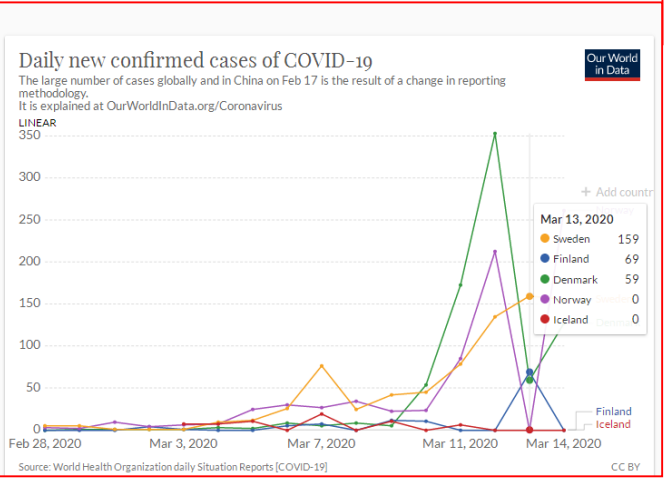


Obs - sannsynlig
ulike test-metoder &
ulike test-populasjoner



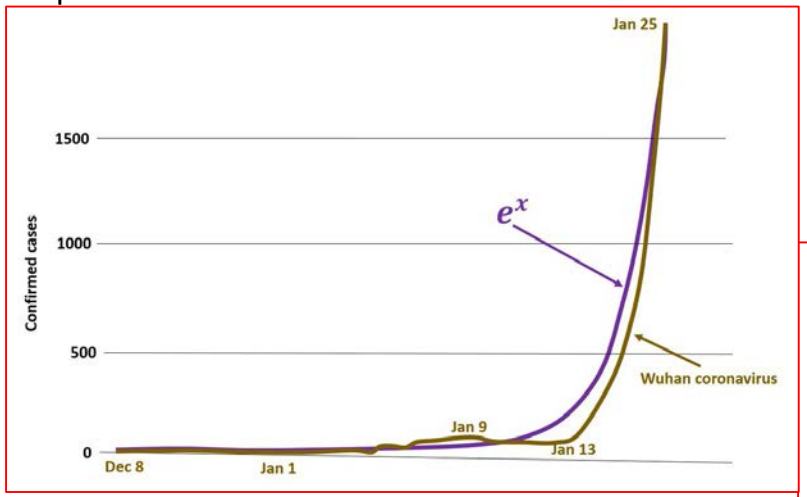




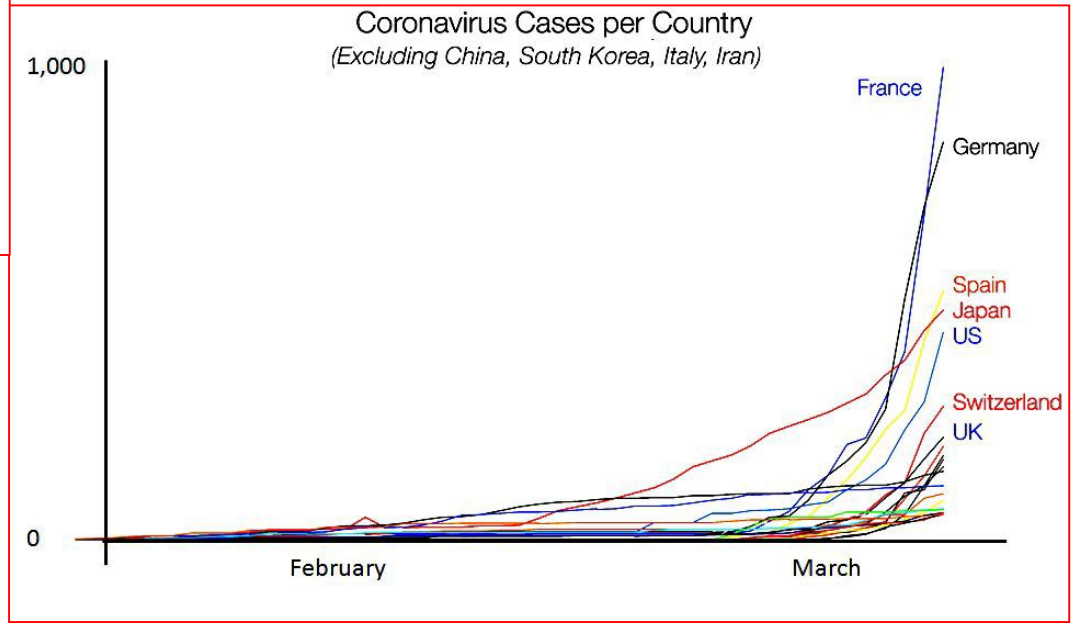


Fasongen i en vekstkurve kan si noe om etiologi:

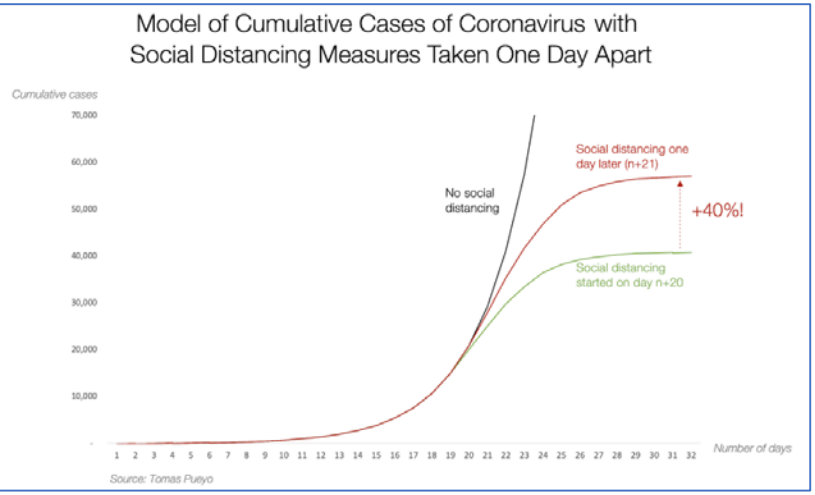
Eksponentiell vekst



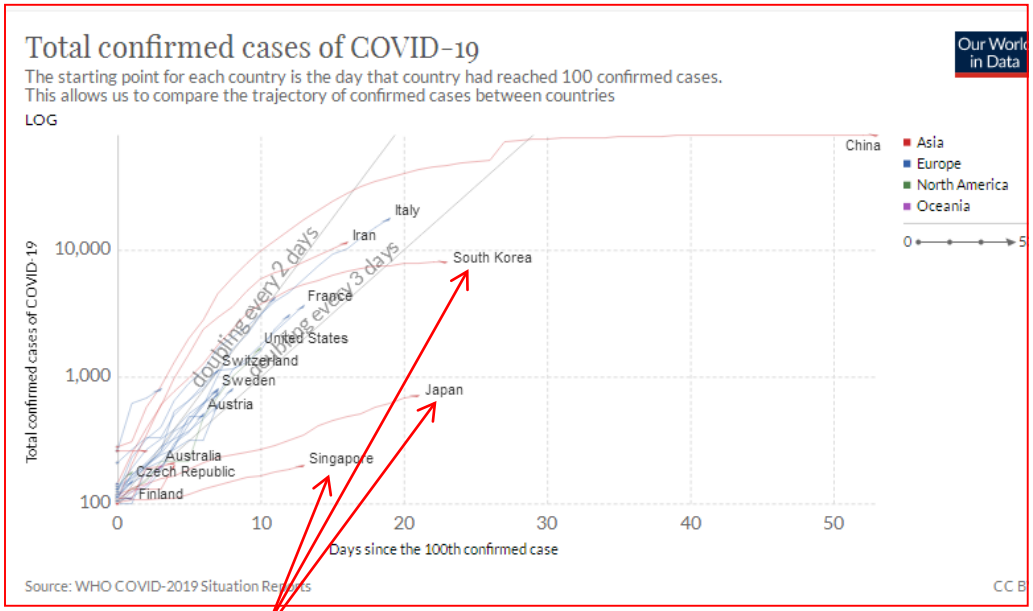
Veksten i de fleste land ser ut til å ha fulgt et tilnærmet samme format, dvs eksponentielt



Fasongen i vekstkurven sier noe om (mot-)tiltak har en effekt



Dersom den eksponentielle veksten kan bli bremset, vil kurven få et annet forløp



Noen land ser ut til å ha klart å bremse opp smitteoverføringen (med mindre kriteriene for å bli testet har endret seg)

https://ourworldindata.org/coronavirus

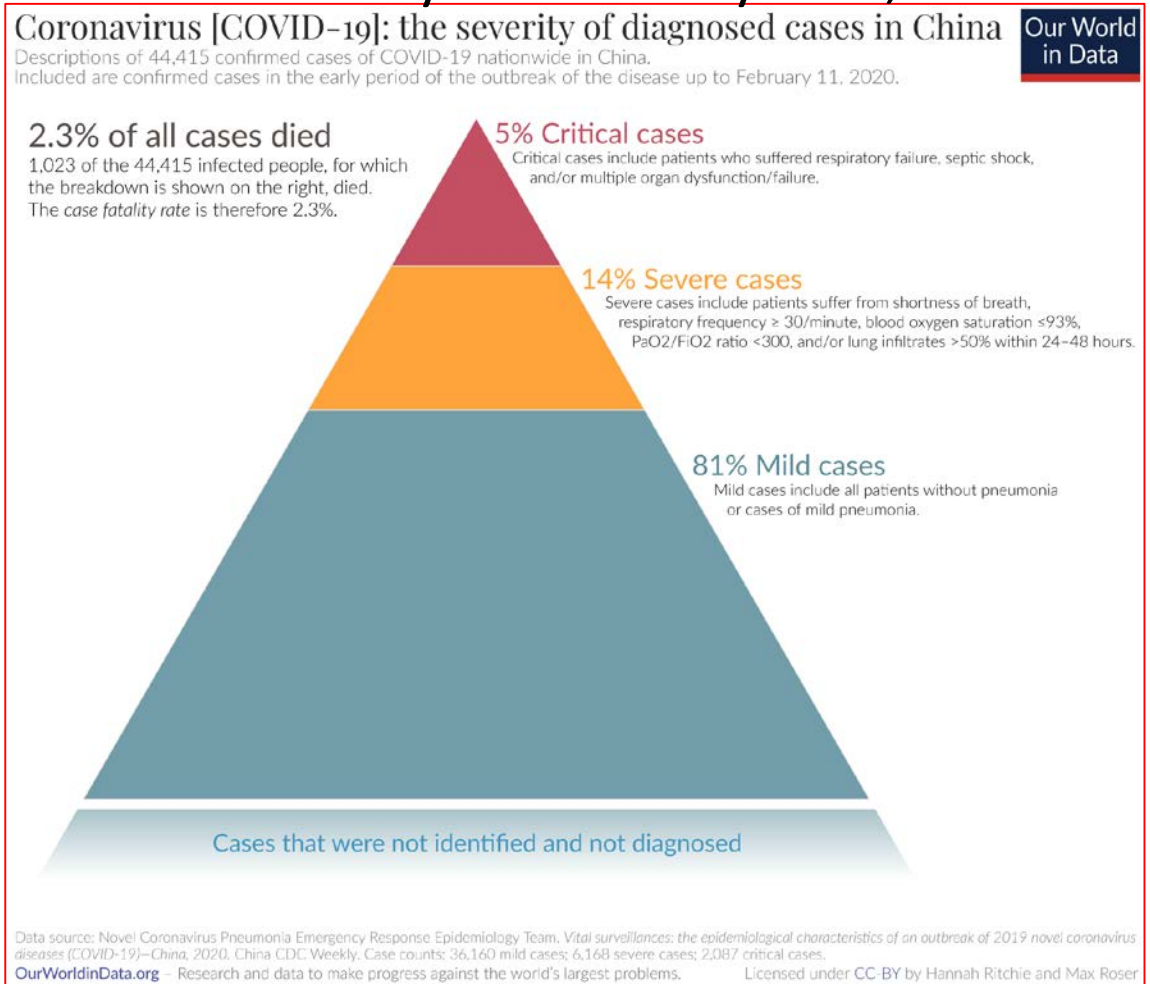
Hvor stor er andelen av smittede som kan antas å bli alvorlige syke ? / eller dø ?, i.e., Case Fatality Rate (CFR)

- Most current discussions of the mortality risk of COVID-19 refer to the **case fatality rate (CFR)**. This is the metric we will focus on, but it is crucial to understand the caveats to this data, and how it differs from alternative measures.
- **CFR** is the share who died from the disease among individuals diagnosed with the disease. It is expressed as a percentage and used as a measure of disease severity.

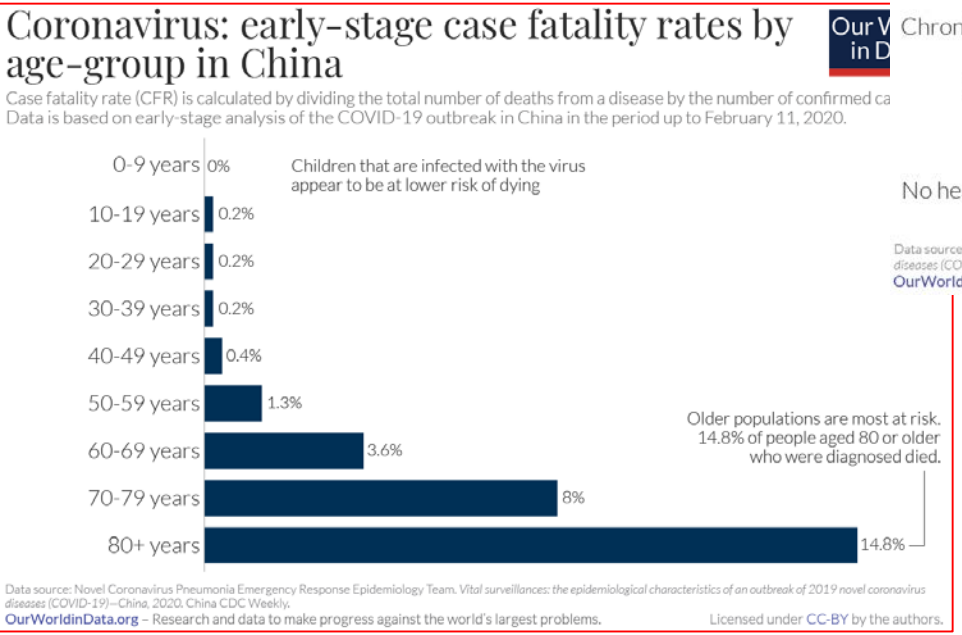
$$\text{CFR} = \frac{\text{total number of } \textit{deaths} \text{ from a disease}}{\text{the number of } \textit{confirmed cases}.}$$

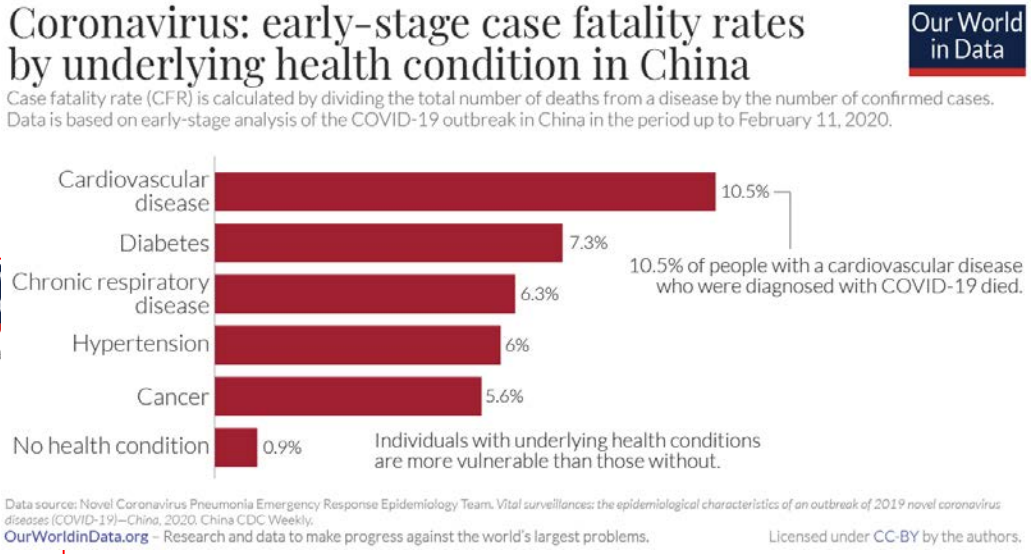
One of the key challenges is that the number of confirmed cases is often smaller than the number of total cases. The trouble is that often **many cases of a disease are never diagnosed**. This could be because cases with mild symptoms are often not tested or because not everyone who is sick goes to a hospital where such cases could be diagnosed, or because testing facilities are limited.

COVID-19 Sykdomsbyrde, Kina



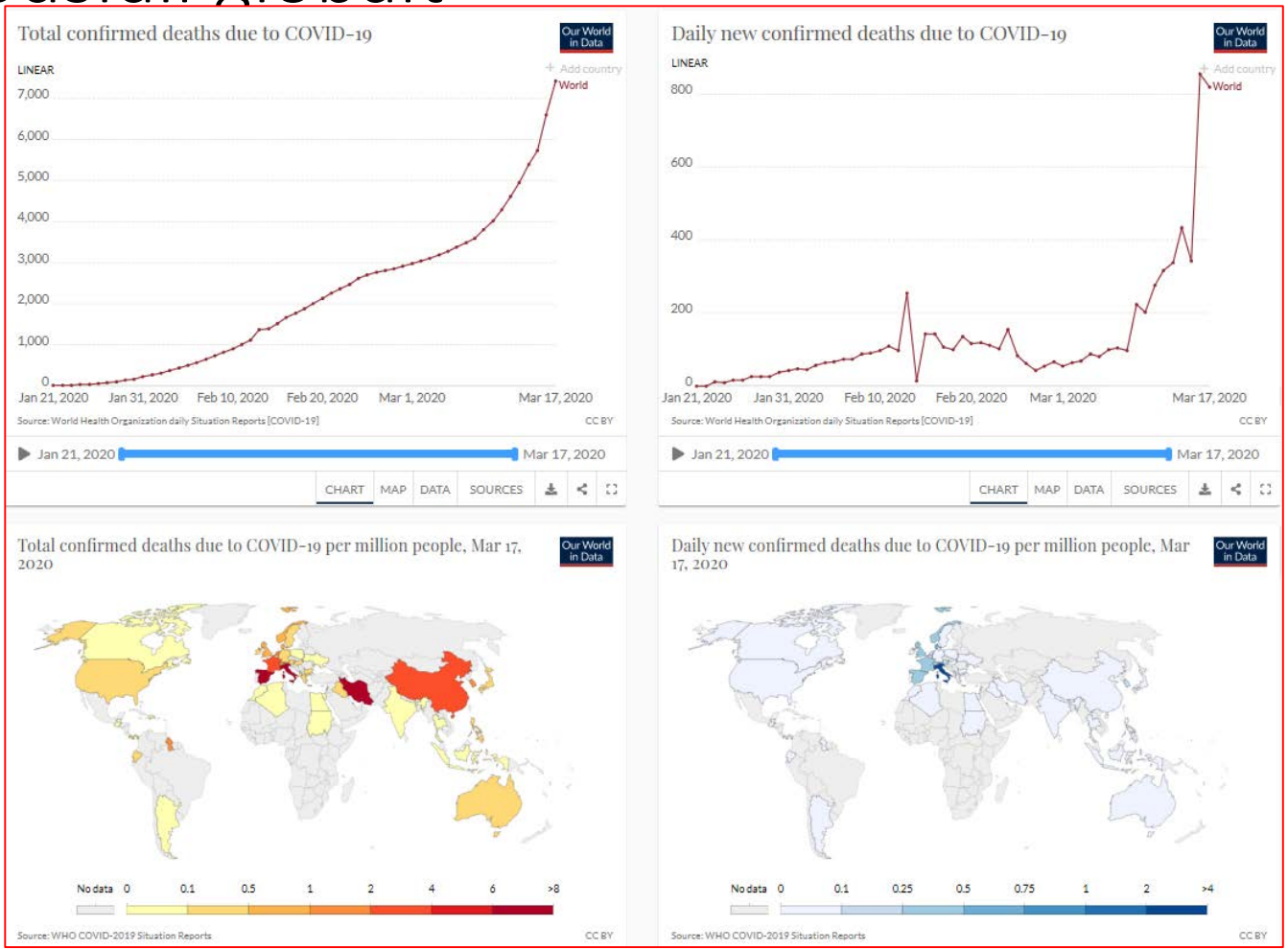
Dødsfall - kofaktorer



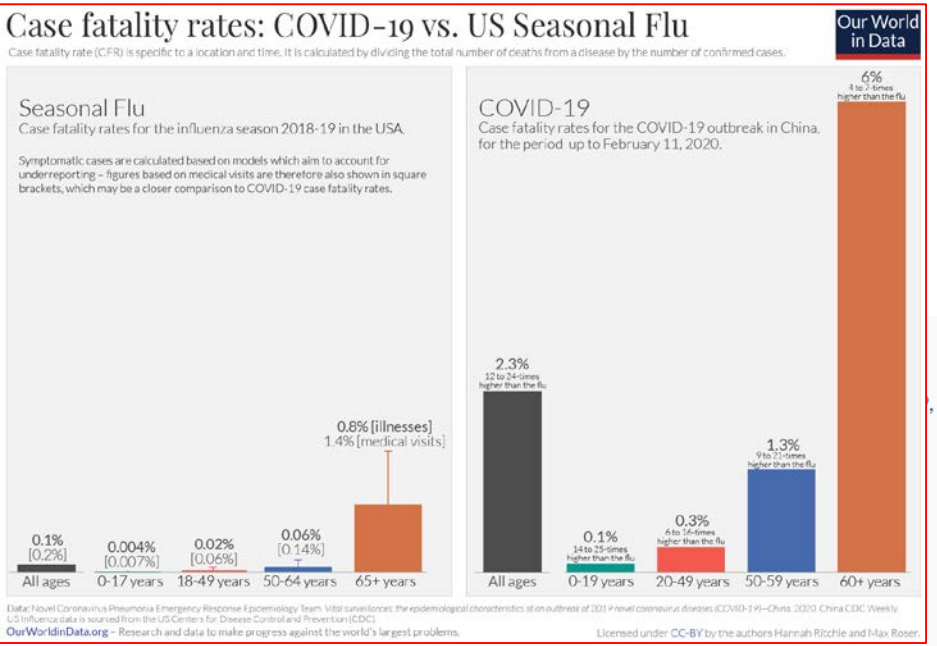


Dødsfall globalt

https://ourworldindata.org/coronavirus



COVID-19 CFR i forhold til andre virus-pandemier



Disease	Estimated case fatality rate (CFR)
SARS-CoV	10% Venkatesh and Memish (2004) Munster et al. (2020)
MERS-CoV	34% Munster et al. (2020)
Seasonal flu (US)	0.1% US CDC
Ebola	50% 40% in the 2013-16 outbreak WHO (2020) Shultz et al. (2016)

Sources of data shown in the table:

SARS-CoV: Venkatesh, S. & Memish, Z.A. (2004). SARS: the new challenge to international health and travel medicine. *EMHJ – Eastern Mediterranean Health Journal, 10 (4-5), 655-662, 2004.*

SARS-CoV and MERS-CoV: Munster, V. J., Koopmans, M., van Doremalen, N., van Riel, D., & de Wit, E. (2020). A novel coronavirus emerging in China—key questions for impact assessment. *New England Journal of Medicine, 382*(8), 692-694.

Seasonal flu: US Centers for Disease Control and Prevention (CDC). Influenza Burden, 2018-19.

Ebola: Shultz, J. M., Espinel, Z., Espinola, M., & Rechkemmer, A. (2016). Distinguishing epidemiological features of the 2013–2016 West Africa Ebola virus disease outbreak. *Disaster Health, 3*(3), 78-88.

Ebola: World Health Organization (2020). Ebola virus disease: Factsheet.

Oversikter 1/3: WHO

GENERELT: https://www.who.int/emergencies/diseases/novel-coronavirus-2019

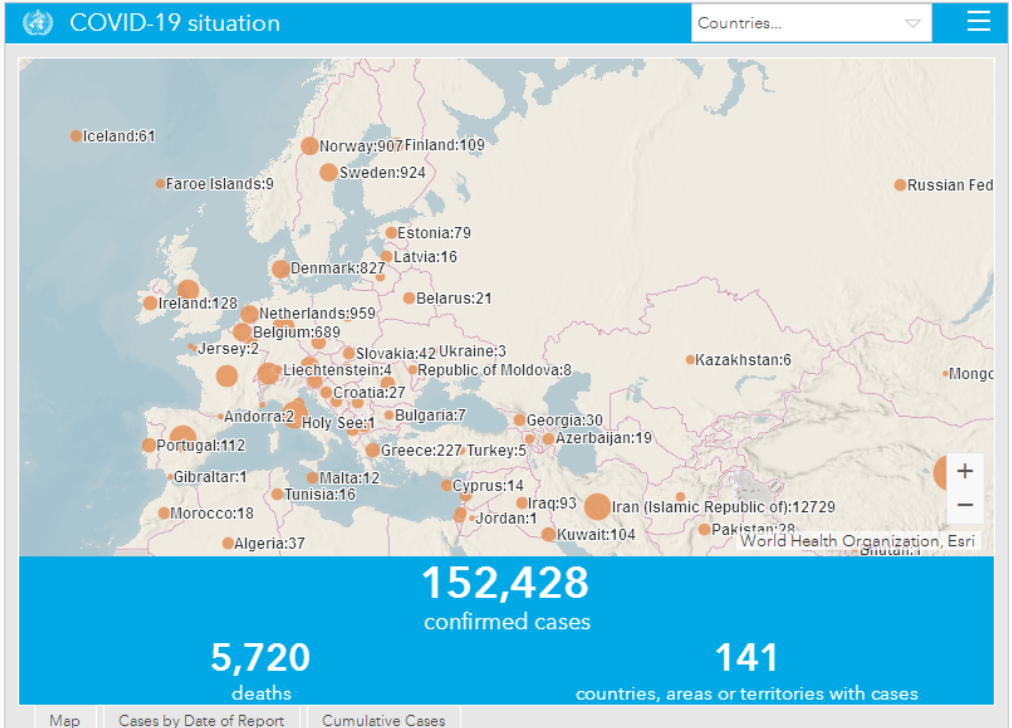
WHO data on COVID-19

The World Health Organization (WHO) publishes a dashboard similar to that of Johns Hopkins above.

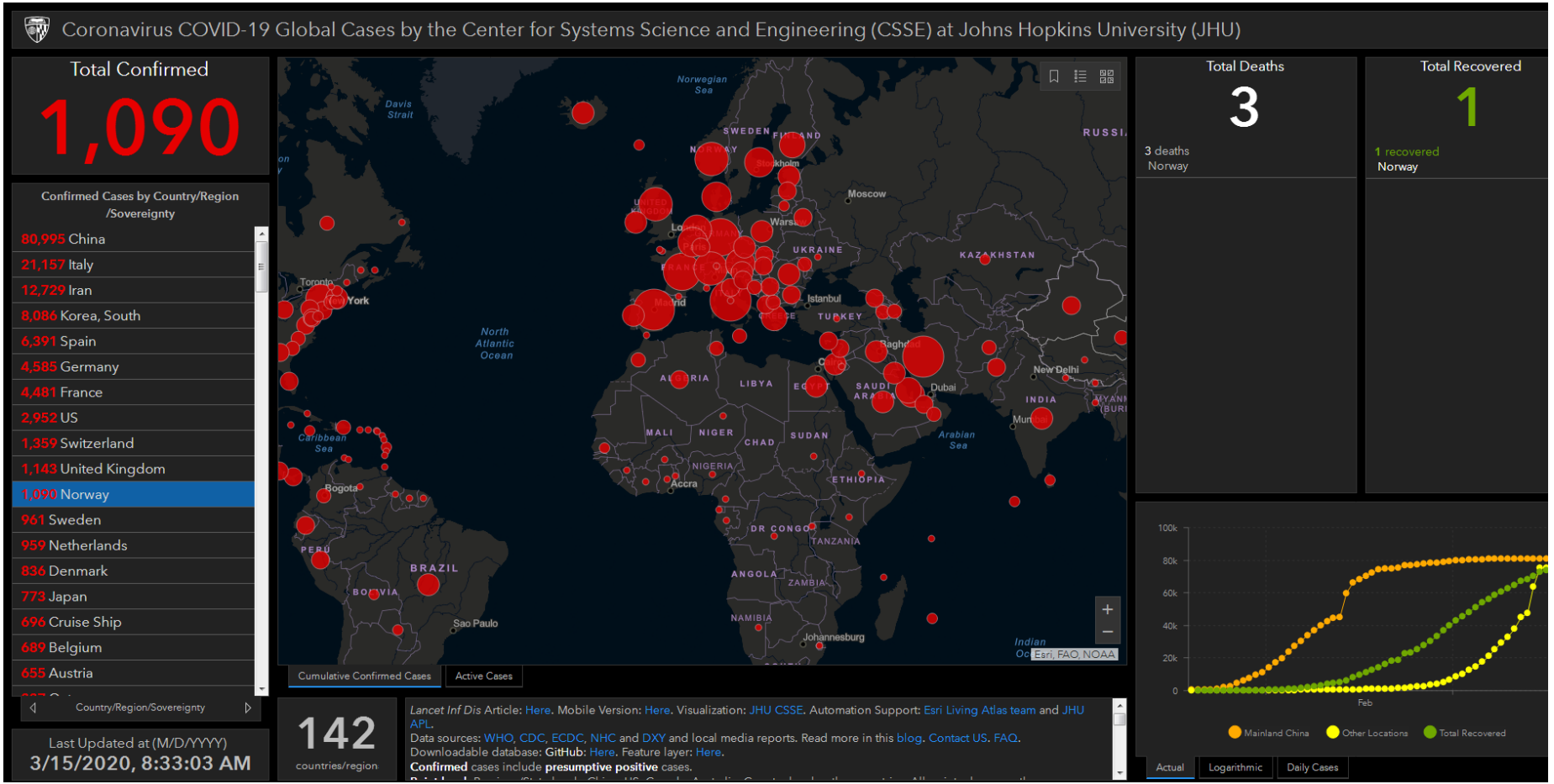
The **WHO dashboard** on global cases and deaths is embedded here. In this dashboard it is possible to see up-to-date country specific data by selecting the country in the top right.

In addition to this dashboard, the WHO publishes **daily Situation Reports** which can be found here. It is the daily Situation reports that we rely on in our own published datasets on case and death numbers. Unlike the daily Situation Reports, the WHO dashboard is updated three times per day: any inconsistencies between the WHO dashboard and the data we present will be explained by this fact.

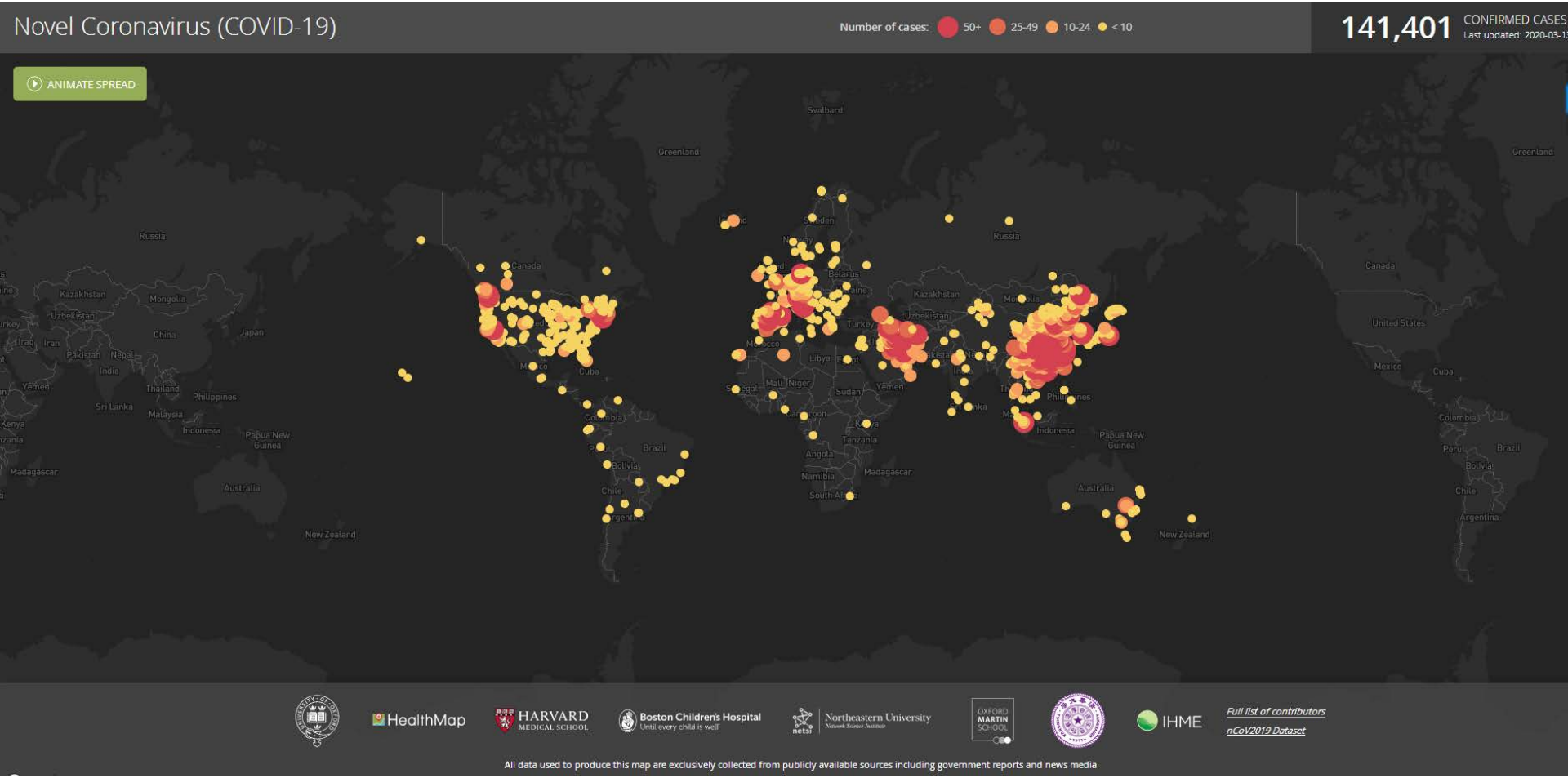
As we explained above, the Our World in Data team found several minor errors in the WHO data – we documented these errors, corrected them, reported them to the WHO, and are in close contact with colleagues at the WHO. Here is the documentation of our adjustments to the WHO data and an option to download all data.



https://gisanddata.maps.arcgis.com/apps/opsdashboard/index.html



https://healthmap.org/covid-19/



https://www.ecdc.europa.eu/en/geographical-distribution-2019-ncov-cases

COVID-19
Latest outputs
Assessing the risk to the EU
Situation update for the the EU/EEA and the UK
Situation update worldwide
Preparedness
Surveillance
Laboratory support
Facts
External resources

Situation update worldwide, as of 17 March 2020 08:00

Epidemiological update

Since 31 December 2019 and as of 17 March 2020, 180 159 cases of COVID-19 (in accordance with the applied case definitions and testing strategies in the affected countries) have been reported, including 7 103 deaths. The deaths have been reported from China (3 226), Italy (2 158), Iran (853), Spain (309), France (148), United States (85), South Korea (81), United Kingdom (55), Japan (28), Netherlands (24), Switzerland (14), Germany (13), Philippines (12), Iraq (9), San Marino (9), International conveyance in Japan (7), Sweden (7), Australia (5), Belgium (5), Indonesia (5), Algeria (4), Canada (4), Greece (4), Poland (4), Austria (3), India (3), Lebanon (3), Norway (3), Argentina (2), Bulgaria (2), Ecuador (2), Egypt (2), Ireland (2), Albania (1), Bahrain (1), Denmark (1), Guatemala (1), Guyana (1), Hungary (1), Luxembourg (1), Morocco (1), Panama (1), Sudan (1), Taiwan (1) and Thailand (1).

Cases have been reported on the following continents:

https://www.worldometers.info/coronavirus/

ANDRE

- Novel coronavirus infection map (University of Washington)
- COVID-19 surveillance dashboard (University of Virginia)
- Coronavirus disease 2019 (COVID-19) in the US (CDC)
- COVID-19 coronavirus tracker (Kaiser Family Foundation)
- Coronavirus: the new disease Covid-19 explained (*South China Morning Post*)
- Mapping the Wuhan coronavirus outbreak (Esri StoryMaps)

Til slutt - ti oppløftende nyheter om COVID-19*

1. Virus-identiteten er kjent
2. Man vet hvordan viruset kan identifiseres
3. Situasjonen i opprinnelseslandet (Kina) har forbedret seg
4. 80% av de som blir smittet har milde symptomer
5. De aller fleste pasientene blir friske
6. COVID-19 affiseres barn relativt sett i mindre grad enn andre virus
7. Viruset kan inaktiveres
8. Det finnes allerede mer enn 150 vitenskapelige artikler om COVID-19
9. Prototype vaksiner er allerede under utprøving
10. Det er ≥ 80 kliniske studier på gang for å teste ut antivirale intervensjoner

*Adaptert fra: https://www.theyucatantimes.com/2020/03/the-good-news-about-the-covid-19/