Table S1: Characteristics of Included Studies

Study	Design/ setting	Sample	Strategies	Assumptions	Main findings
Effectiveness					
Emery et al [44]	• Modeling study in Japan	• 3711	• Symptom-based testing • Symptom-agnostic testing	• Constant infectiousness • Progress to presymptomatic/ asymptomatic is irrespective of the origin of infections. • Unavailable symptom onset date for 115 cases proportional to cases with reported dates • Unavailable test dates for 13 persons proportionate to tests among those with unreported symptom onset. • Proportion of asymptomatic infectiousness • Individual test negative after the infectious period • Test accuracy = 100% • People are 50% more likely to be tested in biased symptom-agnostic testing	• Testing irrespective of symptoms showed to be more effective in case identification than symptom-based testing
Grassly et al [45]	• Modeling study in the UK	• Hypothetical	• Symptom-based self-isolation • Symptom testing and case isolation.	• Asymptomatic individuals are less infectious than symptomatic individuals. • 100% Polymerase chain	• Self-isolation upon symptom onset will reduce transmissions by 47% (95% Uncertainty

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			• Regular testing of high-risk groups irrespective of symptoms & isolation • Test and trace of contacts & isolation • Contact tracing by symptoms alone. • Test-trace-test contacts and isolate	reaction (PCR) test sensitivity • 100% coverage of Test and Trace • Sample collection is done at symptom onset. • 1 day delay from sample collection and quarantining of contacts. • 80% of symptomatic cases are reported. • 80% of symptomatic contacts are traced. • Testing is done on the day of symptom onset	Interval, UI: 32-55). • Screening all healthcare workers and other high at-risk populations every week will further reduce transmission by 23% (95% Uncertainty Interval: UI 16–40) in addition to that achieved by isolation. • Test and trace will further reduce transmissions by 26% (95% UI:14-35)
Tsou et al [46]	• Modeling study in Taiwan	• 393	• Symptom-based testing and isolation of index cases • Mass testing of symptomatic and asymptomatic subclinical cases • Symptom-based testing, isolation, and quarantine of all at-risk group	• Incubation period per case and symptom onset to isolation delay, follow a Weibull distribution. • Potential secondary cases follow a negative binomial distribution with mean = reproduction number R • Strategies differed in their control of subclinical cases. • Initial number of cases = 5, 20 & 40 • At-risk persons investigated = 40%, 60%, 80% & 90%	• The strategy of symptom-based testing, isolation, and quarantining all subclinical cases was most effective. • Strategy B was better than A in the prevention of transmissions before symptom onset

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				• 40%, 60%, 80% of subclinical cases assumed to be detected and isolated. • Subclinical cases can completely be prevented	
Mizumoto et al [47]	• Modeling study in Japan	• 3063	• Mass testing	N/A	• A total of 634 cases were detected 328 of whom were asymptomatic. • The proportion of asymptomatic increased over the weeks
Sasmita et al [48]	• Modeling study in Indonesia	• Daily Covid-19 cases	• Scenario 1 = u1+u4+u5 • Scenario 2 = u1+u2+u4+u5 • Scenario 3 = u1+u2+u3+u4+u5 U1 = Large-scale social restriction; U2 = Contact tracing; U3 = Mass testing; U4 = Case detection and treatment; U5 = Face masks use	• 95% false positive rate from susceptible to exposed. • Possibility of reinfections due to loss of immunity • All parameters were assumed to be positive and constant. • Availability of rapid PCR tests	• COVID-19 cases attained peak for strategy 1, 2, and 3 on 59^{th}, 38^{th}, and 40^{th} day after initial outbreak with 33151, 37908, and 39305 cases, respectively. • The optimal control measure was scenario 2 with (u1), (u2), (u4), and (u5)
Moghadas et al [49]	• Modeling study in Canada	• Hypothetical	• No self-isolation • 100% severe cases self-isolate • 100% symptomatic	• The Proportion of asymptomatic infections is 17.9% and 30.8%	• Isolating all symptomatic will still be inefficient in outbreak control. • Combined with case

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			case self-isolate • 100% isolation of symptomatic cases plus detection and isolation of asymptomatic cases		isolation, results indicated that 33% and 42% detection and isolation of silent infections would be needed to suppress the attack rate below 1%, for asymptomatic proportions of 17.9% and 30.8%, respectively
Bracis et al [50]	• Modeling study in the USA	• Daily Covid-19 cases	• No intervention • Isolating the elderly • Schools opening in fall. • Testing, treatment, isolation, and contact tracing in combination with physical distancing	• 20% of infections are symptomatic. • Homogenous infectivity and outcome • Constant diagnostic rate • More than 40% diagnosed during early testing. • 50% of contacts are successfully traced. • Contact tracing permits 5% of asymptomatic and subclinical to be tested. • Differential post-COVID-19 physical interaction	• Ramping up testing, isolation, and contact tracing of symptomatic cases reduced post-COVID interactions by 60% and very few deaths. • Mass testing was not found to be feasible
Pollmann et al [51]	• Modeling study	• Hypothetical	• Digital contact tracing (based on reported symptoms), • Quarantining,	• All contacts using digital contact tracing can be traced. • Unreported symptoms and untested symptomatic cases • Tracing of infected contacts	• Contact tracing must be combined with either random mass testing or social distancing to control the epidemic.

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			• Testing • Social distancing • Random testing	• Immediate quarantine upon the report of symptoms • 100% test accuracy • Homogeneous population • Immunity once recovered. • No symptoms-testing delay • Absence of manual tracing • Fixed latent period. • A backward/forward tracing	• Daily random testing of 20% of the population found to be as effective as social distancing
Hill et al [52]	• Modeling study in the UK	• 2010 social contact data	• Test and trace • Regular mass testing	• Each person can be infectious. • Contact network follows the Poisson distribution. • Contact probabilities fall with the level of accommodation. • No random accommodation • People can infect 1-day post symptom onset. • 100% test specificity • Possible to Forget contacts • Self-isolation time=10 days • Test- results delay= 2 days • Contact isolation = 14 days • Adherence to test and trace. • No contacts during isolation • No COVID-19 student beginning the term	• Daily and weekly testing combined with contact tracing adherence reduced the number of infections by more than 50% compared to test and trace alone
Gorji	• Modeli	• Hypo	• Mass testing	• 90% infection reduction due to	• Testing high-risk

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et al [53]	ng study in Switzerland	thetical	• Contact tracing. • Smart testing[a] and contact tracing	self-isolation • Basic reproduction number of 2.4 if no mitigation • Test results take 1 day. • Children under 10 contribute little to infections. • The at-risk subpopulation has a 27-fold prevalence rate. • Detection of high contact individuals every 7 days	individuals irrespective of symptoms with contact tracing will reduce R to 1. • Contact tracing based on symptom testing will miss most cases.
Alsing et al [54]	• Modeling study in the UK	• 2011 commuter data and BBC pandemic dataset	• Contact tracing and social distancing. • Contact tracing with Mass testing. • Contact tracing with lockdowns	• Active infections at 8 months • The number of daily tests required. • Effective reproduction number (RE) per scenario • Number of people in lockdown	• Possible to control 38% of outbreak simulations within 8 months using contact tracing with 63.3% of outbreak still leaving R>1. • Mass testing and contact tracing contained 74% of the outbreak simulations with 36.8% of outbreaks resulting in R<1
Hagan et al [55]	• Cross sectional in the USA	• 16161	• Symptom-based testing • Mass testing	N/A	• Mass testing increased the number of COVID-19 cases from 642 (range = 2–181, median = 19) after symptom-based testing to 8,239 (range = 10–2,193, median = 403) giving a

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					median increase of 12.3-fold
Cost-Effectiveness (model)					
Paltiel et al [56]	• Modeling study in the USA	• 4990 hypothetical cohort	• Base case scenario with a reproduction number (Rt) of 2.5, test specificity of 98%, and 10 new infections each week • Worst case scenario with an Rt of 3.5, test specificity of 98%, and 25 new infections every week • Best case scenario with an Rt of 1.5, test specificity of 99.7%, and 5 new infections each week	• Test frequency = 1, 2, 3 & 7 • Test sensitivity = 70%- 99% • Importation of infections via exogenous shocks • Specificity of 98% - 99% • Reproduction number = 1.5, 2.5 and 3.5 • Case fatality = 0.05% • 30% chance that infection will lead to virus symptoms. • Cost per test = $10 - $50 • Abbreviated 80-days period. • A cohort of non-immune students in a congregate setting of 5,000 students • 8-hour test turnaround time • Availability of 100% confirmatory tests at $100 • 25 new cases per week	• A willingness-to-pay of ≤$5,500/infection averted, screening every week using a 70% sensitive test was optimal. • Regular screening (7, 3 & 2 days) was optimal if only a single test of $25 with 80% sensitivity was available. • There was no condition under which symptom-based screening alone will contain the outbreak
Asymptomatic proportion					
Porru et al [57]	• Cohort study in Italy	• 5942	• Mass RT-PCR[b] testing using oropharyngeal and	• N/A	• A total of 238 cases were detected, of whom 109 were asymptomatic.

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			nasopharyngeal swabs		• Mass testing permitted prompt isolation and monitoring of cases
Nishiura et al [58]	• Cross-sectional in Japan	• 565	• RT-PCR testing	• N/A	• 63 passengers were symptomatic. • Four (30.8%, 95% CI: 7.7– 53.8%) of 13 positive cases were asymptomatic and 9 were symptomatic
Treibel et al [59]	• Cross-sectional in the UK	• 396 • 284 • 263 • 267 • 269	• PCR test on 400 nasopharyngeal swaps at 5-time points	• N/A	• Twelve (27%) of 44 positive cases were asymptomatic. • Positive. Fifty staff self-isolated as a result of symptoms
Abeysuriya et al [60]	• Cross-sectional in the UK	• 180	• Nasopharyngeal swap PCR test	• N/A	• Seven women tested positive with 6 (85.7 %, 95% CI: 42.1–99.6) as asymptomatic. • Symptom-based testing sensitivity was 14.3% (0.36–57.87) and specificity was 91.86% (86.72–95.48)
Brown et al [61]	• Cross-sectional in the UK	• 1152	• Nasopharyngeal/ oropharyngeal swap PCR tests	• N/A	• Thirteen (57%) of 23 positive cases had symptoms compliant with COVID-19, of whom 4

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					(17.4%) were asymptomatic
Graham et al [62]	• Cross-sectional in the UK	• 383	• Comprehensive testing with oropharyngeal and nasopharyngeal swaps • Symptom screening	• N/A	• 126 (40%, 95% CI 35 to 46) of the 313 tested residents were positive. • Only 72 (57%, 95% CI 49–66) positive cases would have been diagnosed based on symptom-testing
Arons et al [63]	• Cross-sectional in the USA	• 76	• Point prevalence testing with RT-PCR on nasopharyngeal and oropharyngeal swabs	• N/A	• 48 (63%) of 76 tested residents were positive of whom 27 (56%) were asymptomatic. 24 of the 27 developed symptoms 1-week post-test
Jameson et al [64]	• Cross-sectional in the USA	• 121	• Universal testing • Universal symptom: screening • Isolation of cases (nasopharyngeal swaps)	• N/A	• No positive case was found among 121 out of 499 eligible healthcare workers screened
Callaghan et al [65]	• Cross-sectional in the USA	• 217	• Nasopharyngeal swap PCR test	• N/A	• No participant tested positive for COVID-19
Louie et al [66]	• Cross-sectional in the	• 303	• Outbreak response mass testing with PCR on	• N/A	• Mass testing identified a high proportion of asymptomatic cases.

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	USA		nasopharyngeal swabs		• The symptom-based screening was ineffective in detecting cases among healthcare workers
Gudbjartsson et al [67]	• Cross-sectional in Iceland	• 9199 • 10797 • 2283	• Targeted testing • Open invitation screening • Random invitation screening (on nasopharyngeal and oropharyngeal samples)	• N/A	• 13.3% tested positive in targeted testing, 0.8% in open invitation testing, and 0.6% in random invitation testing.
Reid et al [68]	• Cross-sectional in Canada	• 2751	• Symptomatic testing • Asymptomatic testing (on nasopharyngeal swabs)	• N/A	• 188 (6.4%) positive cases detected during symptomatic testing and 5 (0.2%) positive cases during asymptomatic testing, with a low probability of testing positive
Lavezzo et al [69]	• Cross-sectional in Italy	• 2812 • 2343	• Pre and post-RT-PCR on nasopharyngeal swabs	• N/A	• The first survey gave a prevalence of 2.6% (95% CI: 2.1–3.3%) and 1.2%; 95% CI: 0.8–1.8%) for survey 2. 29 (39.7%; 95% CI: 28.5–51.9%) of positive tests in the survey 1 were asymptomatic and 13 (44.8%; 95% CI: 26.5–

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					64.3%) in survey 2.
Kimball et al [70]	• Cross-sectional in the USA	• 76	• RT- PCR mass testing on nasopharyngeal and oropharyngeal swabs	• N/A	• Twenty-three (30%) residents were positive with 13 (57%) either presymptomatic or asymptomatic. • Testing based on symptom screening could miss up to 50% of cases
Olalla et al [71]	• Cross-sectional in Spain	• 498	• Symptom screening • Asymptomatic testing (on nasopharyngeal and oropharyngeal swaps)	• N/A	• 2 asymptomatic on day of sampling tested positive. 1 reported having had symptoms in the last 14 days
Guery et al [72]	• Cross-sectional in France	• 136	• RT-PCR mass testing on nasopharyngeal swap	• N/A	• Three (2.2%) cases detected, 1 of whom was symptomatic and the other developed symptoms within 24 hours
Roxby et al [73]	• Cross-sectional in the USA	• 142 • 80	• Repeated RT-PCR mass testing on nasopharyngeal swap (7 days apart)	• N/A	• Five (7%) cases were detected, 3 of which were asymptomatic. • Symptom-based testing might not identify all positive cases
Lytras et al(a) [74]	• Cross-sectional in	• 357	• RT-PCR mass testing using nasopharyngeal	• N/A	• Thirteen (3.6%, CI: 2.0–6.1) positive asymptomatic cases

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	• Greece		swap		
Lytras et al(b) [74]	• Cross-sectional in Greece	• 394	• RT-PCR mass testing on nasopharyngeal swaps	• N/A	• Twenty-five (6.3%, 95% CI: 4.1–9.2%) positive asymptomatic cases
Lytras et al(c) [74]	• Cross-sectional in Greece	• 32	• RT-PCR mass testing on nasopharyngeal swap	• N/A	• Two (6.3%, 95% CI: 0.8–20.8%) positive asymptomatic cases
Hoehl et al [75]	• Cross-sectional in Germany	• 114	• RT-PCR mass testing on nasopharyngeal swap and sputum	• N/A	• Two (1.8%) of 114 asymptomatic passengers tested positive. All 11 symptomatic patients tested negative. • Symptom-based testing failed to detect SARS-CoV-2 patients.
Cao et al [76]	• Cross-sectional in China	• 9,899,828	• Citywide mass testing using TR-PCR on nasopharyngeal and throat swabs	• N/A	• No symptomatic case was found compared to 300 asymptomatic cases (0.303/10,000, 95% CI; 0.270–0.339/10,000)
Bagget et al [77]	• Cross-sectional in the USA	• 408	• Mass testing • Symptom screening (on nasopharyngeal swaps)	• N/A	• 147 (36.0%) subjects tested positive, of whom 87.8% were asymptomatic
Imbert et al	• Cross-section	• 210	• Mass RT-PCR testing on	• N/A	• Fifty-two (52%) of tested residents were

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[78]	al in the USA		nasopharyngeal specimens		asymptomatic. This occurred when registered incidence was 5.1 case per 100,000

[a]Mass testing of individuals with high contact rates (at-risk group)
[b]Reverse transcription-polymerase chain reaction