National Collaborating Centre for Methods and Tools

Centre de collaboration nationale des méthodes et outils

School of Nursing | McMaster University

# Revue rapide : Qu'a-t-on démontré au sujet de la transmission de la COVID-19 dans les milieux de soins de courte durée?

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Veuillez noter : Cette revue a peut-être été mise à jour. Consultez la version la plus récente de cette revue en visitant le Service rapide de données probantes sur la COVID-19 du Centre de collaboration nationale des méthodes et outils, au lien ci-dessus.



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Les auteures déclarent n'avoir aucun conflit d'intérêts à divulguer.

# Résumé


## Contexte

Les données probantes relatives à la transmission de la COVID-19 dans les milieux de soins de courte durée influencent notre compréhension des risques pour le personnel, les patients et les collectivités, des mesures de prévention et de contrôle des infections, et des stratégies d'atténuation possibles.

Cette revue rapide a été produite pour soutenir la réponse de l'Agence de la santé publique du Canada à la pandémie de coronavirus 2019 (COVID-19). Cette revue vise à recenser, évaluer et résumer les nouvelles données de recherche à l'appui de la prise de décision fondée sur des données probantes.

Cette revue rapide inclut les données probantes disponibles au 13 novembre 2020 pour répondre à la question suivante : **Que sait-on des manières et des personnes qui introduisent et transmettent la COVID-19 dans les milieux de soins de courte durée? Quels facteurs influencent l'introduction et la propagation de la COVID-19 dans les milieux de soins de courte durée? Quelles mesures de contrôle ont réussi à prévenir, dans les milieux de soins de courte durée, les cas primaires et secondaires de COVID-19?**

Ce rapport utilise les abréviations suivantes :

- HCW : travailleur(s) de la santé (*health care worker[s]*)
- PPE : équipements de protection individuelle (*personal protective equipment*)
- FFP1 : masque filtrant 1 (*filtering face piece 1*) – filtre au moins 80 % des particules en suspension dans l'air
- FFP2 : masque filtrant 2 (*filtering face piece 2*) – filtre au moins 94 % des particules en suspension dans l'air
- FFP3 : masque filtrant 3 (*filtering face piece 3*) – filtre au moins 99 % des particules en suspension dans l'air

## Points clés

Introduction et transmission de la COVID-19

- Souvent, dans les milieux de soins de courte durée, la recherche de contacts ne réussit pas à trouver la source de l'infection (le cas index), particulièrement en ce qui concerne les cas qui touchent les travailleurs de la santé (HCW). La nature du travail réalisé en soins de courte durée signifie que les HCW atteints ont de multiples contacts, avec des patients, des membres du personnel, ainsi que des membres de leur famille et de leur collectivité, ce qui complique la recherche de contacts. Par conséquent, les conclusions tirées des données probantes dont on dispose au sujet de la transmission de la COVID-19 dans les milieux de soins de santé doivent être examinées prudemment.
- On a rapporté des cas de transmission dans des milieux de soins de courte durée, mais leur fréquence n'est pas connue et dépend de facteurs associés au milieu, comme les mesures de prévention et de contrôle des infections (PCI) et les niveaux de transmission communautaire, entre autres.

- Les données probantes dont on dispose au sujet de la transmission de la COVID-19 dans les milieux de soins de courte durée indiquent un risque faible que les HCW transmettent l'infection à des HCW ou à des patients lorsque les PPE sont utilisés (p. ex., masques, gants, blouses, protection des yeux). Lorsque les PPE sont systématiquement utilisés dans le milieu, les HCW sont plus susceptibles d'être infectés par d'autres HCW que par des patients, et les patients sont plus susceptibles d'être infectés par d'autres patients que par des HCW. Le degré global de certitude de ces données probantes est très faible, et il est très probable que les conclusions changeront à mesure que de nouvelles données probantes apparaîtront.

<u>Facteurs de risque</u>

- Dans les études qui se sont intéressées aux HCW dont les expositions étaient connues, des contacts étroits avec un collègue infecté ou dans un espace de travail commun ont semblé augmenter le risque d'infection comparativement au fait d'être exposé à un patient infecté. Le degré de certitude global des données probantes est très faible, et il est très probable que les conclusions changeront à mesure que de nouvelles données probantes apparaîtront.
- Le manque d'accès aux PPE ou l'utilisation inadéquate de ceux-ci sont associés à un plus grand risque d'infection. Le degré de certitude global des données probantes est modéré. Ainsi, si la direction de l'effet est moins susceptible de changer à mesure que de nouvelles données probantes apparaîtront, la taille, ou la magnitude, de l'effet pourrait changer.
- Il n'y a pas d'association évidente entre les caractéristiques démographiques, la fonction précise dans un milieu de soins de courte durée (p. ex., médecin, infirmière, membre du personnel administratif, etc.) ou le fait de travailler dans un service ou un lieu spécifique dans un hôpital (p. ex., un service des urgences, une salle d'opération, etc.) et le risque d'infection à la COVID-19 chez les HCW en milieu de soins de courte durée. Le degré global de certitude de ces données probantes est faible, et les conclusions pourraient changer à mesure que de nouvelles données probantes apparaîtront.

<u>Stratégies de protection</u>

- Parmi les stratégies dont l'efficacité à contrôler la propagation de l'infection a été démontrée, nommons :
    - l'utilisation des PPE (masques, gants, blouses, protection des yeux);
    - le dépistage universel des HCW en milieu de travail;
    - la distanciation de 1 m ou plus;
    - les zones de triage sont associées à de faibles niveaux d'infection, bien qu'aucune comparaison précise ne soit disponible.

  Le degré global de certitude de ces données probantes est très faible, et il est très probable que les conclusions changeront à mesure que de nouvelles données probantes apparaîtront.

## Aperçu des données probantes et lacunes dans les connaissances

- Les études incluses sont des études observationnelles (essentiellement des études transversales et cas-témoins, qui ont un risque élevé de biais) et elles ne tiennent pas compte des concentrations de virus qui circulent dans la collectivité. La majorité des études examinent les relations unidimensionnelles entre les facteurs de transmission ou de risque et l'infection à la COVID-19, sans prendre en compte d'autres facteurs de confusion et d'autres sources d'exposition.
- La majorité des études trouvées incluent des données recueillies au cours des premières phases de la pandémie de COVID-19, alors que le manque d'accès aux PPE appropriés était relevé dans certaines juridictions. Comme les connaissances au sujet de la voie de transmission et des mesures de PCI efficaces ont considérablement évolué, l'applicabilité de ces données au contexte actuel est peut-être limitée. Par exemple, plusieurs études notent que les données ont été recueillies avant que le port du masque soit répandu en milieu hospitalier.
- Peu de synthèses récentes concernent directement ces questions, et les études incluses ont principalement été réalisées au cours de la première vague de la pandémie. Bien que cela n'ait pas été fait dans le cadre de la présente revue, il pourrait être utile de réaliser une analyse par juridiction des taux actuels de COVID-19 chez les HCW et chez les patients hospitalisés, étant donné que la mise en œuvre de mesures de PCI robustes semble coïncider avec une diminution de la transmission dans les milieux de soins de santé comparativement à dans la collectivité, où les PPE ne sont généralement pas portés.
- La majorité des études explorent la transmission aux HCW et la propagation chez ceux-ci. Moins d'études explorent la transmission de la COVID-19 aux patients déjà hospitalisés pour des raisons non associées à la COVID-19.
- Les études dont on dispose contiennent des définitions imprécises et variables des termes « travailleur de la santé » et « membre du personnel ». Les participants inclus dans ces termes occupent souvent des fonctions qui ne nécessitent pas de contacts directs avec les patients, mais qui ont de fréquents contacts avec d'autres membres du personnel hospitalier (p. ex. nettoyage, restauration, administration). Un usage plus précis de ces termes améliorerait la possibilité d'établir des voies à risque spécifiques dans les milieux de soins de courte durée.
- La prévalence des infections confirmées à la COVID-19 et la séroprévalence fondée sur des tests de détection des anticorps varient grandement d'une étude incluse à une autre. Cela indique que plusieurs facteurs contextuels (comme les mesures de PCI qui sont en place à l'intérieur et à l'extérieur des milieux hospitaliers, les taux de transmission dans la communauté, etc.) sont probablement très importants. Comme ceux-ci n'ont pas été pris en compte dans les analyses, il est très difficile de comparer les résultats de différentes juridictions. De même, les résultats d'autres pays pourraient ne pas s'appliquer au contexte canadien.

Introduction et transmission de la COVID-19

- Dans 6 études portant sur la recherche de contacts en aval (laquelle trouve d'abord un cas, pour ensuite suivre les infections subséquentes parmi ses contacts) de HCW infectés, un total de 69 cas index de HCW ont été liés à 18 cas de HCW et à 12 cas de patients. Trois de ces études ont établi que l'utilisation des PPE était absente ou inadéquate, et celles-ci rendent compte de 9 infections de HCW et de 2 infections de patients. Des 3 autres études, une étude canadienne rapporte 5 cas de HCW, pour lesquels aucune transmission à des collègues ou à des patients n'a été établie; une étude chinoise rapporte 1 cas index de HCW lié à 4 cas de HCW; une étude polonaise rapporte une éclosion, lors de laquelle 1 cas index de HCW a été associé à 5 cas de HCW et à 10 cas de patients.
- Dans 1 étude de recherche de contacts en aval de patients infectés, 28 patients infectés dans une salle de soins respiratoires n'étaient associés à aucune infection de HCW et étaient possiblement associés à 1 infection d'un patient ayant été exposé à d'autres cas.
- Deux études qui se sont penchées sur des infections de HCW ont trouvé la source de l'infection grâce à des analyses de séquençage viral de la souche de COVID-19, et toutes deux concluent que les infections des HCW ont été acquises dans la collectivité.
- Dans 12 études faisant état d'une recherche de contacts en amont (laquelle trouve d'abord un cas, pour ensuite examiner ses expositions préalables) d'infections de HCW, 5 étaient dans des contextes où l'utilisation des PPE était absente ou inadéquate. Les sources précises de l'infection ont été trouvées dans 4 des 7 autres études. Dans ces 4 études, 291 cas de HCW ont été suivis. La source de ceux-ci était un HCW dans 85 cas, un patient dans 94 cas, et la source n'a pas été identifiée dans 179 cas.
- La transmission de patient à HCW est peu fréquente dans les milieux où les PPE sont utilisés. Dans une revue examinant les taux d'attaque secondaires (TAS) de COVID-19 dans les milieux de soins de santé où le cas index était un patient infecté, le TAS aggloméré était de 0,7 % (IC à 95 %; 0,4 %-1,0 %), la plupart des études individuelles rapportant un TAS de <2 %.
- Dans 2 études faisant état d'une recherche de contacts en amont d'un total de 111 infections de patients, 5 infections étaient attribuables à des HCW et 85 à des patients, tandis que la source des 21 autres cas n'a pas été identifiée.
- Des infections de HCW sont fréquemment trouvées chez du personnel dont les fonctions ne requièrent aucun contact avec des patients. Ce résultat indique que la transmission à ces membres du personnel se produit par les HCW ou par des contacts dans la collectivité.
- Les études portant sur les croyances des HCW au sujet de la source de leur infection montrent qu'ils considèrent le plus souvent que la source de leur infection est un patient.
- Selon une revue de faible qualité, il n'existe à ce jour aucune donnée probante démontrant de façon évidente une association entre la transmission de la COVID-19 et les systèmes de chauffage, de ventilation et de climatisation dans les établissements de soins de santé, selon 4 études incluses qui se sont intéressées spécifiquement à la COVID-19 et dont le risque de biais est inconnu.

Facteurs de risque

- Les facteurs de risque de transmission explorés dans les études individuelles sont très variables, ce qui complique les comparaisons entre les études. De même, quand différentes études mesurent ce qui semble être la même variable (p. ex., le terme « HCW » englobe parfois le personnel qui n'est pas responsable des soins aux patients, comme le personnel administratif, les travailleurs de laboratoire, les concierges, les porteurs; les médecins et les infirmières sont parfois divisés par département ou spécialité, etc.), les catégories étaient très différentes.
- Les résultats indiquant qu'un accès inadéquat aux PPE et une utilisation incorrecte de ceux-ci sont des facteurs de risque sont conformes aux résultats d'études portant sur les stratégies de protection, ce qui souligne l'importance d'une utilisation adéquate des PPE pour la réduction de la transmission.

Stratégies de protection

- Plusieurs revues portant sur les stratégies de protection comprennent des études d'infections autres que la COVID-19 (p. ex., le SRAS, le SRMO, la grippe A [H1N1]). Il n'a pas toujours été possible de séparer les résultats d'études spécifiques à la COVID-19.
- Plusieurs études qui se sont penchées sur des stratégies de protection n'incluent pas de données comparatives. L'efficacité spécifique à cette stratégie relativement à d'autres mesures est alors inconnue.
- Parmi les stratégies dont l'efficacité à contrôler la propagation de l'infection a été démontrée, nommons :
    - l'utilisation des PPE (masques, gants, blouses, protection des yeux), et ce, même si une étude de qualité modérée a constaté que les PPE FFP2 n'étaient pas supérieurs aux PPE FFP1 (p. ex., les masques chirurgicaux) pour prévenir les infections à la COVID-19;
    - le dépistage universel des HCW en milieu de travail;
    - la distanciation de 1 m ou plus;
    - les zones de triage sont associées à de faibles niveaux d'infection, bien qu'aucune comparaison précise ne soit disponible.
    - Des études de modélisation démontrent que :
        - Un dépistage précoce des cas suspectés (avec résultats en moins de 8 heures) et une unité de quarantaine pour les nouveaux patients sont les mesures les plus efficaces.
        - Le contrôle à l'entrée est modérément efficace.
        - Les PPE (même les PPE moins efficaces) réduisent les infections, comparativement à l'absence de PPE.
        - Le port du masque est supérieur à la distanciation.
        - Un dépistage hebdomadaire des patients et des HCW réduit les infections. Un dépistage hebdomadaire des HCW réduit la transmission de 24 %, tandis qu'un dépistage quotidien la réduit de 64 %.
        - Le recours à de petites cohortes de cas suspectés réduit les infections, comparativement à l'emploi de cohortes plus larges.
        - L'isolement des cas suspectés dans des chambres individuelles réduit la transmission comparativement au recours à des salles de quarantaine.

- Parmi les stratégies n'ayant pas démontré qu'elles contrôlent la propagation de l'infection, mentionnons que :
    - Les boîtiers à aérosol ne protègent pas les HCW contre les particules aérosol.
    - Les barrières de protection créent peut-être des risques additionnels.
    - Les appareils filtrants à ventilation assistée ne sont pas supérieurs aux autres équipements de protection respiratoire lorsque l'on réalise des interventions touchant les voies respiratoires.
    - L'hydroxychloroquine prophylactique n'a pas démontré d'effet chez les HCW.

# Méthodologie

## Questions de recherche :

1. Que sait-on des manières et des personnes qui introduisent et transmettent la COVID-19 dans les milieux de soins de courte durée?
2. Quels facteurs influencent l'introduction et la propagation de la COVID-19 dans les milieux de soins de courte durée?
3. Quelles mesures de contrôle ont réussi à prévenir, dans les milieux de soins de courte durée, les cas primaires et secondaires de COVID-19?

## Recherche

Les bases de données suivantes ont été fouillées le 13 novembre 2020, en utilisant les termes clés doctor, physician, clinician, nurse, nursing, practitioner, "healthcare worker", "health care worker", "primary care", "acute care", nosocomial :

- Pubmed's curated COVID-19 literature hub: LitCOVID
- World Health Organization's Global literature on coronavirus disease
- COVID-19 Living Overview of the Evidence (L·OVE)
- McMaster Health Forum
- Prospero Registry of Systematic Reviews
- NCCMT COVID-19 Rapid Evidence Reviews
- MedRxiv preprint server
- NCCEH Environmental Health Resources for the COVID-19 Pandemic
- NCCID Disease Debrief
- Uncover (USHER Network for COVID-19 Evidence Reviews)
- Alberta Health Services
- Oxford COVID-19 Evidence Service
- Centers for Disease Control and Prevention's Morbidity and Mortality Weekly Report
- Institut national de santé publique du Québec (INSPQ)

Une copie de la stratégie de recherche complète peut être consultée à lien.

## Critères de sélection des études

Les résultats de la recherche ont d'abord été examinés pour recenser les directives et les synthèses récentes. Les études uniques ont été incluses si aucune synthèse n'était disponible ou si des études uniques ont été publiées après que la recherche ait été effectuée à partir de la synthèse. Les sources de langue anglaise évaluées par les pairs et les sources publiées avant l'impression et avant l'évaluation par les pairs ont également été incluses. Les sources de surveillance ont été exclues. Lorsqu'ils sont disponibles, les conclusions des synthèses et les guides de pratique clinique sont présentés en premier, car ils tiennent compte de l'ensemble des preuves disponibles et peuvent donc être appliqués largement aux populations et aux milieux.

**Question 1 : Que sait-on des manières et des personnes qui introduisent et transmettent la COVID-19 dans les milieux de soins de courte durée?**

| | Critères d'inclusion | Critères d'exclusion |
|---|---|---|
| Population | Personnel, patients, visiteurs | |
| Intervention | Cas index | |
| Comparaison | | |
| Résultats | Infection secondaire et/ou éclosion, grappes | Non liée à la COVID-19 |
| Contexte | Soins de courte durée : hôpitaux, services des urgences | Autres milieux de santé |

**Question 2 : Quels facteurs influencent l'introduction et la propagation de la COVID-19 dans les milieux de soins de courte durée?**

| | Critères d'inclusion | Critères d'exclusion |
|---|---|---|
| Population | Personnel, patients, visiteurs | |
| Intervention | Facteurs de risque individuels et organisationnels (modifiables et non modifiables) | |
| Comparaison | | |
| Résultats | Infection à la COVID-19 et/ou infection secondaire et/ou éclosion | Non liée à la COVID-19 |
| Contexte | Soins de courte durée : hôpitaux, services des urgences | Autres milieux de santé |

**Question 3 : Quelles mesures de contrôle ont réussi à prévenir, dans les milieux de soins de courte durée, les cas primaires et secondaires de COVID-19?**

| | Critères d'inclusion | Critères d'exclusion |
|---|---|---|
| Population | Personnel, patients, visiteurs | |
| Intervention | Stratégies touchant la propagation et le contrôle | |
| Comparaison | | |
| Résultats | Infection à la COVID-19 et/ou infection secondaire et/ou éclosion | Non liée à la COVID-19 |
| Contexte | Soins de courte durée : hôpitaux, services des urgences | Autres milieux de santé |

## Extraction et synthèse des données

Pour les synthèses, les données relatives à la conception de l'étude, au cadre, à l'emplacement, aux caractéristiques de la population, aux interventions ou à l'exposition et aux résultats ont été extraites lorsqu'elles étaient déclarées.

## Évaluation de la qualité des données probantes

Nous avons évalué la qualité des données probantes incluses en utilisant des outils d'évaluation critique, comme nous le décrivons ci-dessous. L'évaluation de la qualité a été réalisée par un examinateur et vérifiée par un deuxième examinateur. Les conflits ont été résolus par la discussion. Pour certaines des données probantes incluses, aucun outil approprié n'a été trouvé, ou l'équipe de revue n'avait pas l'expertise nécessaire pour évaluer leur qualité méthodologique. Les études pour lesquelles aucune évaluation de la qualité n'a été effectuée sont indiquées dans les tableaux de données.

| **Méthodologie de l'étude** | **Outils d'évaluation critique** |
|---|---|
| Synthèse | Assessing the Methodological Quality of Systematic Reviews (AMSTAR) AMSTAR 1 Tool |
| Cas-témoins | Joanna Briggs Institute (JBI) Checklist for Case Control Studies |
| Série de cas | Joanna Briggs Institute (JBI) Checklist for Case Series |
| Rapport de cas | Joanna Briggs Institute (JBI) Checklist for Case Reports |
| Cohorte | Joanna Briggs Institute (JBI) Checklist for Cohort Studies |
| Étude transversale | Joanna Briggs Institute (JBI) Checklist for Analytical Cross Sectional Studies |
| Essai clinique randomisé | Joanna Briggs Institute (JBI) Checklist for Randomized Controlled Trials |

Les évaluations de la qualité effectuées pour chaque étude incluse sont disponibles sur demande.

L'approche GRADE (Grading of Recommendations, Assessment, Development and Evaluations) a été utilisée pour évaluer la certitude des résultats sur la base de huit domaines clés.

Selon l'approche GRADE en matière de qualité des données probantes, les **études observationnelles**, telles que celles incluses dans cette revue, fournissent des données probantes de **faible qualité**. Cette évaluation peut être réduite encore davantage en fonction d'autres domaines :

- un risque de biais élevé;
- l'incohérence des effets;
- le caractère indirect des interventions/résultats;
- des imprécisions dans l'estimation de l'effet;
- un biais de publication.

À l'inverse, elle peut être rehaussée sur la base des domaines suivants :

- un effet important;
- une relation dose-effet;
- une prise en compte des variables confusionnelles.

Pour chaque résultat, la certitude globale des données probantes a été déterminée en tenant compte des caractéristiques des données probantes dont on dispose (des études observationnelles, dont certaines n'ont pas été évaluées par les pairs, des variables confusionnelles potentielles qui n'ont pas été prises en compte, des essais et des protocoles d'essais différents, et une absence de groupes de comparaison valides). Un jugement selon lequel « la certitude globale est très faible » signifie que les résultats risquent fort de changer à mesure que de nouvelles données probantes apparaissent.

# Résultats

## Synthèse de la qualité des données probantes

Ce document comprend 11 synthèses terminées et 52 études individuelles pour un total de 63 publications. La qualité des données probantes incluses dans cette revue se décrit comme suit :

| Questions de recherche | Données probantes incluses | | Certitude globale des données probantes |
|---|---|---|---|
| Que sait-on des manières et des personnes qui introduisent et transmettent la COVID-19 dans les milieux de soins de courte durée? | Synthèses terminées<br>Études individuelles | 2<br>25 | Très faible |
| Quels facteurs influencent l'introduction et la propagation de la COVID-19 dans les milieux de soins de courte durée? | Synthèses terminées<br>Études individuelles | 4<br>17 | • Cas index : très faible<br>• PPE : modéré<br>• Fonction, emplacement dans l'établissement, profil démographique : très faible |
| Quelles mesures de contrôle ont réussi à prévenir, dans les milieux de soins de courte durée, les cas primaires et secondaires de COVID-19? | Synthèses terminées<br>Études individuelles | 6<br>14 | Très faible |

## Attention

Comme il faut rendre rapidement disponibles les nouvelles données probantes sur la COVID-19, plusieurs études émergentes n'ont pas été révisées par des pairs. Pour cette raison, nous vous conseillons la prudence quand vous utilisez et interprétez les données probantes incluses dans cette revue rapide. Nous avons fourni une synthèse de la certitude globale des données probantes afin de soutenir le processus de prise de décision.  Lorsque c'est possible, nous vous recommandons de fonder vos décisions sur les données probantes de la plus haute qualité possible.

Il est important de noter que nous n'avons pas évalué la qualité méthodologique des cinq études de modélisation mathématique. En raison de la nature hautement technique de ces études, nous recommandons vivement de consulter un expert en matière de contenu pour éclairer la prise de decision.

## Question 1 : Que sait-on des manières et des personnes qui introduisent et transmettent la COVID-19 dans les milieux de soins de courte durée?

### Tableau 1 : Synthèses

| Reference | Date Released | Description of Included Studies | Summary of Findings | Quality Rating: Synthesis | Quality Rating: Included Studies |
|---|---|---|---|---|---|
| Koh, W. C., Naing, L., Chaw, L., Rosledzana, M. A., Alikhan, M. F., Jamaludin, S. A., . . . Wong, J. (2020). What do we know about SARS-CoV-2 transmission? A systematic review and meta-analysis of the secondary attack rate and associated risk factors. *PLoS One, 15*(10), e0240205-e0240205. | Oct 8, 2020 (Search completed Jul 25, 2020) | 18 studies examining transmission rates in health care settings | This review examined secondary attack rates (SAR) of COVID-19 in various settings, including health care.<br><br>18 studies were identified where the index case in health care was an infected patient.<br><br>Pooled SAR was 0.7% (95% Confidence Interval (CI): 0.4%-1.0%), with most individual studies reporting a SAR of < 2%.<br><br>There was some variation in who was tested between studies (only symptomatic vs all close contacts) and who was classified as a close contact (usually HCW and other patients). | High | High |
| Alberta Health Services. (2020, Jun 5). *Has there been documented transmission of SARS-CoV-2 virus (or similar viruses) through heating, ventilation, and air conditioning (HVAC) systems in hospitals or nonhospital settings?* | Jun 5, 2020 (Search completed May 11, 2020) | This review included:<br>• 12 studies<br>• 20 additional references (primary and grey literature)<br><br>4 studies specifically addressed COVID-19 | This rapid evidence report reviewed the transmission of COVID-19 in Heating, Ventilation and Air Conditioning (HVAC) systems in hospitals and non-hospital settings.<br><br>There is no clear evidence to date of transmission of COVID-19 associated with HVAC systems in hospitals or health care facilities, although there is a mechanistic possibility of this occurring.<br><br>Studies that have identified the presence of viral RNA in procedure-generated aerosols have not demonstrated viable virus that would be capable of infecting susceptible hosts. | Low | Not reported |

## Tableau 2 : Études individuelles

| Reference | Date Released | Study Design | Participants | Setting and Timing | Summary of findings | Quality Rating: |
|---|---|---|---|---|---|---|
| Studies of forward transmission by HCW | | | | | | |
| Cao, G., Tang, S., Yang, D., Shi, W., Wang, X., Wang, H., . . . Ma, L. (2020). The Potential transmission of SARS-CoV-2 from patients with negative RT-PCR swab tests to others: two related clusters of COVID-19 outbreak. *Japanese Journal of Infectious Diseases, 73*(6), 399-403. | Nov 30, 2020 | Case report | 4 HCW | Hospital, China<br><br>Jan 2020 | 4 cases of HCW COVID-19 were identified on a ward in a hospital in China. The index case was a HCW who was symptomatic but had repeatedly tested negative for COVID-19 infection. The index case worked while symptomatic. | Moderate |
| Baker, M. A., Fiumara, K., Rhee, C., Williams, S. A., Tucker, R., Wickner, P., . . . Klompas, M. (2020). Low risk of COVID-19 among patients exposed to infected healthcare workers. *Clinical Infectious Diseases*. Epub ahead of print. | Aug 28, 2020 | Cohort | Patients | Medical Centre, Boston<br><br>Mar 1 to Jun 10, 2020 | 238 patients were identified as having been exposed to COVID-19 infected HCW (n=60).<br><br>Among 92 patients tested, 2 tested positive:<br>• 1 was exposed to a pre-symptomatic physician for 30 minutes in an outpatient setting. Neither the physician nor patient were masked.<br>• 1 was exposed for >10 minutes to a nurse in a peri-operative setting. Only the nurse was masked. This patient also had close household contact with a case, which likely was exposure source.<br><br>Overall, 0.4% of infections were attributable to HCW exposure.<br><br>No infections were attributed to patient-to-patient transmission. A few patients had more than one exposure. | High |

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| Mponponsuo, K., Kerkerian, G., Somayaji, R., Missaghi, B., Vayalumkal, J. V., Larios, O. E., . . . Conly, J. (2020). Lack of nosocomial transmission to exposed inpatients and coworkers in an investigation of five SARS-CoV-2-infected healthcare workers. *Infection Control & Hospital Epidemiology*. Epub ahead of print. | Aug 3, 2020 | Case series | HCW | Calgary, Alberta<br><br>Mar 1 and Apr 15, 2020 | Between epidemiologic investigation of 5 HCW cases with community-acquired COVID-19 was conducted to identify patient and colleague close contacts who had multiple high-risk exposures.<br><br>A total of 39 HCW and 20 patient close contacts were identified, of whom none developed infection (16 HCW and 22 patients were tested; the remainder did not report any symptoms and were considered not infected). | Moderate |
| Biernat, M. M., Zinczuk, A., Biernat, P., Bogucka-Fedorczuk, A., Kwiatkowski, J., Kalicinska, E., . . . Wrobel, T. (2020). Nosocomial outbreak of SARS-CoV-2 infection in a haematological unit - high mortality rate in infected patients with haematologic malignancies. *Journal of Clinical Virology*. Epub ahead of print. | Aug 1, 2020 | Cohort | Patients and HCW | Poland<br><br>Apr 7 to May 7, 2020 | During an outbreak of COVID-19 on a haematological unit after exposure to an index HCW case, among 20 HCW on the unit, 5 developed infection as confirmed through RT-PCR testing. Among 19 patients on the unit, 10 developed infection as confirmed through RT-PCR testing. | High |
| Knoll, R. L., Klopp, J., Bonewitz, G., Grondahl, B., Hilbert, K., Kohnen, W., . . . Gehring, S. (2020). Containment of a large SARS-CoV-2 outbreak among healthcare workers in a pediatric intensive care unit. *The Pediatric Infectious Disease Journal, 39*(11), e336-e339. | Jul 19, 2020 | Case report | HCW | Pediatric Intensive Care Unit (PICU), Germany<br><br>Mar 13 to Apr 27, 2020 | On March 13, 2020, a positive HCW case of COVID-19 was identified in the PICU. Point of care testing was performed on 91 HCW identified as contacts. A total of 8 additional HCW cases (19.5%) were identified by March 23, 2020.<br><br>All infected HCW were working at the PICU and had direct unprotected contact with each other prior to March 13, 2020. An infection rate of 16.3% was calculated.<br><br>Mass screening undertaken in the hospital from April 14 to 27, 2020 revealed only one additional case. This case had no connection to the PICU, and infection was attributed to community transmission. | High |

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| Prasitsirikul, W., Pongpirul, K., Pongpirul, W. A., Panitantum, N., Ratnarathon, A. C., & Hemachudha, T. (2020). Nurse infected with COVID-19 from a provisional dengue patient. *Emerging Microbes & Infections, 9*(1). | Jun 15, 2020 | Case report | HCW | Hospital, China<br><br>Jan 30, 2020 | A HCW was exposed to a symptomatic patient in hospital while performing venipuncture without appropriate PPE. The patient was later diagnosed with COVID-19 infection. The HCW subsequently became infected. No forward transmission of virus was documented among hospital or community close contacts. | High |
| Studies of forward transmission by patients | | | | | | |
| Wee, L. E. I., Sim, X. Y. J., Conceicao, E. P., Aung, M. K., Tan, K. Y., Ko, K. K. K., . . . Ling, M. L. (2020). Containing COVID-19 outside the isolation ward: The impact of an infection control bundle on environmental contamination and transmission in a cohorted general ward. *American Journal of Infection Control*, *48*(9), 1056-1061. | Sep 4, 2020 | Cohort | HCW<br><br>In-patients | Hospital, Singapore<br><br>Feb 7 to May 7, 2020, | A hospital in Singapore evaluated its experience with managing unsuspected COVID-19 infection in 28 patients admitted to respiratory surveillance wards instead of a COVID-19 ward.<br><br>There were no infections among staff close contacts; one exposed patient (who had other additional exposures) developed infection. | High |

| Studies of HCW Contact tracing with genome/RNA testing | | | | | | |
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| Sikkema, R. S., Pas, S. D., Nieuwenhuijse, D. F., Toole, Á., Verweij, J., van der Linden, A., . . . Koopmans, M. P. G. (2020). COVID-19 in health-care workers in three hospitals in the south of the Netherlands: A cross-sectional study. *The Lancet Infectious Diseases*, *20*(11), 1273-1280. | Jul 2, 2020 | Cross-sectional | HCW<br><br>Patients | 3 hospitals, Netherlands<br><br>Mar 2 to Mar 12, 2020, | 1796 HCW (15% of the total number of staff) were voluntarily screened for COVID-19.<br><br>Genome sequences were completed on 60 samples. The noted patterns were consistent with multiple introductions into the hospitals through community-acquired infections and local amplification in the community.<br><br>856 patients were also screened and tested.<br>• 96 HCW (5%) tested positive.<br>• Of these, 20 HCW did not have direct contact with patients; however, 6 had contact with colleagues who had also tested positive.<br>• Many HCW had numerous potential exposures in the community.<br>• 32% reported close contact with a confirmed case in the 14 days prior to onset of symptoms including patients and colleagues in the hospital, household members or persons outside the hospital, including at a carnival which could have been a super-spreader event.<br>Of 856 patients tested, 23 (3%) were positive. | High |

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| Nasia, S., Gage, K. M., Katarina, M. B., Thomas, C. F., & David, H. O. C. (2020). Determining the source of transmission of SARS-CoV-2 infection in a healthcare worker. *Preprint*. | May 1, 2020 | Case report | HCW | Hospital, Wisconsin USA<br><br>Mar 21 to Apr 14, 2020 | A HCW case of COVID-19 was identified in hospital after developing symptoms and seeking out testing. This HCW case had hospital exposure to two COVID-19 positive patients while working in full PPE. No infection control breaches were identified. The worker also had community exposure to a symptomatic household member who was not tested for COVID-19.<br><br>As part of the epidemiologic investigation, samples were collected from the case, the two patient cases and the household member whose specimen resulted as positive. Based on viral RNA sequencing the likely source of infection was the family member, with transmission occurring outside the hospital, though other sources could not be ruled out. | High<br><br>**PREPRINT** |
| Studies of HCW Contact tracing | | | | | | |
| Buising, K. L., Williamson, D., Cowie, B. C., MacLachlan, J., Orr, E., MacIsaac, C., . . . Marshall, C. (2020). A hospital-wide response to multiple outbreaks of COVID-19 in health care workers: Lessons learned from the field. *The Medical Journal of Australia*. Epub ahead of print. | Nov 15, 2020 | Case report | HCW | Hospital, Melbourne, Australia<br><br>Jul 1 and Aug 31, 2020 | 262 cases of COVID-19 infection were identified among staff.<br>• 28.1% of affected staff worked in "hot wards" – designated COVID-19 wards.<br>• Clusters of infection occurred on three occasions on wards outside of designated "hot wards".<br>• There was anecdotal reporting by staff of transmission events being associated with various patient behaviours such as shouting and vigorous coughing.<br><br>HCW contact with COVID-19 cases outside the hospital was infrequent but did occur (i.e., HCW living together). | High |

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| Wee, L. E., Sim, X. Y. J., Conceicao, E. P., Aung, M. K., Goh, J. Q., Yeo, D. W. T., . . . Venkatachalam, I. (2020). Containment of COVID-19 cases among healthcare workers: The role of surveillance, early detection, and outbreak management. *Infection Control and Hospital Epidemiology*, 41(7), 765-771. | Nov 5, 2020 | Case report | HCW | Hospital, Singapore<br><br>Jan 1 and Apr 22, 2020 | Epidemiological investigation of 14 cases of COVID-19 among HCW determined that:<br>• 10 cases were acquired in the community<br>• 1 staff cluster occurred in a shared office in a non-clinical area of the hospital<br>• 1 staff cluster was family members<br>• 2 staff clusters were cases who shared a dormitory | High |
| Alajmi, J., Jeremijenko, A. M., Abraham, J. C., Alishaq, M., Concepcion, E. G., Butt, A. A., & Abou-Samra, A.-B. (2020). COVID-19 infection among healthcare workers in a national healthcare system: The Qatar experience. *International Journal of Infectious Diseases, 100*, 386-389. | Nov 1, 2020 | Cross-sectional | HCW | 14 hospitals with over 28,000 staff<br><br>Qatar<br><br>Mar 10 to Jun 24, 2020 | 16,912 staff across 14 hospitals were tested for COVID-19. Across all hospitals 1,799 (10.6%) staff tested positive.<br><br>Epidemiologic investigation of staff cases revealed:<br>• 9.5% of positive staff reported close contact with a case (family member or roommate).<br>• 5% reported acquiring infection while working at a COVID-19 designated facility; 95% reported working at a non-COVID-19 facility. Of these cases who were not working in a COVID-19 hospital, 45% reported exposure to an infected colleague and 29% reported exposure to an infected patient.<br>• Among HCW cases at designated COVID-19 facilities, 82% used full PPE, at all times.<br>• Among those HCW cases working at a non-designated facility, 68% reported using PPE as directed. | Low |

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| Tubiana, S., Burdet, C., Houhou, N., Thy, M., Manchon, P., Blanquart, F., . . . Duval, X. (2020). High-risk exposure without personal protective equipment and infection with SARS-CoV-2 in healthcare workers: Results of the CoV-CONTACT prospective cohort. *Preprint*. | Sep 18, 2020 | Cohort | HCW | Hospital, Paris, France<br><br>Feb 5 to May 30, 2020 | 154 HCW had high-risk exposure(s) to 44 confirmed COVID-19 index cases (70 were exposed to in-patients and 95 were exposed to colleagues) without having worn appropriate PPE.<br><br>At day 30 following exposure, 43.9% had a confirmed or suspected infection. | High<br><br>**PREPRINT** |
| Kim, S. W., Jo, S. J., Lee, H., Oh, J. H., Lim, J., Lee, S. H., . . . Lee, J. (2020). Containment of a healthcare-associated COVID-19 outbreak in a university hospital in Seoul, Korea: A single-center experience. *PLoS One*. Epub ahead of print. | Aug 14, 2020 | Cross-sectional | Patients, Caregivers, and HCW | Hospital, Korea<br><br>Feb 21 to Feb 28, 2020 | After a hospital staff case was identified, 3,091 specimens were tested for COVID-19 among patients and staff in hospital.<br><br>2 in-patient and 1 caregiver hospital-associated cases were identified.<br><br>The 3 confirmed in-hospital cases were all linked to the same ward. There were no medical staff cases identified on this ward. | High |
| Contejean, A., Leporrier, J., Canoui, E., Alby-Laurent, F., Lafont, E., Beaudeau, L., . . . Kerneis, S. (2020). Comparing dynamics and determinants of SARS-CoV-2 transmissions among health care workers of adult and pediatric settings in central Paris. *Clinical Infectious Diseases*. Epub ahead of print. | Jul 15, 2020 | Cross-sectional | HCW | Hospital in Paris – 2 units (adult and pediatric)<br><br>Feb 24 to Apr 10, 2020 | 1344 symptomatic HCW were tested for COVID-19 and 373 (28%) were positive.<br><br>Unit specific attack rates were 3.2% and 2.3% for adult and pediatric units respectively, with an overall attack rate of 2.8%.<br><br>Epidemiologic investigations reported the following findings for 336 HCW participants:<br>• 70% had direct patient contact, 22% in dedicated COVID-19 units.<br>• In the adult setting, HCW reported multiple exposures to COVID-19 patients without PPE (25% vs 15% in the pediatric setting).<br><br>Some HCW reported having exposures to patients or colleagues without PPE, even after a masking policy was implemented | High |

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| Garzaro, G., Clari, M., Ciocan, C., Grillo, E., Mansour, I., Godono, A., . . . Pira, E. (2020). COVID-19 infection and diffusion among the healthcare workforce in a large university-hospital in northwest Italy. *La Medicina del lavoro*, *111*(3), 184-194. | Jun 26, 2020 | Case report | HCW | 4 hospitals in Italy<br>Mar 6 to Mar 21, 2020 | From 830 HCW with high risk or medium risk exposures to COVID-19 were tested. Of these, 80 tested positive (9.6%).<br><br>Investigations revealed the following:<br>• 57.6% reported exposure to a case, the majority were reported to be colleague cases.<br>• Social Network Analysis showed that HCW who had multiple contacts with other HCW were an important source of transmission.<br>• When patients were the source of infection, the cluster was limited to the area in which they were admitted, and spread was limited. | High |
| Lai, X., Wang, M., Qin, C., Tan, L., Ran, L., Chen, D., . . . Wang, W. (2020). Coronavirus disease 2019 (COVID-2019) infection among health care workers and implications for prevention measures in a tertiary hospital in Wuhan, China. *JAMA Network Open, 3*(5), e209666 | May 21, 2020 | Case series | HCW | Hospital, China<br><br>Jan 1 to Feb 9, 2020 | 110 HCW tested positive for COVID-19. The infection rate was 1.1% among HCW.<br><br>Presumed sources of infection include:<br>• General clinics or wards (63.3%)<br>• Community (12.7%)<br>• Fever clinics or wards (6.4%)<br><br>Contact with positive patients (59.1%) and colleagues with infection (10.9%) as well as community-acquired infection (12.7%) were the main routes of exposure. | Moderate |

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| Guo, X., Wang, J., Hu, D., Wu, L., Gu, L., Wang, Y., . . . Wu, Y. (2020). Survey of COVID-19 disease among orthopaedic surgeons in Wuhan, People's Republic of China. *The Journal of Bone and Joint Surgery, American volume*, *102*(10), 847-854. | May 20, 2020 | Case control | HCW: Orthopaedic surgeons | 8 hospitals in Wuhan China<br><br>Dec 31, 2019 to Feb 24, 2020 | A total of 24 orthopaedic surgeons with COVID-19 were identified from 8 hospitals. 21 cases were lab-confirmed and 3 were clinically diagnosed.<br><br>The number of cases in each hospital varied from 1 to 8 and the incidence of infection ranged from 1.5% to 20.7%. 5 of 8 hospitals had only 1 case.<br><br>Epidemiologic investigation determined:<br>• Suspected sites of exposure were general wards (79.2%), public places at the hospital (20.8%), operating rooms (12.5%), intensive care units (4.2%) and outpatient clinics (4.2%).<br>• Forward transmission was demonstrated in 25% of cases including to colleagues (4.2%) and patients (4.2%) in addition to non-hospital contacts. | High |
| Jin, Y.H., Huang, Q., Wang, Y.Y., Zeng, X.T., Luo, L.S., Pan, Z.Y., . . . Wang, X.H. (2020). Perceived infection transmission routes, infection control practices, psychosocial changes, and management of COVID-19 infected healthcare workers in a tertiary acute care hospital in Wuhan: A cross-sectional survey. *Military Medical Research, 7*(24). | May 11, 2020 | Cross-sectional | HCW | Hospital in Wuhan China<br><br>Feb 15 to 29, 2020 | 105 HCW were confirmed with COVID-19 infection. Epidemiologic analysis was conducted for 103 of these HCW cases. Relevant findings included:<br>• 32 worked in high-risk departments such as respiratory medicine, infectious diseases, emergency, clinical laboratory, anesthesia surgery, operating room, and intensive care unit.<br>• 71 cases worked in low-risk departments (other than those listed as high risk).<br>• 84.5% were suspected of being infected in the working environment in hospital.<br>  ○ 73.6% reported close contact with confirmed patients<br>  ○ 17.2% had close contact with suspected cases<br>  ○ 41.4% were exposed to confirmed colleague cases<br>• 1.0% in the laboratory<br>• 4.9% through community exposure<br>• 41.8% related to inadequate PPE | Moderate |

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| Mandić-Rajčević, S., Masci, F., Crespi, E., Franchetti, S., Longo, A., Bollina, I., . . . Colosio, C. (2020). Contact tracing and isolation of asymptomatic spreaders to successfully control the COVID-19 epidemic among healthcare workers in Milan (Italy). *Preprint*. | May 8, 2020 | Cohort | HCW | 2 large hospitals and 40 territorial health care units in Italy<br><br>Feb 27 to Apr 8, 2020 | 185 HCW had positive test results for COVID-19. 12 of these samples were done at random. The positive rate in non-random samples was around 10% while the rate among randomly sampled HCW was 2.6%.<br><br>Epidemiologic investigation of 143 HCW cases determined:<br>• 49% had close contact with a positive colleague<br>• 28% had unknown contact<br>• 9.8% had positive household member<br>• 7.7% had close contact with positive patient | Moderate<br><br>**PREPRINT** |
| Wang, Q., Huang, X., Bai, Y., Wang, X., Wang, H., Hu, X., . . . Zhao, H. (2020). Epidemiological characteristics of COVID-19 in medical staff members of neurosurgery departments in Hubei province: A multicentre descriptive study. *Preprint*. | Apr 24, 2020 | Cross-sectional | HCW | Neurosurgery departments in 107 hospitals in Hubei province China<br><br>Jan 8 to Mar 1, 2020 | 120 HCW in neurosurgery departments of 26 hospitals had been infected with COVID-19. The overall incidence was 2.2%.<br><br>All 120 HCW had direct contact with COVID-19 patients. 119 did not use standard protective measures at work before infection.<br><br>Most common mode of transmission was contact with a positive patient (62.5%) or infected colleague (30.8%).<br><br>No confirmed transmission from medical staff to patients was noted. | High<br><br>**PREPRINT** |
| Studies of contact tracing of inpatients | | | | | | |
| Wake, R. M., Morgan, M., Choi, J., & Winn, S. (2020). Reducing nosocomial transmission of COVID-19: Implementation of a COVID-19 triage system. *Clinical Medicine Journal*. Epub ahead of print. | Oct 28, 2020 | Cohort | Patients | Hospital, London, England<br><br>Mar 11 and May 12, 2020, | Inpatients tested positive for COVID-19 more than 7 days after admission were labelled as probable hospital-acquired infections.<br><br>Analyzing date of symptom onset determined 45 cases were likely acquired in hospital.<br><br>Of hospital-acquired cases:<br>• 40 (88%) shared a ward with a known case, of which 13 (29%) had shared a bay with a known case.<br>• 5 (11%) cases may have been acquired from shared facilities or a HCW. | Moderate |

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| Rickman, H. M., Rampling, T., Shaw, K., Martinez-Garcia, G., Hail, L., Coen, P., . . . Houlihan, C. F. (2020). Nosocomial transmission of COVID-19: A retrospective study of 66 hospital-acquired cases in a London teaching hospital. *Clinical Infectious Diseases*. Epub ahead of print. | Jun 20, 2020 | Cross-sectional | Patients | London teaching hospital<br><br>Mar 2 and Apr 12, 2020 | 66 COVID-19 in-patients (15%) had infections that were determined to be "definitely" (11%) or "probably" (4%) hospital-acquired.<br>• 36 (55%) had been in the same bay as a patient with confirmed infection.<br>• 9 (14%) had no identified contacts in the same bay but had contacts on the same ward.<br>• 21 (32%) had no clear source of infection.<br>• Among the 36 cases with index case in the same bay, 22 (61%) of the index infections were also hospital-acquired with several possible chains of patient-to-patient in-hospital transmission.<br>  ○ 14 (39%) were linked to community-acquired index cases.<br>• 45 (68%) of hospital-acquired cases were not associated with any forward transmission; however, there were several community- and hospital-acquired cases associated with four or more likely secondary infections. | Low |

| Studies of HCW and patient contact tracing | | | | | | |
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| Schwierzeck, V., König, J. C., Kühn, J., Mellmann, A., Correa-Martínez, C. L., Omran, H., . . . Kampmeier, S. (2020). First reported nosocomial outbreak of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) in a pediatric dialysis unit. *Clinical Infectious Diseases*. Epub ahead of print. | Apr 27, 2020 | Cohort | Patients and HCW | Pediatric dialysis unit in Germany<br><br>Feb to Jul 2020 | 7760 inpatients, outpatients and HCW were tested for COVID-19. Of these, 357 were found to be positive.<br><br>The overall attack rate in the hospital was 1.3%<br>• 0.9% among inpatients<br>• 1.6% among HCW<br><br>In March, an outbreak occurred on the pediatric dialysis unit. Based on epidemiologic investigation, 27 cases (23 HCW and 4 patients) were identified. These individuals had contact with patients or HCW without the use of adequate PPE.<br><br>The overall attack rate in the outbreak was 25.5%<br>• 20% among inpatients<br>• 29.6% among HCW | Moderate |
| Luong-Nguyen, M., Hermand, H., Abdalla, S., Cabrit, N., Hobeika, C., Brouquet, A., . . . Sauvanet, A. (2020). Nosocomial infection with SARS-CoV-2 within departments of digestive surgery. *Journal of Visceral Surgery*, *157*(3S1), S13-S18. | Apr 23, 2020 | Case series | Patients and HCW | France<br><br>Mar 1 to Apr 5, 2020 | 15 patients (4.9%) admitted to digestive surgery departments developed hospital-acquired COIVD-19 infection.<br><br>Within 3 surgical services, 7 HCW were diagnosed with COVID-19 infection during the same time period.<br><br>A clear source of infection was not identified, though the possibility of community exposure for at least some of the cases exists. | High |

## Question 2 : Quels facteurs influencent l'introduction et la propagation de la COVID-19 dans les milieux de soins de courte durée?

## Tableau 3 : Synthèses

| Reference | Date Released | Description of Included Studies | Summary of Findings | Quality Rating: Synthesis | Quality Rating: Included Studies |
|---|---|---|---|---|---|
| Galanis, P., Vraka, I., Fragkou, D., Bilali, A., & Kaitelidou, D. (2020). Seroprevalence of SARS-CoV-2 Antibodies and Associated Factors in Health Care Workers: A Systematic Review and Meta-Analysis. *The Journal of Hospital Infection*. Epub ahead of print. | Nov 16, 2020 (Search completed Aug 24, 2020) | This systematic review and meta-analysis included 49 studies, with 127,480 HCW to determine seroprevalence of SARS-CoV-2 antibodies and factors associated with seroprevalence.<br>• 26 cross-sectional<br>• 20 prevalence<br>• 3 cohort<br><br>27 analyzed risk factors for SARS-CoV-2 antibodies positivity.<br><br>The majority of studies were from Europe (n=31); the remaining were from North America (n=9), Asia (n=6), and Africa (n=3). | A number of risk factors associated with seropositivity were explored; no consistent risk factors were identified. Risk factors explored included:<br>• Sex: 3 studies found increased risk for males (OR range: 1.39 to 3.21), 23 found no relationship.<br>• Ethnicity: 2 studies found increased risk among African American HCW ($p<0.05$) and other ethnicities vs. white (OR: 2.30, 95% CI: 1.71, 3.10); 5 found no relationship.<br>• Age: 3 studies found conflicting results, with higher risk in those < 30 years (OR: 1.40, 95%CI 1.22, 1.60); ≥ 40 years old (OR: 1.36, 95%CI 1.09, 1.60) and ≥ 65 years old ($p<0.001$); 21 studies found no relationship.<br>• Role: 5 studies found relationships, including increased risk with work on COVID-19 unit (3 studies, OR range: 1.4 to 1.67); patient-facing work (3 studies, OR range: 1.22 to 2.9), frontline HCW (OR: 1.38, 95% CI: 1.22, 1.56); working in the surgery department (OR: 6.47, 95%CI 2.37, 17.63) or pediatric ICU (OR: 3.77, 95%CI 1.44, 9.89), or being an assistant (2 studies, OR: 1.39, 95%CI 1.05, 1.84 and 3.8, 95%CI 2.3, 6.1); 17 studies found no relationship.<br>• Lack of use or access to PPE, 2 studies found increased risk when not using a face covering for all clinical encounters ($p=0.012$) or working within a PPE shortage ($p=0.009$); 2 studies found no relationship.<br><br>Authors note poor reporting of testing validity and protocols, high heterogeneity amongst studies and few peer reviewed studies. | Moderate | Moderate |

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| Chou, R., Dana, T., Buckley, D. I., Selph, S., Fu, R., & Totten, A. M. (2020). Update Alert 5: Epidemiology of and risk factors for coronavirus infection in health care workers: A living rapid review. *Annals of Internal Medicine*. Epub ahead of print. | Oct 20, 2020 (Search completed Sep 24, 2020) | The most recent version of this living review includes 34 studies about risk factors for COVID-19. | Inconsistent findings were reported across studies with respect to difference in risk of COVID-19 between males and females.<br><br>Some studies report increased risk in nurses vs. physicians, but this is inconsistent.<br><br>Proper PPE and handwashing, in particular face shields and goggles seem to have the strongest evidence for protection.<br><br>The authors note that the included studies are limited by methods of measuring exposures, recall bias, no control of confounders, and imprecise estimates. | Low | Not reported |
| Calò, F., Russo, A., Camaioni, C., De Pascalis, S., & Coppola, N. (2020). Burden, risk assessment, surveillance and management of SARS-CoV-2 infection in health workers: A scoping review. *Infectious diseases of poverty, 9*(1), 139. | Oct 7, 2020 (Search completed May 22, 2020) | This scoping review included 43 studies, 14 webpages and 5 ongoing trials assessing risk factors associated with COVID-19 in HCW.<br><br>5 of the sources considered adherence to infection control practices or other risk factors; 3 from China, 1 from Singapore and 1 unidentified. | Two studies found no difference in rate of infection with surgical mask or N95 respirators.<br><br>One study found increased risk with suboptimal adherence to IPAC measures (handwashing before (RR: 3.10, 95% CI: 1.43–6.73) and after (RR: 2.82, 95% CI: 1.11–7.18) patient contact; Improper PPE use, RR: 2.82, 95% CI: 1.11–7.18).<br><br>One study found increased risk in high risk versus general department (RR: 2.13,95% CI: 1.45–3.95), and with close direct contact (<1 m) with COVID-19 patients (OR not reported). | Low | Not reported |
| Gomez-Ochoa, S., Franco, O. H., Rojas, L. Z., … Muka, T. (2020). COVID-19 in Health-Care Workers: A Living Systematic Review and Meta-Analysis of Prevalence, Risk Factors, Clinical Characteristics, and Outcomes. *American Journal of Epidemiology*. Epub ahead of print. | Sep 1, 2020 (Search completed Jul 8, 2020) | This systematic review and meta-analysis included 97 studies, for a total of 230,398 HCW:<br>• 50 prevalence<br>• 31 cross-sectional<br>• 14 cohort<br><br>5 studies reported factors associated with COVID-19 infection in HCW. The majority were from Wuhan China. | Risk factors for COVID-19 infection included:<br>• Lack of adherence to IPAC measures including handwashing generally (OR: 2.64, 95%CI 1.04, 6.71), handwashing before patient contact (OR: 3.10, 95%CI 1.43, 6.73), inadequate PPE (OR: 2.82, 95%CI 1.11, 7.18), never using PPE vs. usual PPE use (OR: 3.72, 95%CI 2.12, 6.52).<br>• Wearing medical masks vs. N95 respirators (OR: 464.82, 95%CI 97.73, infinite).<br>• Having a larger household size was not associated with infection (p = 0.093). | Low | Low |

## Tableau 4 : Études individuelles

| Reference | Date Released | Study Design | Participants | Setting and timing | Summary of findings | Quality Rating: |
|---|---|---|---|---|---|---|
| COVID-19 prevalence studies | | | | | | |
| Mortgat, L., Barbezange, C., Fischer, N., Heyndrickx, L., Hutse, V., Thomas, I., . . . Duysburgh, E. (2020). SARS-CoV-2 prevalence and seroprevalence among HCW in Belgian hospitals: Baseline results of a prospective cohort study. *Preprint*. | Oct 6, 2020 | Cross-sectional | n=699 HCW | 14 hospitals, Belgium<br><br>Apr 22 to 26, 2020 | Prevalence of COVID-19 with RT-PCR was 1.1% (95% CI: 0.04, 3.0%) and seroprevalence was 7.7% (95% 4.7, 12.2%).<br><br>Only exposure to a COVID-19 patient without following precautions (vs. no contact) was associated with COVID-19 risk (adjusted RR=2.11, 95% CI: 1.36-3.28).<br><br>No other demographic or work-related factors were associated with positive serology. | High<br><br>**PREPRINT** |
| Zheng, C., Hafezi-Bakhtiari, N., Cooper, V., Davidson, H., Habibi, M., Riley, P., & Breathnach, A. (2020). Characteristics and transmission dynamics of COVID-19 in healthcare workers at a London teaching hospital. *The Journal of Hospital Infection*, *106*(2), 325-329. | Oct 1, 2020 | Cross-sectional | n=1045 symptomatic hospital staff | Hospital, London, UK<br><br>Mar to Apr 2020 | Frequency of staff testing, and percent positive are presented, but no statistical comparisons or denominators are provided<br>• A greater proportion of male staff were tested (13%) and positive (7%) than females (10%, 5% respectively).<br>• A higher proportion of clinical staff (7%) tested positive than non-clinical staff (3%).<br>• Doctors were most likely to test positive (11%) followed by nurses (7%) and health care assistants (6%).<br><br>Emergency (17.3%) and acute medicine, (10.4%) had the highest positivity rates followed by cardiothoracic (9.2%), cardiology (8.9%) renal, oncology and palliative (8.7%) and specialists (8.6%). | Moderate |

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| Tubiana, S., Burdet, C., Houhou, N., Thy, M., Manchon, P., Blanquart, F., . . . Duval, X. (2020). High-risk exposure without personal protective equipment and infection with SARS-CoV-2 in healthcare workers: Results of the CoV-CONTACT prospective cohort. *Preprint*. | Sep 18, 2020 | Cohort | n=154 HCW with exposure to patient or colleague with confirmed COVID-19 | Hospital, Paris, France<br><br>Feb to May 2020 | Prevalence of RT-PCR confirmed COVID-19 was 25% (95% CI: 18.4, 32.9). Including possible infections based on symptoms, the prevalence rose to 43.9% (95% CI: 35.9%, 52.3%).<br><br>Factors associated with infection include:<br>• Being a pharmacist or administrative assistant vs. medical staff (adjusted OR=3.8, 95% CI=1.3, 11.2)<br>• Exposure to infected patient vs. colleague (adjusted OR=2.6, 95% CI=1.2, 5.9)<br><br>Authors note 57% of exposures occurred prior to widespread use of masks. | High<br><br>**PREPRINT** |
| Wang, Y., Wu, W., Cheng, Z., Tan, X., Yang, Z., Zeng, X., . . . Wang, X. (2020). Super-factors associated with transmission of occupational COVID-19 infection among healthcare staff in Wuhan, China. *The Journal of Hospital Infection*, *106*(1), 25-34. | Sep 1, 2020 | Cross-sectional | n=92 hospital staff with >14 days patient contact | Hospital, Wuhan, China<br><br>Jan 1 to Feb 29, 2020 | Social Network Analysis was used to identify factors affecting transmission to medical staff. Overall, 33.7% were infected with COVID-19.<br><br>Odds of infection were higher amongst:<br>• Physicians (p = 0.045)<br>• Those with medical staff infected in the same department (p<0.001)<br>• Those with infected patients in the department (p < 0.001)<br>• Those reporting touching their check, nose and mouth during work (p = 0.045)<br>• Those who did not wear masks correctly (p = 0.045)<br>• Those who attended large parties or crowded places (p = 0.08)<br><br>Touching the check, nose or mouth during work was the factor most associated with infected participants, identified as a 'super-factor' in the social network analysis. | Moderate |

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| Garzaro, G., Clari, M., Ciocan, C., Grillo, E., Mansour, I., Godono, A., . . . Pira, E. (2020). COVID-19 infection and diffusion among the healthcare workforce in a large university-hospital in northwest Italy. *La Medicina del lavoro*, *111*(3), 184-194. | Jun 26, 2020 | Case report | n=2411 HCW with known COVID-19 contact | 4 Hospitals in Northwest Italy<br><br>Mar 6 to 21, 2020 | HCW with a positive test were more likely to be:<br>• Physicians (OR=2.03, 95%CI: 1.18-3.49) vs. nurses<br>• Administrative staff (OR=5.77, 95%CI: 1.47-19.55) vs. nurses<br>• Providing non-medical services (OR=4.23, 95%CI: 1.99-8.63) vs. inpatient services<br>• Working in the maternity hospital (OR=2.94, 95%CI: 1.72-4.95) vs. the general hospital<br>• Exposed through a shared working environment (OR=2.63, 95%CI: 1.34-5.32) vs. direct care | High |
| Guo, X., Wang, J., Hu, D., Wu, L., Gu, L., Wang, Y., . . . Wu, Y. (2020). Survey of COVID-19 disease among orthopaedic surgeons in Wuhan, People's Republic of China. *The Journal of Bone and Joint Surgery, American Version*, *102*(10), 847-854. | May 20, 2020 | Cross-sectional | n=24 orthopedic surgeons with COVID-19 and 48 matched controls. | 8 Hospitals, Wuhan, China<br><br>Dec 31, 2019 to Feb 24, 2020 | Surgeons with confirmed COVID-19 were more likely to:<br>• Report severe fatigue before infection (OR=4.0, 95%CI: 1.0-16.0)<br>• Not wear a N95 respirator (OR=5.20, 95%CI: 1.09-25.0)<br>• Report patients with suspected COVID-19 were not wearing masks (OR=6.05, 95%CI: 1.70-21.51)<br><br>The following factors decreased odds of infection:<br>• Participation in infection control training (OR=0.12, 95%CI: 0.03-0.57)<br>• Wearing respirators or masks all of the time (OR=0.15, 95%CI: 0.04-0.55) | High |
| Jiaqiang, Z., Mingyang, S., Weijia, Z., Ningtao, L., MingZhang, Z., Lei, Q., & Szu-Yuan, W. (2020). Predictive factors of transmission during endotracheal intubation for coronavirus disease 2019 (COVID-19). *Preprint*. | Apr 1, 2020 | Cross-sectional | n=98 anesthesiologists intubating COVID-19 patients | Hospitals, China<br><br>Feb 2020 | 20/98 were infected (20.41%).<br><br>Factors influencing risk for infection:<br>• Planned intubations were associated with a lower risk (adjusted OR=0.28, 95% CI: 0.14-0.68)<br>• Patient cough during intubation was associated with a higher risk (adjusted OR=1.70, 95% CI: 1.39-2.97) | High<br>**PREPRINT** |

| Seroprevalence surveys | | | | | | |
|---|---|---|---|---|---|---|
| Jones, C. R., Hamilton, F. W., Thompson, A., Morris, T. T., & Moran, E. (2020). Seroprevalence of SARS-CoV-2 IgG in healthcare workers and other staff at North Bristol NHS Trust: A sociodemographic analysis. *Preprint*. | Nov 16, 2020 | Case-control | n=6858 HCW and support staff | Hospital, England<br><br>Exposure Mar to May 2020, testing in May 2020 | Overall seroprevalence was 9.3%.<br><br>Factors associated with seropositivity include:<br>• Black, Asian and minority ethnic individuals were twice as likely to have antibodies for COVID-19 than white individuals (adjusted OR=1.99, 95% CI=1.69, 2.34).<br><br>Critical care and operating room staff were about one third as likely to have antibodies for COVID-19 than staff in other roles (adjusted OR=0.29, 95% CI=0.13, 0.57 for critical care, adjusted OR=0.29, 95% CI=0.15, 0.49 for operating room staff). | High<br>**PREPRINT** |
| Baker, J. M., Nelson, K. N., Overton, E., Lopman, B. A., Lash, T. L., Photakis, M., . . . Steinberg, J. P. (2020). Quantification of occupational and community risk factors for SARS-CoV-2 seropositivity among healthcare workers in a large U.S. Healthcare system. *Preprint*. | Nov 3, 2020 | Cross-sectional | n=10,275 HCW volunteers | Atlanta, USA<br><br>Exposure Mar to Jun 2020, testing from Apr to Jun 2020. | Overall seropositivity was 5.7% (95% CI: 5.2%,6.1%).<br><br>Occupational risk factors accounted for 27% (95% CI: 25%-30%) of risk in multivariable regression models.<br><br>Risk of infection was associated with:<br>• Community contact with a known or suspected case (adjusted OR=1.9, 95% CI:1.4, 2.5)<br>• Contact with a positive colleague (adjusted OR: 1.2, 95% CI: 1.0, 1.6)<br>• Community incidence (adjusted OR: 1.4, 95% CI: 1.0,2.0)<br>• Being Black (adjusted OR=2.0, 95% CI:1.6, 2.4)<br><br>The authors note that changing in understanding of and adherence to infection control measures in and out of the workplace was not accounted for in analysis. | High<br><br>**PREPRINT** |

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| Erber, J., Kappler, V., Haller, B., Mijočević, H., Galhoz, A., da Costa, C. P., . . . Lingor, P. (2020). Strategies for infection control and prevalence of anti-SARS-CoV-2 IgG in 4,554 employees of a university hospital in Munich, Germany. *Preprint*. | Oct 6, 2020 | Cross-sectional | n=4554 hospital employees and medical students | Hospital, Munich, Germany<br><br>Exposure Mar to May 2020, testing Apr 14 to May 29, 2020 | Overall seroprevalence was 2.4% (95% CI: 1.9-2.9).<br><br>Risk factors for seropositivity include:<br>• Male sex (OR=1.54, 95% CI:1.03-2.27)<br>• Age 51-60 years (OR=1.75, 95% CI:1.06-2.85) vs </30 years<br>• Diabetes (OR=2.96, 95% CI:1.01-6.81)<br>• Administrative staff without direct patient contact (OR=2.36, 95% CI:1.19-4.80)<br>• Staff with exposure to COVID-19 co-workers (OR=1.74, 95% CI:1.11-2.65)<br>• Staff with exposure to private contacts with COVID-19 (OR=5.56, 95% CI:3.32-8.94)<br>• Unprotected contact with COVID-19 patients (OR=4.77, 95% CI:3.09-7.22)<br><br>Protective factors include:<br>• Smoking (OR=0.52, 95% CI:0.26-0.94)<br>• Performing aerosol generating procedures (OR=0.50, 95% CI:0.23-0.94).<br><br>The authors did not provide any explanation for the surprising protective factors. | Moderate<br><br>**PREPRINT** |
| Jespersen, S., Mikkelsen, S., Greve, T., Kaspersen, K. A., Tolstrup, M., Boldsen, J. K., . . . Erikstrup, C. (2020). SARS-CoV-2 seroprevalence survey among 18,000 healthcare and administrative personnel at hospitals, pre-hospital services, and specialist practitioners in the central Denmark region. *Clinical Infectious Diseases*. Epub ahead of print. | Oct 3, 2020 | Cross-sectional | n=17,971 HCW (69% of all in Central Denmark) | 7 hospitals, Central Denmark<br><br>Exposure Mar to Jun 2020, testing May 18 to Jun 19, 2020. | Adjusted seroprevalence was 3.4% (95% CI: 2.5%, 3.8%).<br>• Younger age, < 30 years vs. all others, was associated with higher seropositivity adjusted OR=1.9, 95% 1.4-2.6)<br>• Compared to medical secretaries, nurses (OR: 7.3, 95% CI: 3.5, 14.9), doctors (OR: 4.0, 95% CI: 1.8, 8.9) and laboratory staff (OR: 5.0, 95% CI: 2.1, 11.6) had higher seropositivity<br>• Emergency departments had the highest seropositivity (29.7%, vs departments with no or limited COVID-19patient contact (1.8%) | High |

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| Wilkins, J., Gray, E. L., Wallia, A., Hirschhorn, L., Zembower, T., Ho, J., . . . Evans, C. (2020). Seroprevalence and correlates of SARS-CoV-2 antibodies in healthcare workers in Chicago. *Preprint*. | Sep 13, 2020 | Cross-sectional | n=6510 HCW | Hospitals, immediate care centres and outpatient practices in Chicago and suburbs, USA<br><br>Exposure Mar to Jul 2020, testing Jul 2020 | Weighted seroprevalence was 5.3% (95% CI: 4.8%, 5.9%).<br><br>The following demographic groups had higher seropositivity:<br>• Younger age (18-29), prevalence 7.4%, vs. older age groups ranging from 2.6 o 4.5% (p-value and OR not reported)<br>• Being Hispanic (9.6%) or non-Hispanic Black (8.5%) vs White (4.3) or Asian (4.6%) (p-value and OR not reported)<br><br>Other factors associated with seropositivity include:<br>• Known out of hospital exposure (adjusted OR=4.7, 95%CI: 3.5, 6.4)<br>• Family member with confirmed case (adjusted OR=26.8, 95%CI: 17.3, 41.8)<br>• Nurses (adjusted OR=1.9, 95%CI: 1.3, 2.9)<br>• Taking care of COVID-19 patients (adjusted OR=2.19, 95%CI: 1.61, 3.01)<br>• Exposure to patients receiving high flow oxygen (OR: 145, no 95% CI)<br>• Exposure to patients receiving hemodialysis (OR: 1.57, no 95% CI) | High<br><br>**PREPRINT** |
| Nishida, T., Iwahashi, H., Yamauchi, K., Kinoshita, N., Okauchi, Y., Suzuki, N., . . . Abe, K. (2020). Seroprevalence of SARS-CoV-2 antibodies among 925 staff members in an urban hospital accepting COVID-19 patients in Osaka prefecture, Japan. *Preprint*. | Sep 11, 2020 | Cross-sectional | n=925 HCW | Hospital, Japan<br><br>Exposure Feb to Jun 2020, testing Jun 2020.<br><br>Authors note only occasional PPE shortages | Overall seroprevalence was 0.43%, 95% CI: 0.17, 1.1% (4/925).<br><br>Those who were seropositive were significantly older (52.8+/- 6.8 vs 40.0+/-11.8, p = 0.03). There was insufficient statistical power to explore other risk factors. | Moderate<br><br>**PREPRINT** |

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| Alkurt, G., Murt, A., Aydin, Z., Tatli, O., Agaoglu, N. B., Irvem, A., . . . Doganay, L. (2020). Seroprevalence of coronavirus disease 2019 (COVID-19) among health care workers from three pandemic hospitals of Turkey. *Preprint*. | Aug 22, 2020 | Case-control | n=932 HCW | 3 Hospitals, Turkey<br><br>Exposure Mar to Jun 2020, testing Jun 2020. | Overall seroprevalence was 2.7%.<br><br>Seroprevalence was higher in non-pandemic clinics (6.4%, p = 0.05). No differences were found between other settings or profession. | Moderate<br><br>**PREPRINT** |
| Morcuende, M., Guglielminotti, J., & Landau, R. (2020). Anesthesiologists' and intensive care providers' exposure to COVID-19 infection in a New York City academic center: A prospective cohort study assessing symptoms and COVID-19 antibody testing. *Anesthesia & Analgesia, 131*(3), 669-676. | Jun 9, 2020 | Cross-sectional | n=105 anesthesiologists and intensive care residents and staff | Hospital, New York, USA<br><br>Exposure Mar 1 to Apr 15, 2020, testing Apr 2020 | Overall seroprevalence was 12.1% (11/91).<br><br>Seropositive HCW were more likely to:<br>• Use the NYC subway (8.18 vs. 41.2%, p = 0.027)<br>• Have tested positive previously (p = 0.002)<br><br>There was a statistical difference in role type, with positive tests more common in staff than residents (p = 0.06).<br><br>There were no differences between groups for work-related exposure to COVID-19. | High |

| **Modelling Studies** | | | | | | |
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| King, M.F., Wilson, A. M., Weir, M. H., Lopez-Garcia, M., Proctor, J., . . . Noakes, C. J. (2020). Modelling the risk of SARS-CoV-2 infection through PPE doffing in a hospital environment. *Preprint*. | Sep 23, 2020 | Modelling | N/A | Health care settings, not specified | This study constructed a Quantitative Microbial Risk Assessments (QMRA) model to predict the number of potential surface exposures and risk of COVID-19 infection for HCW over time. The model considered the following variables: number of patients on a ward, proportion of COVID-19 patients, length of HCW shift, probability of contact with contaminated PPE.<br><br>The model considered transmission within a health care setting and within the broader community. Interventions occurred in general health care settings by two actors (hospital HCW and patients). Measures included PPE, and periodic testing of patients and HCW.<br><br>Risk of COVID-19 infection was reported in terms of risk during a single HCW shift. The model found the following rates of risk:<br>• Single face-to-face contact: 0.18%<br>• Providing intravenous care: 1%<br>• Caring for 7 patients: 0.6%; caring for 14 patients: 1.3%<br>• Caring for exclusively COVID-19 patients: 1.6%<br>• Mistakes while doffing PPE: <1.0% | Not appraised<br><br>*Interpret with caution*<br><br>**PREPRINT** |

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| Huang, Q., Mondal, A., Jiang, X., Horn, M. A., Fan, F., Fu, P., . . . Gurarie, D. (2020). SARS-CoV-2 transmission and control in a hospital setting: An individual-based modelling study. *Preprint*. | Aug 25, 2020 | Modelling | N/A | Wuhan, China | This study constructed an IBM (individual-based model) with a SEIR (susceptible-exposed-infectious-recovered) framework to predict transmission over time and the impact of different interventions in a tertiary hospital. Interventions occurred in a ward setting by two actors (hospital HCW and patients). Measures included social distancing, self-isolation, tracing and quarantining and PPE.<br><br>The model was calibrated to empirical data from a hospital department during the early pandemic in Wuhan, China.<br><br>The model found that high-risk pools of HCW were 52% more susceptible to COVID-19 infection. This was attributed to work-related stress. | Not appraised<br><br>*Interpret with caution*<br><br>**PREPRINT** |

## Question 3 : Quelles mesures de contrôle ont réussi à prévenir, dans les milieux de soins de courte durée, les cas primaires et secondaires de COVID-19?

## Tableau 5 : Synthèses

| Reference | Date Released | Description of Included Studies | Summary of Findings | Quality Rating: Synthesis | Quality Rating: Included Studies |
|---|---|---|---|---|---|
| Calò, F., Russo, A., Camaioni, C., De Pascalis, S., & Coppola, N. (2020). Burden, risk assessment, surveillance and management of SARS-CoV-2 infection in health workers: A scoping review. *Infectious Diseases of Poverty, 9*. | Oct 7, 2020 (Search completed May 22, 2020) | 43 studies<br><br>5 ongoing trials<br><br>14 webpages | Inadequate or non-use of PPE is associated with increased infection risk. Strict infection prevention and control procedures, adequate training programs on the appropriate use of PPE and close monitoring of HCW with symptom surveillance and testing are recommended.<br><br>In a study of 41 HCW (35 wearing surgical masks, 6 wearing N95 masks) exposed to aerosol generating medical procedures with a COVID-19 patient, no cases of transmission were reported. | Low | Not reported |
| Sorbello, M., Rosenblatt, W., Hofmeyr, R., Greif, R., & Urdaneta, F. (2020). Aerosol boxes and barrier enclosures for airway management in COVID-19 patients: A scoping review and narrative synthesis. *British Journal of Anaesthesia*, *125*(6), 880-894. | Sep 3, 2020 (Search completed May 27, 2020) | 52 articles including:<br>• 19 correspondences<br>• 16 letters to the editor<br>• 10 original articles<br>• 3 research letters<br>• 1 guideline<br>• 1 short recommendation<br>• 1 case report<br>• 1 quality improvement study<br><br>6 websites | Aerosol boxes and other barrier-enclosure systems may reduce large droplet spread, but no evidence that they protect HCW from aerosolised viral particles.<br><br>Barrier type systems may create additional risk during airway emergencies, are not always ergonomically practical, may be associated with additional infection hazards and may damage or reduce use of PPE.<br><br>Much of this evidence is based on expert opinion or simulation studies – data with patients is lacking. | Moderate | Not reported |

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| Licina, A., Silvers, A. J., & Stuart, R. (2020). Use of powered air-purifying respirator (PAPR) by healthcare workers for preventing highly infectious viral diseases - a systematic review of evidence. *Systematic Reviews, 9*(173). | Aug 8, 2020 (Search completed Jun 2020) | 10 studies, of which 2 included COVID-19 and 8 included other viruses (MERS, SARS, Ebola):<br>• 1 observational case series (COVID-19)<br>• 1 observational cohort study without a control group (COVID-19)<br>• 1 simulation RCT<br>• 3 observational simulation studies<br>• 4 randomized cross over simulation study | In HCW conducting airway procedures, powered air purifying respirators (PAPRs) were not associated with different rates of COVID-19 infection compared to other protective respiratory equipment. | Moderate | Low |
| Luqman Arafath, T. K., Jubbal, S. S., Gireesh, E. D., Margapuri, J., Jogu, H. R., . . . Penupolu, S. (2020). Risk of transmission of infection to healthcare workers delivering supportive care for coronavirus pneumonia; a rapid GRADE review. *Preprint*. | Jul 8, 2020 (Search completed Jun 28, 2020) | 22 studies:<br>• 11 mechanistic studies (7 on mannikins, 2 healthy volunteers, 2 others)<br>• 11 clinical studies (5 case-control, 6 cohort) | This review found across all studies (not specific to COVID-19) risk of transmission is:<br>• Lower when a mask is worn<br>• Lower when a gown is worn<br>• Lower when goggles are worn<br><br>The certainty of evidence for all the above factors was moderate according to GRADE. | Low<br><br>**PREPRINT** | Not reported |
| Alberta Health Services. (2020, Jun 12). *Topic: Effectiveness of screening programs for reducing the spread of COVID-19 in healthcare settings*. | Jun 12, 2020 (Search completed May 22, 2020) | 47 articles that included studies of screening for COVID-19 and other infections (MERS, influenza, TB):<br>• 4 modelling studies<br>• 3 systematic reviews on travel screening<br>• 1 systematic review on TB screening<br><br>Most studies observational.<br><br>Evidence related to COVID-19 was only found in grey literature, not primary research literature. | Evidence does not show that any single form of HCW screening program reduces transmission of infections, although specific studies related to COVID-19 were not identified.<br><br>There is some preliminary evidence (one modeling study and one observational study) that testing HCW for infection may reduce transmission in acute care settings. | Low | Quality of evidence related to travel screening, TB screening, MERS and H1N1 was relatively robust. |

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| Chu, D.K., Akl, E.A., Duda, S., Solo, K., Yaacoub, S., & Schunemann, H.J. (2020). Physical distancing, face masks, and eye protection to prevent person-to-person transmission of SARS-CoV-2 and COVID-19: A systematic review and meta-analysis. *The Lancet*, *395*(10242), 1973-1987. | Jun 1, 2020 (Search completed May 3, 2020) | 172 observational studies, no RCTs. Includes 44 comparative studies included in meta-analysis.<br><br>Includes 7 studies focused on COVID-19 and other studies of MERS, SARS. | Absolute risk of infection was greater for shorter distance (<1m) vs longer distance (1metre or more), this association held for COVID-19 specific studies and those in health care settings.<br><br>Use of face masks was associated with lower risk of infection compared to no mask, with a stronger association in health care settings. This is possibly due to increased use of N95 type respirators in health care settings, which are associated with greater infection protection than other mask types.<br><br>Eye protection was also associated with a lower risk of infection (compared to no eye protection) although this finding was not specific to COVID-19. | High | Low-to-moderate |

## Tableau 6 : Études individuelles

| Reference | Date Released | Study Design | Population | Setting and Timing | Preventive Measure | Summary of findings | Quality Rating: |
|---|---|---|---|---|---|---|---|
| Schmitz, D., Vos, M., Stolmeijer, R., Lameijer, H., Schonberger, T., Gaakeer, M. I., . . . Ter Avest, E. (2020). Association between personal protective equipment and SARS-CoV-2 infection risk in emergency department healthcare workers. *European Journal of Emergency Medicine*. Epub ahead of print. | Nov 6, 2020 | Cross-sectional | Emergency physicians in 45 emergency departments, N not specified | Emergency department, Netherlands<br><br>Mar 1 to May 1, 2020 | High-level PPE | A survey of emergency departments between evaluated the association between COVID-19 infection and personal protective equipment used.<br><br>Use of high-level PPE (e.g., FFP2 mask, eye protection) was not associated with lower COVID-19 infections compared to lower-level PPE (e.g., FFP1 or surgical mask).<br><br>Contacts among physicians in contexts in which PPE was not in use were not controlled for. | Moderate |
| Ahmad, J., Anwar, S., Latif, A., Haq, N. U., Sharif, M., & Nauman, A. A. (2020). The Association of PPE Availability, Training and Practices with COVID-19 Sero-prevalence in Nurses and Paramedics in Tertiary Care Hospitals of Peshawar, Pakistan. *Disaster Medicine and Public Health Preparedness*. Epub ahead of print. | Nov 5, 2020 | Cross-sectional | n=133 nurses and paramedics | Hospital, Peshawar, Pakistan<br><br>Dates not specified | PPE | A survey and serological screen for COVID-19 antibodies evaluated the association between COVID-19 infection and personal protective equipment used.<br><br>There was no statistically significant difference in the seroprevalence of COVID-19 antibodies for staff who had received PPE immediately at the onset of the pandemic or who did not have interruptions in PPE supply, compared to those with delays or interruptions.<br><br>Most study participants (58.6%) did not report self-isolating during the pandemic. | Moderate |

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| Abella, B. S., Jolkovsky, E. L., Biney, B. T., Uspal, J. E., Hyman, M. C., Frank, I., . . . Treatment of, C.-W. H. I. (2020). Efficacy and safety of hydroxychloroquine vs placebo for pre-exposure SARS-CoV-2 prophylaxis among health care workers: A randomized clinical trial. *JAMA Internal Medicine*. Epub ahead of print. | Sep 30, 2020 | Randomized controlled trial | n=132 HCW (focus on those working in emergency or COVID-19 units) | 2 Hospitals, Philadelphia, USA<br><br>Apr 9 to Aug 4, 2020 | Prophylactic use of hydroxy-chloroquine | A double-blind, placebo controlled, RCT examined efficacy of Hydroxychloroquine for prevention of COVID-19 transmission in HCW.<br><br>There was no significant difference in COVID-19 infection rates between those receiving the Hydroxychloroquine (n=4, 6.3%) and those receiving the placebo (n=4, 6.6%) over the 8-week intervention period.<br><br>Study was terminated early due to futility. | Low |
| Schwartz, C., Oster, Y., Slama, C., Benenson, S., & Hadassah, C.-I. W. G. (2020). A dynamic response to exposures of health care workers to newly diagnosed COVID-19 patients or hospital personnel, in order to minimize cross-transmission and the need for suspension from work during the outbreak. *Open Forum Infectious Diseases*, *7*(9), ofaa384. | Sep 1, 2020 | Cohort | n=1095 HCW exposures to 51 index cases (n=23 HCW and n=28 patients) | Hospital, Jerusalem, Israel<br><br>Mar 8 to May 23, 2020 | Compulsory isolation based on level of contact and timing of symptomology of index case, PPE | The hospital revised guidelines for compulsory isolation of HCW based on close contact with index cases. Most HCW (251/400) were sent into isolation in the first 2 weeks of the study period.<br><br>Following this, isolation rules were changed and masks were made mandatory for all patient contact. The isolation rate of HCW after this measure was introduced dropped from 17.22 per index case to 2.79 per index case.<br><br>Of the 5 HCW who were diagnosed with COVID-19, none of these cases occurred after mandatory masks were introduced at 2 weeks. | Moderate |

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| Carretta, G., Contessa, C., Boemo, D. G., Bordignon, G., Bennici, S. E., Merigliano, S., . . . Donato, D. (2020). COVID-19 challenge: Proactive management of a tertiary university hospital in Veneto region, Italy. *Pathogens and Global Health*, *114*(6). | Aug 23, 2020 | Case report | n=7649 HCW | Hospital, Italy<br><br>Feb 21 to 1 May, 2020 | A number of hospital wide measures, but provision of FFP2/FFP3 respirators, goggles and protective suits as well as isolation protocols and testing via a swab were instituted for workers. | Low prevalence rate of COVID-19 (1.8%) among HCW compared to other regions of Italy was attributed to high staff testing rates, as well as timely and correct use of PPE. | Moderate |
| Hawkins, E. S., Fertel, B. S., Muir, M. R., Meldon, S. W., Delgado, F. J., & Smalley, C. M. (2020). Adding eye protection to universal masking reduces COVID-19 among frontline emergency clinicians to the level of community spread. *American Journal of Emergency Medicine*. Epub ahead of print. | Aug 20, 2020 | Cohort | n=352 frontline ED clinicians | 14 Midwest emergency departments, USA<br><br>Mar 18 to Jul 18, 2020 | Eye protection (goggles), plus universal masking of HCW and patients in ED | 1.14% (n=4) clinicians contracted COVID-19, which was not significantly different from the community prevalence rate of 0.85%.<br><br>Eye protection and universal masking brings the level of clinician prevalence of COVID-19 down to community levels (rather than ED patient population levels). | Moderate |

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| Cattelan, A. M., Sasset, L., Di Meco, E., Cocchio, S., Barbaro, F., Cavinato, S., . . . Baldo, V. (2020). An integrated strategy for the prevention of SARS-CoV-2 infection in healthcare workers: A prospective observational study. *International Journal of Environmental Research and Public Health*. | Aug 10, 2020 | Cohort | n=60 HCW | Hospital, Italy<br><br>Feb 21 to Apr 16, 2020 | Advanced triage area, PPE protocols and testing | 361 swabs were taken from HCW, with no positive results for COVID-19 in this setting with triage, PPE and testing in place. | Moderate |
| Turcato, G., Zaboli, A., & Pfeifer, N. (2020). The COVID-19 epidemic and reorganisation of triage, an observational study. *Internal and Emergency Medicine*. Epub ahead of print. | Aug 9, 2020 | Diagnostic | Medical and nursing staff working in emergency department, n not specified | Emergency Department, Italy<br><br>Mar 4 to Apr 15, 2020 | Pre-triage area established in ED and PPE protocols implemented for infected and clean areas. | No medical or nursing staff working in the emergency department showed symptoms of COVID-19 in this setting with pre-triage and PPE in place. Of 63 swabs tested, none were positive. | Low |

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|---|---|---|---|---|---|---|---|
| Zhong, Q., Liu, Y. Y., Luo, Q., Zou, Y. F., Jiang, H. X., Li, H., . . . Zhang, Z. Z. (2020). Spinal anaesthesia for patients with coronavirus disease 2019 and possible transmission rates in anaesthetists: Retrospective, single-centre, observational cohort study. *British Journal of Anaesthesia*, *124*(6), 670-675. | Mar 28, 2020 | Cohort | n=44 anesthetists | Hospital, Wuhan China<br><br>Jan 1 to Feb 14, 2020 | PPE | 49 patients with radiologically confirmed COVID-19 (but only 26% RT-PCR confirmed) received spinal anesthesia from 44 anesthetists. Anesthetists' only contact with presumed COVID-19 patients was during surgery.<br><br>37 anesthetists wore Level 3 PPE (positive pressure, full chemical protective suit and self-contained breathing apparatus) while the other 7 wore Level 1 PPE (gown, surgical mask, gloves, hat).<br><br>1 anesthetist wearing Level 3 PPE contracted COVID-19, 4 anesthetists wearing Level 1 PPE contracted COVID-19, suggesting the higher level of PPE reduces risk of transmission (relative risk reduction 95.3% (95% CI: 63.7-99.4%).<br><br>26 of the anesthetists (23/37 wearing PPE Level 3 and 3/7 wearing PPE Level 1) were also taking prophylactic antiviral therapy.<br><br>It is also possible that the infected anesthetists contracted COVID-19 through contact with a colleague or another source. | Low |

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|---|---|---|---|---|---|---|---|
| Huang, Z., Zhao, S., Li, Z., Chen, W., Zhao, L., Deng, L., & Song, B. (2020). The battle against coronavirus disease 2019 (COVID-19): Emergency management and infection control in a radiology department. *Journal of the American College of Radiology*, *17*(6), 710-716. | Mar 24, 2020 | Case report | n=65 diagnostic radiologists and 161 other staff members | Hospital, Chengdu, China<br>Jan 21 to Mar 9, 2020 | The radiology department reconfigured areas to reduce cross-contamination. Staff were provided with multiple forms of PPE, given regular breaks, monitored for symptoms and received additional training on infection control. | The radiology department screened 7203 people for COVID-19 and 24 were positive. 3083 of those screened received a CT. No radiology staff member contracted COVID-19 during this period, with PPE and protocols in place in the setting. | Moderate |

| **Modelling Studies** | | | | | | | |
|---|---|---|---|---|---|---|---|
| Baek, Y. J., Lee, T., Cho, Y., Hyun, J. H., Kim, M. H., Sohn, Y., . . . Choi, J. Y. (2020). A mathematical model of COVID-19 transmission in a tertiary hospital and assessment of the effects of different intervention strategies. *PLoS One*, *15*(10), e0241169 | Oct 26, 2020 | Modelling | N/A | Hospital, South Korea | Front door symptom screening, quarantine unit for new patients, early testing of suspected cases, PPE for staff and visitors | This study constructed a SEIR (susceptible-exposed-infectious-recovered) mathematical model to predict transmission over time and the impact of different interventions in a tertiary hospital. Interventions occurred in three categories (ward, outpatient clinics, emergency room) and by four actors (doctors, nurses, patients, caregivers). Measures included front door screening, triage clinics, access control, universal masking, increasing testing and isolation wards.<br><br>Effectiveness of simulated interventions was reported in terms of the proportion of decreased cases due to an intervention. The model found the following rates of effectiveness:<br>• All interventions combined: 80.7%<br>• Early testing of suspected cases with test results <8 hours: 80.7%<br>• Universal masking of HCW and visitors: 66.4%<br>• Quarantine of newly admitted patients: 65.7%<br>• Front door screening: 43.1% | Not appraised<br><br>*Interpret with caution* |

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|---|---|---|---|---|---|---|---|
| Huang, Q., Mondal, A., Jiang, X., Horn, M. A., Fan, F., Fu, P., . . . Gurarie, D. (2020). SARS-CoV-2 transmission and control in a hospital setting: An individual-based modelling study. *Preprint*. | Aug 25, 2020 | Modelling | N/A | Hospital, Wuhan, China | Social distancing, HCW screening, PPE | This study constructed an IBM (individual-based model) with a SEIR (susceptible-exposed-infectious-recovered) framework to predict transmission over time and the impact of different interventions in a tertiary hospital. Interventions occurred in a ward setting by two actors (hospital HCW and patients). Measures included social distancing, self-isolation, tracing and quarantining and PPE.<br><br>The model was calibrated to empirical data from a hospital department during the early pandemic in Wuhan, China.<br><br>Effectiveness of simulated interventions was reported in terms of the proportion of decreased cases due to an intervention and decrease in workday loss. The model found the following rates of effectiveness:<br>• High efficacy face masks: 80% decrease in cases, 87% decrease in workday loss<br>• Health care worker screening: only marginal effects on number of cases and workday loss<br>• Social distancing: only marginal effects on number of cases and workday loss | Not appraised<br><br>*Interpret with caution*<br><br>**PREPRINT** |

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|---|---|---|---|---|---|---|---|
| Miller, J.C., Qiu, X., MacFadden, D., & Hanage, W.P. (2020). Evaluating the contributions of strategies to prevent SARS-CoV-2 transmission in healthcare setting: a modelling study. *Preprint*. | Jul 14, 2020 | Modelling | N/A | Health care settings, not specified | PPE, periodic testing of patients and HCW, cohorting of suspected cases | This study constructed a SEIR (susceptible-exposed-infectious-recovered) model to predict transmission over time and the impact of different interventions in a tertiary hospital. The model considered transmission within a health care setting and within the broader community. Interventions occurred in general health care setting by two actors (hospital HCW and patients). Measures included PPE, and periodic testing of patients and HCW.<br><br>Effectiveness of simulated interventions was reported in terms of decreased cases of HCW infections due to an intervention. The model found:<br>• PPE use greatly reduces the number of health worker infections<br>• Use of less-effective PPE (improper use or low quality equipment) reduces infection rates in HCW to that of the general population<br>• Weekly testing of patients and HCW significantly reduced COVID-19 infections.<br>• Smaller cohorts of suspected cases reduced nosocomial infections, compared to larger cohorts.<br>• High efficacy face masks: 80% decrease in cases, 87% decrease in workday loss | Not appraised<br><br>*Interpret with caution*<br><br>**PREPRINT** |

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|---|---|---|---|---|---|---|---|
| Evans, S., Agnew, E., Vynnycky, E., & Robotham, J. V. (2020). The impact of testing and infection prevention and control strategies on within-hospital transmission dynamics of COVID-19 in English hospitals. *Preprint*. | May 20, 2020 | Modelling | N/A | Hospital, United Kingdom | Periodic testing of HCW, single room isolation vs. cohorting of suspected cases | This study constructed a SEIR (susceptible-exposed-infectious-recovered) mathematical model to predict transmission over time and the impact of different interventions in a tertiary hospital. Interventions occurred in a ward setting by two actors (hospital HCW and patients). Measures included periodic testing of HCW and single room isolation vs. cohorting of suspected cases.<br><br>The model was calibrated to National Health Service data from two hospitals.<br><br>Effectiveness of simulated interventions was reported in terms of the proportion of decreased cases due to an intervention. The model found the following rates of effectiveness:<br>• Daily testing of HCW: 64% decrease in cases in HCW<br>• Weekly testing of HCW: 24% decrease in cases in HCW<br>• Single room isolation of suspected cases, instead of cohorting of suspected cases: significant reduction in nosocomial cases in patients | Not appraised<br><br>*Interpret with caution*<br><br>**PREPRINT** |

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