
# Yoğun bakım ünitelerinde DAS uygulamaları

## *COVID-19 negatif ve pozitif hastaların yattığı YBÜ'de fark var mı?*

**Dr. Güven ÇELEBİ**

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Enfeksiyon Hastalıkları ve Klinik Mikrobiyoloji AD

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25 Mayıs 2022, Antalya

Available online at www.sciencedirect.com

Journal of Hospital Infection

journal homepage: www.elsevier.com/locate/jhin

# Cross-sectional point prevalence survey to study the environmental contamination of nosocomial pathogens in intensive care units under real-life conditions

I. Wille[a,b], A. Mayr[a,b,*], P. Kreidl[a], C. Brühwasser[a,b], G. Hinterberger[a], A. Fritz[a,b], W. Posch[a], S. Fuchs[a], A. Obwegeser[c], D. Orth-Höller[a], C. Lass-Flörl[a,b]

Sağlık personellerinin elleri

Hastadan uzak yüzeyler

Hastaya yakın yüzeyler

Table ... Numb... ence ... omi... e units ($N$=523)

| War... | Cult... | | | |
|---|---|---|---|---|
| | HCWs' hands | Surfaces distant from patients | Surfaces close to patients | Prevalence of contamination |
| A | 3/10 (30%) | 0/22 (0%) | 6/25 (24.0%) | 9/57 (15.8%) |
| B | 2/9 (22.2%) | 4/19 (21.1%) | 5/48 (10.4%) | 11/76 (14.5%) |
| C | 2/10 (20%) | 2/26 (7.7%) | 7/49 (14.3%) | 11/85 (12.9%) |
| D | 1/9 (11.1%) | 2/24 (18.2%) | 7/45 (15.6%) | 10/78 (12.8%) |
| E | 0/5 (0%) | 4/22 (18.2%) | 3/30 (10%) | 7/57 (12.3%) |
| F | 1/10 (10%) | 0/11 (0%) | 4/31 (12.9%) | 5/52 (9.6%) |
| G | 0/3 (0%) | 2/14 (14.3%) | 0/20 (0%) | 2/37 (5.4%) |
| H | 1/10 (10%) | 0/16 (0%) | 1/55 (1.8%) | 2/81 (2.5%) |
| Total | 10/66 (15.2%) | 14/154 (9.1%) | 33/303 (10.9%) | 57/523 (10.9%) |

I. Wille et al. / Journal of Hospital Infection (2017) 1-6

# Hastane - Enfeksiyon Kaynağı

Hastane enfeksiyonlarının çoğunluğu;

Hastanın **endojen florasından köken** almaktadır.

Bir kısmı **(%20-40) sağlık personelinin elleri veya tıbbi ekipman** aracılığıyla hastaya bulaştırılan mikroorganizmalar nedeniyle oluşmaktadır.

Hastanedeki **çevresel yüzeyler** bu mikroorganizmalar ile kontamine olurlar ve enfeksiyon kaynağı olarak rol oynarlar.

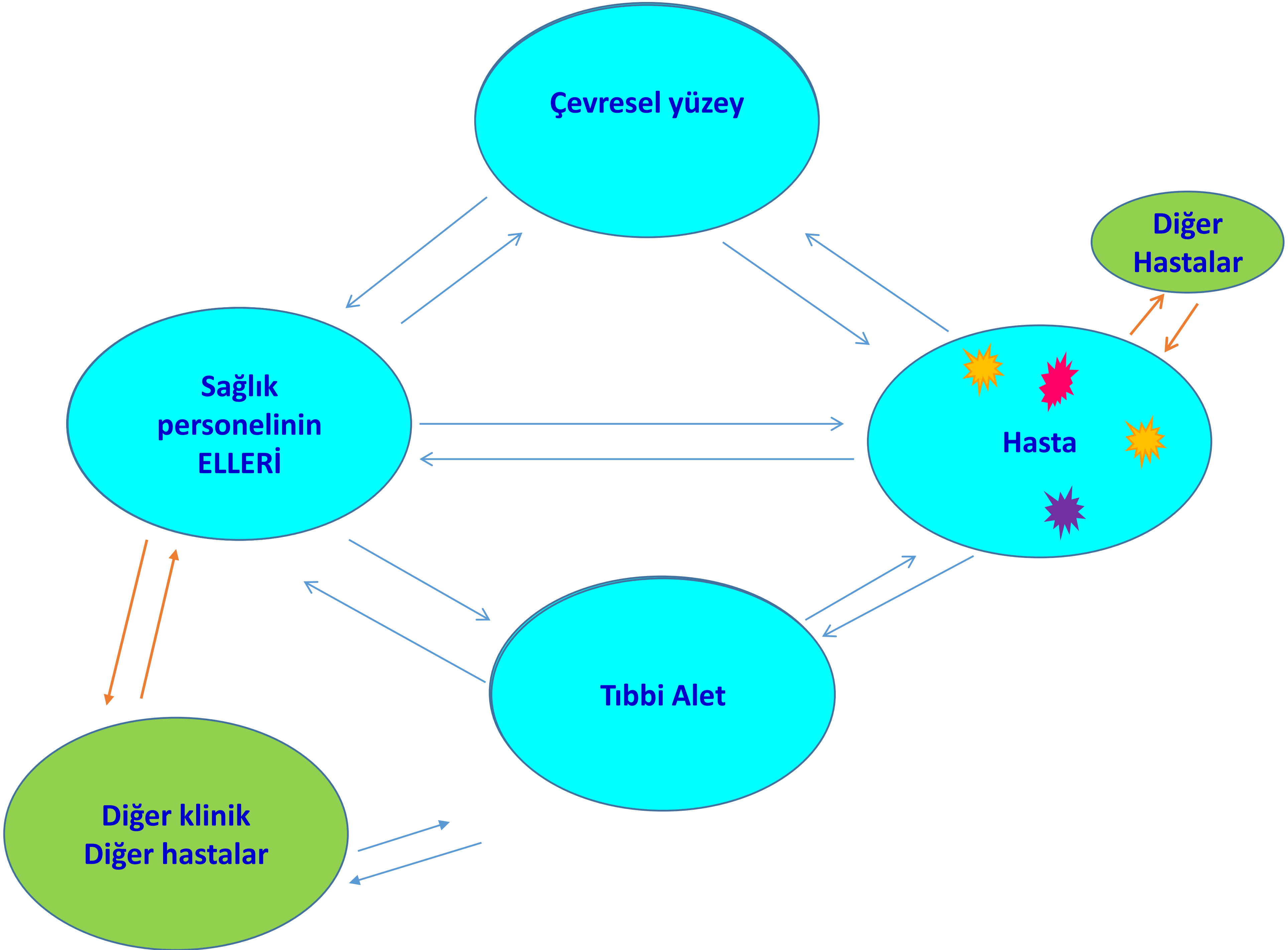
American Journal of Infection Control 44 (2016) e69-e76

Eur J Clin Microbiol Infect Dis (2015) 34:1–11

| Mikroorganizma | Kuru yüzeylerde canlı kalma süresi |
|---|---|
| ***Acinetobacter spp.*** | 3 gün - 5 ay |
| ***P. aeruginosa*** | 6 saat – 16 ay |
| ***VRE*** | 5 gün – 4 ay |
| ***MRSA*** | 7 gün – 7 ay |
| ***E. coli*** | 1,5 saat – 16 ay |
| ***Klebsiella spp*** | 2 saat – 30 ay |
| *M. tuberculosis* | 1 gün – 4 ay |
| *C. difficile* sporları | 5 ay |
| *Salmonella typhi* | 10 gün – **4.2 yıl** |
| *Sigella spp.* | 2 gün – 5 ay |
| *Haemophilus influenza* | 12 gün |

| Mikroorganizma | Kuru yüzeylerde canlı kalma süresi |
|---|---|
| **Adenovirus** | 7 gün – 3 ay |
| **İnfluenza virus** | 1-2 gün |
| **Norovirus** | 8 saat – 7 gün |

Eur J Clin Microbiol Infect Dis (2015) 34:1–11


Çevresel yüzey
Diğer
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Sağlık
personelinin
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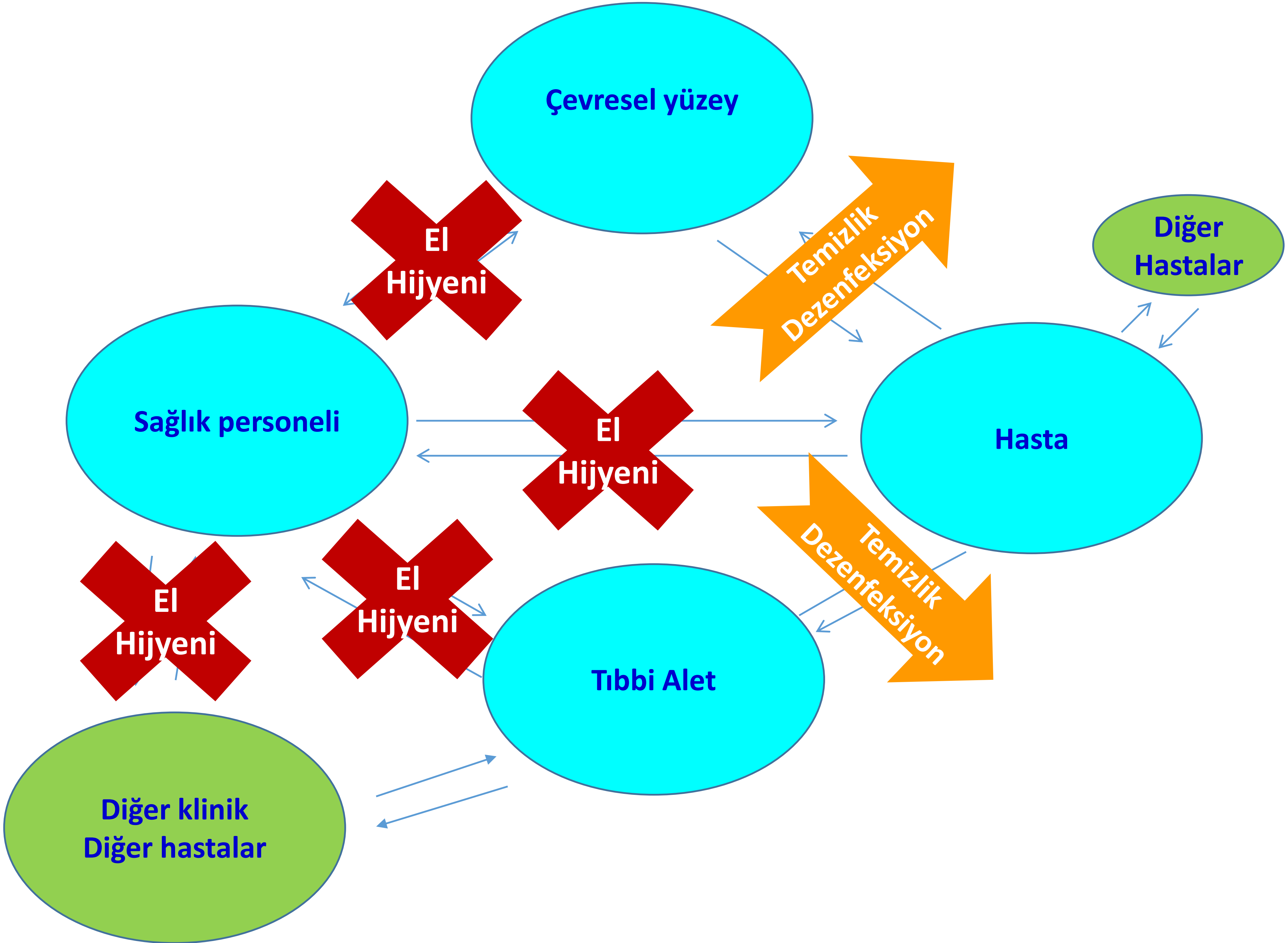
Hasta
Tıbbi Alet
Diğer klinik
Diğer hastalar


Çevresel yüzey
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Temizlik
Dezenfeksiyon
Tıbbi Alet
Diğer klinik
Diğer hastalar

Hastanelerde çevresel yüzeylerdeki mikroorganizmaları yok etmek/azaltmak için **temizlik** ve **dezenfeksiyon** yöntemleri uygulanır.

Standart yöntem **“manüel temizlik”** ve **“manüel dezenfeksiyon”** dur.

# Tanım

- **Temizlik**
  - **Su ve deterjan** kullanarak silme/yıkama
  - Kirlerin mekanik olarak ortamdan uzaklaştırılması
    - *Bu işlem sırasında mikroorganizmalar da mekanik olarak uzaklaştırılır*

- **Dezenfeksiyon**
  - Temizlik işlemine ilave olarak; bir dezenfeksiyon yöntemi (ısı, UV, kimyasal vb.) kullanarak ortamdaki mikroorganizmaların öldürülmesi ve sayısının azaltılması

# Tanım

- **Temiz yüzey**
  - Yüzeyde görünür kir yok. Temiz görünüyor.
    - *Temiz görünmekle birlikte yüzeyde çok sayıda mikroorganizma bulunabilir !!!*

- **Hijyenik yüzey**
  - Temiz yüzeyde; mikroorganizma olmaması veya "az sayıda" *(kabul edilebilir bir sayının altında)* olması

  - Hijyenik yüzey için **TEMİZLİK (+/-) DEZENFEKSİYON**

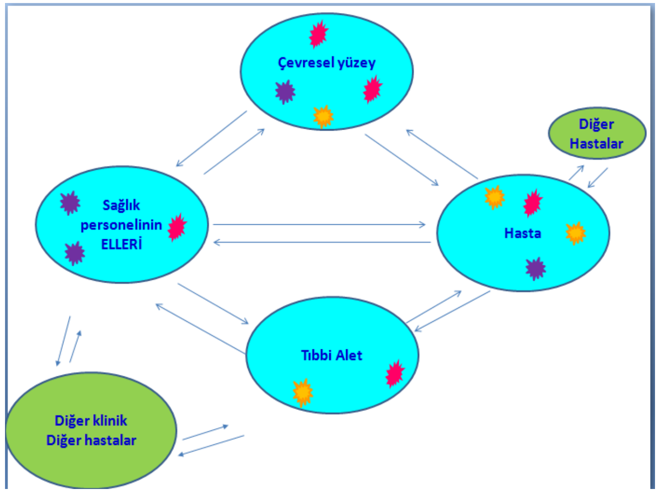
GMS Hygiene and Infection Control 2017, Vol. 12,

# Riskli Yüzeyler (Ellerin sık temas ettiği yüzeyler)

- **Bazı çevresel yüzeyler mikroorganizma transferinde daha fazla rol oynar.**
  - **ELLERİN sık TEMAS ettiği yüzeyler**
    - Monitör düğmesi
    - Klavyeler
    - Kapı kolları
    - Elektrik düğmeleri
    - Hasta yatak başı
    - Serum askısı vb.

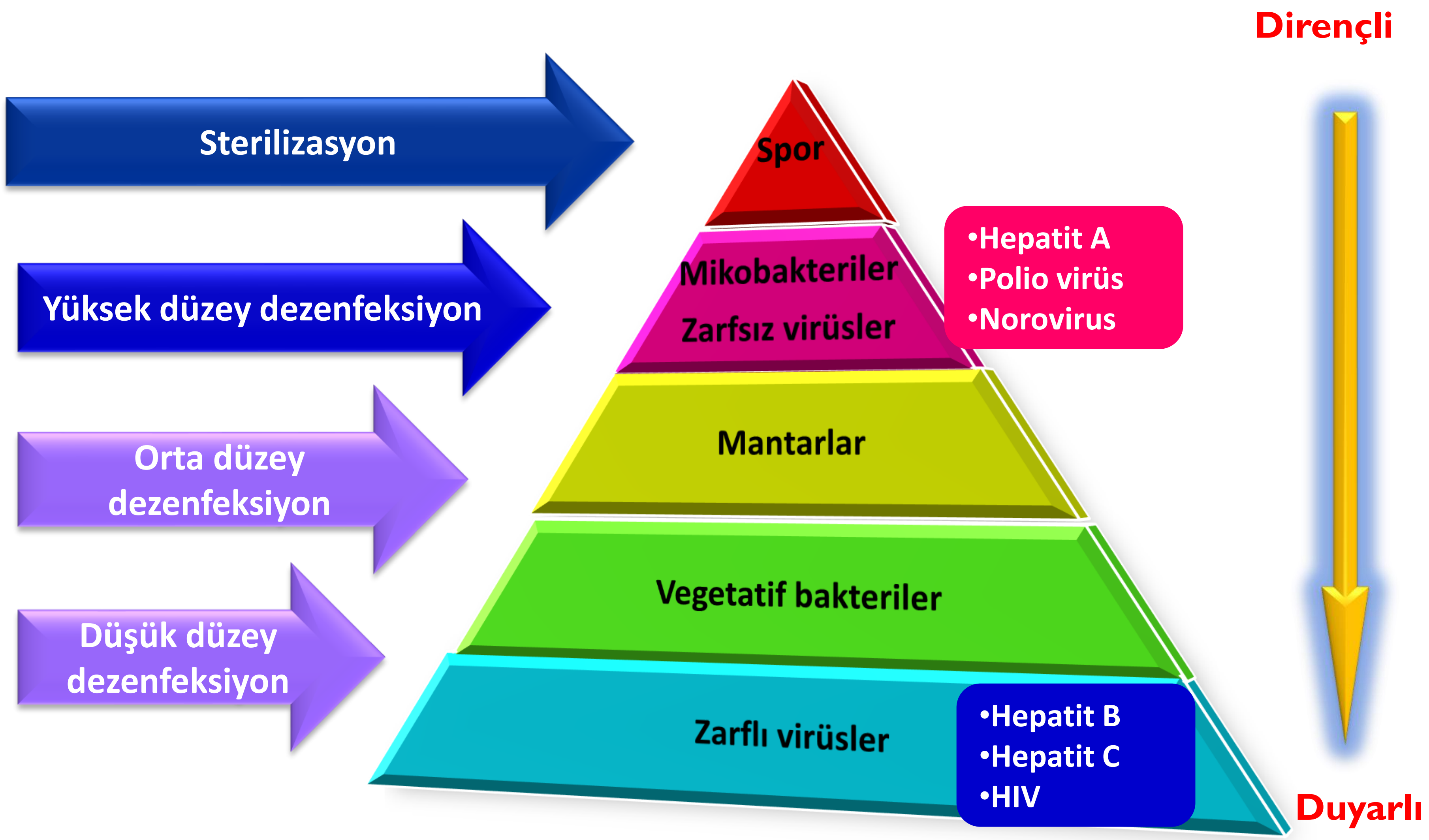
Eur J Clin Microbiol Infect Dis (2015) 34:1–11


- **Bazı alanlar (üniteler) enfeksiyon gelişimi açısından daha fazla risk taşırlar**
  - Ameliyathane
  - Yoğun bakım ünitesi
  - Transplantasyon ünitesi
  - Diyaliz ünitesi
  - Vb.



# Hangi dezenfektan?

# Mikroorganizmaların dezenfektanlara direnci



# Tıbbi aletlerin sınıflaması

| | |
|---|---|
| Kritik alet | Sterilizasyon |
| Yarı kritik | Yüksek düzey dezenfeksiyon |
| Kritik olmayan | Düşük-orta düzey dezenfeksiyon |

# Yüzey dezenfektanları

| Etken | Avantaj | Dezavantaj |
|---|---|---|
| **Alkol** | **•Bakterisidal, tüberkülosidal, fungisidal, virusidal**<br>•Hızlı etkili<br>•Kullanımı kolay<br>•Yüzeyde rezidü kalmaz | **•Sporisidal DEĞİL**<br>•Organik materyal etkinliği azaltır.<br>•Yanıcıdır (geniş yüzeyler için uygun değil)<br>•EPA onayı yok |
| **Klor** | **•Bakterisidal, tüberkülosidal, fungisidal, virusidal, SPOROSİDAL**<br>•Hızlı etkili<br>•Yüzeyde rezidü kalmaz<br>•Biyofilm oluşumunu engeller<br>•Ucuz<br>•EPA onayı var | •Göz ve solunum yolu için **iritan** (yüksek konsantrasyonlarda)<br>•Metal için **koroziv** (500 ppm üzerinde)<br>•Organik materyal etkinliği azaltır.<br>•Asit veya amonyak ile karıştırıldığında **toksik klorin gazı** oluşur |
| **Quarterner amonyum bileşikleri** | • **Bakterisidal, fungisidal, virusidal (zaflı virüsler)**<br>• Yüzeyler ile geçimli<br>• EPA onayı var. | **Sporisidal DEĞİL,**<br>Genellikle **tuberkülosidal DEĞİL**,<br>**zarfzıs virüslere etkili DEĞİL**<br>Organik madde etkinliğini azaltır.<br>Ast |

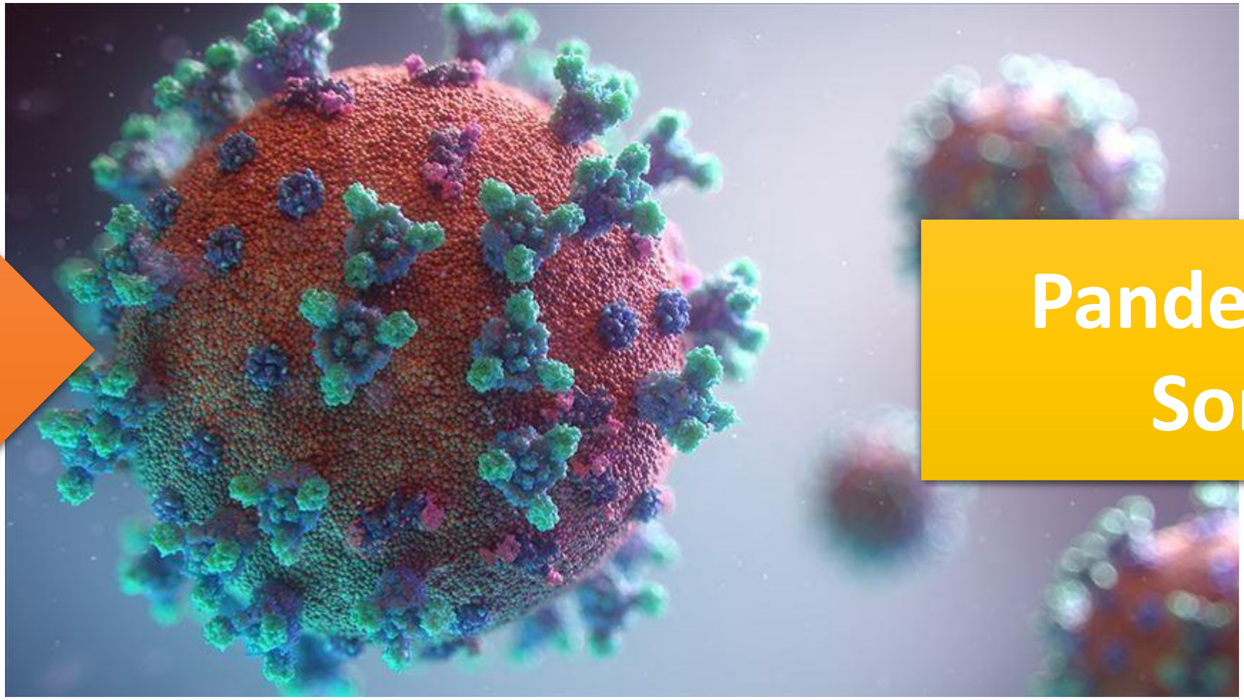
William A. Rutala. American Journal of Infection Control 41 (2013) S36-S41

# Yüzey dezenfektanları

| Etken | Avantaj | Dezavantaj |
|---|---|---|
| **Hidrojen peroksit** | **Bakterisidal, virusidal, tüberkülosidal (5 dakika)**<br>Koroziv değil<br>Çalışanlar için güvenli<br>Çevreye zararsız<br>Organik materyalden etkilenmez<br>EPA onayı var | Maliyet daha yüksek |
| **İyot** | **•Bakterisidal, virusidal, tüberkülosidal** | **•Sporisidal DEĞİL**<br>**•Fungisid etki için temas süresi uzun**<br>•Slikon kateterlere koroziv |
| **Fenol** | **Bakterisidal, tüberkülosidal, fungisidal, virusidal**<br>EPA onayı var | **•Sporisidal DEĞİL**<br>•Doku için toksik<br>•Ciltte depigmentasyon<br>•Çocuklarda hiperbilirubinemi |

William A. Rutala. American Journal of Infection Control 41 (2013) S36-S41

Pandemiden Önce



Pandemiden Sonra

*Infection Control & Hospital Epidemiology* (2020), 1–3
doi:10.1017/ice.2020.416

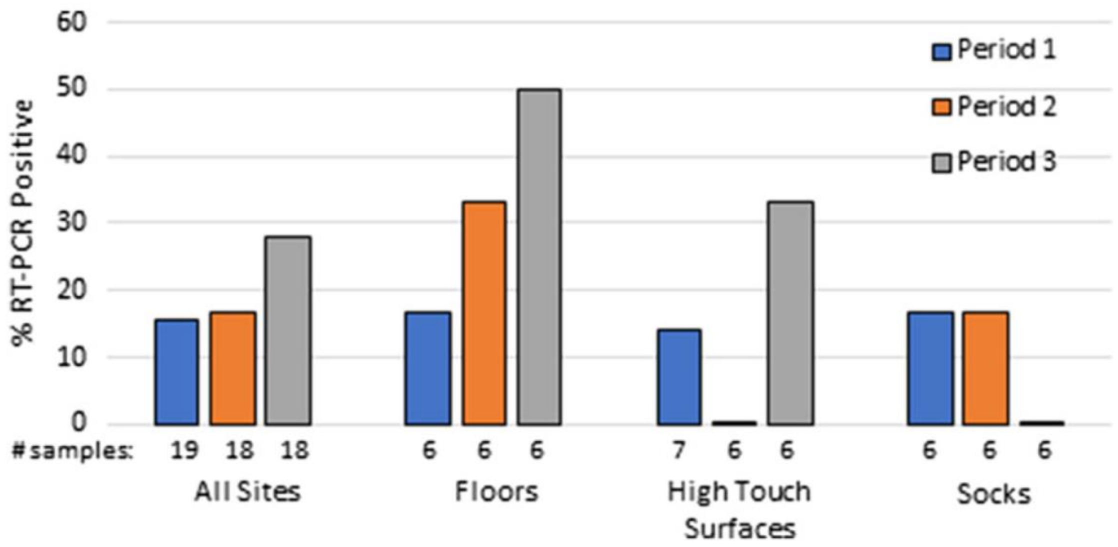
SHEA
The Society for Healthcare Epidemiology of America

**Concise Communication**

# Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) nucleic acid contamination of surfaces on a coronavirus disease 2019 (COVID-19) ward and intensive care unit

Sarah N. Redmond BS[1], Khalid M. Dousa MD[1,2], Lucas D. Jones BS[3], Daniel F. Li BS[1,4], Jennifer L. Cadnum BS[4], Maria E. Navas MD[5], Nataliya M. Kachaluba MLS (ASCP)[5], Sandra Y. Silva MD[6], Trina F. Zabarsky MSN, RN[7], Elizabeth C. Eckstein RN[7], Gary W. Procop MD[8] and Curtis J. Donskey MD[1,2]

**YBÜ'de çevresel yüzeylerin SARS-CoV-2 ile kontaminasyonu?**




Sarah N. Redmond BS. Infection Control & Hospital Epidemiology (2020), 1–3

Journal of Infection 81 (2020) e1–e5

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journal homepage: www.elsevier.com/locate/jinf

hall drier. HCW's used PPE assessed included gloves, eye protection or face shield and hand sanitizer dispensers; samples were collected after the HCW performed their duties with a COVID-19 patient. Hospital areas were classified into contamination zones, based on the percentage of swabs that were positive in that area/object.

# Environmental contamination of SARS-CoV-2 in healthcare premises

Guangming Ye[a,#], Hualiang Lin[b,#], Song Chen[c,#], Shichan Wang[a], Zhikun Zeng[a], Wei Wang[a], Shiyu Zhang[b], Terri Rebmann[d], Yirong Li[a], Zhenyu Pan[e], Zhonghua Yang[c], Ying Wang[f], Fubing Wang[a], Zhengm

**Table 3**

Percentage of Positive Samples of SARS-CoV-2 RNAs for Health Care Workers' Used Personal Protection Equipment.

| Personal Protection Equipment (PPE) | Total Number, No. | Positive Number, No. (%) | *P* value |
|---|---|---|---|
| Total | 195 | 25 (12.8) | $P < 0.01$ |
| Hand sanitizer Dispensers | 59 | 12 (20.3) | |
| Gloves | 78 | 12 (15.4) | |
| Eye Protection or Face Shield | 58 | 1 (1.7) | |

**Table 1**
Percentage of Positive Hospital Environmental Samples for SARS-CoV-2 RNAs

| Hospital Function Zone | Total Number, No. | Positive Number, No. (%) | *P* value |
|---|---|---|---|
| Total | 626 | 85 (13.6) | $P < 0.001$ |
| Contamination Zone III (High Positive Detection Rate) >18% | | | |
| ICU * | 69 | 22 (31.9) | |
| Obstetric Isolation Ward for NCP † | 32 | 9 (28.1) | |
| Isolation Ward ‡ | 56 | 11(19.6) | |
| Contamination Zone II (Middle Positive Detection Rate), 9% - 18% | | | |
| Outpatient Lobby | 30 | 5 (16.7) | |
| Emergency Department | 80 | 10 (12.5) | |
| Office and Preparation Area of the Isolation Ward for NCP | 41 | 5 (12.2) | |
| Obstetric Ward | 33 | 4 (12.1) | |
| Clinical Laboratories | 96 | 11(11.5) | |
| Contamination Zone I (Low Positive Detection Rate) <9% | | | |
| Fever Clinic | 46 | 3 (6.5) | |
| CT Examination Room | 36 | 2 (5.6) | |
| General Ward | 55 | 3 (5.5) | |
| Contamination Zone 0 (Positive Detection Rate) = 0 | | | |
| Administration Area | 42 | 0 (0) | |
| Parking Lot | 10 | 0 (0) | |

G. Ye, H. Lin and S. Chen et al. / Journal of Infection 81 (2020) e1–e5

**Table 2**
Percentage of Positive Hospital Object Samples for SARS-CoV-2 RNAs.

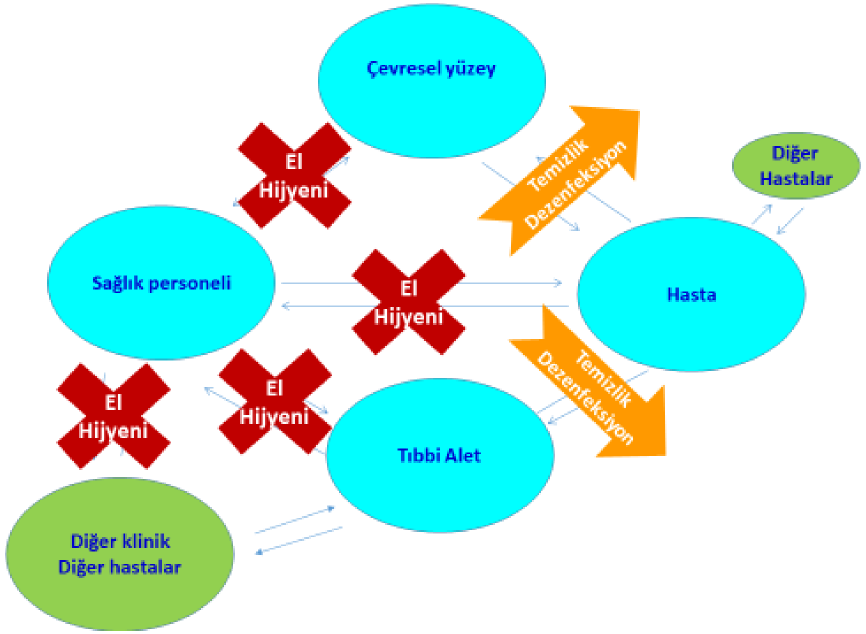
| Hospital Objects | Total Number, No. | Positive Number, No. (%) | *P* value |
|---|---|---|---|
| Total | 431 | 60 (13.9) | $P < 0.05$ |
| Contamination Level II (High Positive Detection Rate) >10% | | | |
| Self-service printer * | 10 | 2 (20.0) | |
| Table top/ keyboard | 173 | 29 (16.8) | |
| Doorknob | 75 | 12 (16.0) | |
| Telephone | 56 | 7 (12.5) | |
| Medical equipment † | 48 | 6 (12.5) | |
| Contamination Level I (Low Positive Detection Rate) <10% | | | |
| Public facilities ‡ | 25 | 2 (8.0) | |
| Wall/ floor | 18 | 1 (5.6) | |
| Others § | 26 | 1 (3.9) | |

# Çevresel temizlik ve dezenfeksiyon

- **SARS-CoV-2** esas olarak damlacık ve hava yolu ile bulaşır.

- Çevresel yüzeylerin bulaşma açısından rolü sınırlıdır.
- Ancak kontamine yüzeyler çapraz bulaşma açısından önemli

- YBÜ de çevresel yüzeyler periyodik olarak temizlenip dezenfekte edilmelidir.




Prashant Nasa. Lancet Infect Dis. Vol 22 March 2022

Environmental Science and Pollution Research
https://doi.org/10.1007/s11356-022-20237-7

RESEARCH ARTICLE

Check for updates

# SARS-CoV-2 surveillance in indoor and outdoor size-segregated aerosol samples

Álvaro del Real[1] · Andrea Expósito[2] · La

SARS-CoV-2 ile enfekte hastanın kaldığı odanın havasında RT-PCR pozitif

**Abstract**

We aimed to determine the presence of SARS-CoV-2 RNA in indoor and outdoor size-segregated aerosol samples ($PM_{10\text{-}2.5}$, $PM_{2.5}$). Five outdoor daily samples were collected between November and December 2020 in an urban/industrial area with relatively high $PM_{10}$ levels (Maliaño, Santander, Spain) by using a PM impactor (air flowrate of 30 L/min). In a non-hospital indoor sampling surveillance context, 8 samples in classrooms and 6 samples in the central library-Paraninfo of the University of Cantabria (UC) were collected between April and June 2021 by using personal PM samplers (air flowrate of 3 L/min). Lastly, 8 samples in the pediatric nasopharyngeal testing room at Liencres Hospital, 6 samples from different single occupancy rooms of positive patients, and 2 samples in clinical areas of the COVID plant of the University Hospital Marqués de Valdecilla (HUMV) were collected between January and May 2021. N1, N2 genes were used to test the presence of SARS-CoV-2 RNA by RT-qPCR. SARS-CoV-2 positive detection was only obtained from one fine fraction ($PM_{2.5}$) sample, corresponding to one occupancy room, where a patient with positive PCR and cough was present. Negative results found in other sampling areas such as the pediatric nasopharyngeal testing rooms should be interpreted in terms of air sampling volume limitation and good ventilation.

Received: 11 November 2021 | Revised: 21 February 2022 | Accepted: 10 March 2022
DOI: 10.1111/ina.13023

ORIGINAL ARTICLE

WILEY

# Detection and isolation of airborne SARS-CoV-2 in a hospital setting

Nuno Rufino de Sousa[1] | Laura Steponaviciute[1] | Lucille
Karolina Nissen[2] | Midori Kjellin[2] | Björn Reinius[3] | Eri
Klas I. Udekwu[4] | Antonio Gigliotti Rothfuchs[1]

**Abstract**

Transmission mechanisms for severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) are incompletely understood. In particular, aerosol transmission remains unclear, with viral detection in air and demonstration of its infection potential being actively investigated. To this end, we employed a novel electrostatic collector to sample air from rooms occupied by COVID-19 patients in a major Swedish hospital. Electrostatic air sampling in conjunction with extraction-free, reverse-transcriptase
ction of SARS-CoV-2 in air from
0/22; 45%). Detection with hid-
the surface of exhaust ventila-
m from the COVID-19 patient.
/-2 particles from room air, with
a total of 496 plaque-forming units (PFUs) being isolated, establishing the presence of infectious, airborne SARS-CoV-2 in rooms occupied by COVID-19 patients. Our results support circulation of SARS-CoV-2 via aerosols and urge the revision of existing infection control frameworks to include airborne transmission.

- **Çok sayıda hava örneğinde SARS-CoV-2 RT-PCR pozitif**
- **Havadan SARS-CoV-2 izolasyonu (hücre kültürü) pozitif**

RUFINO de SOUSA et al. Indoor Air. 2022;32:e13023.

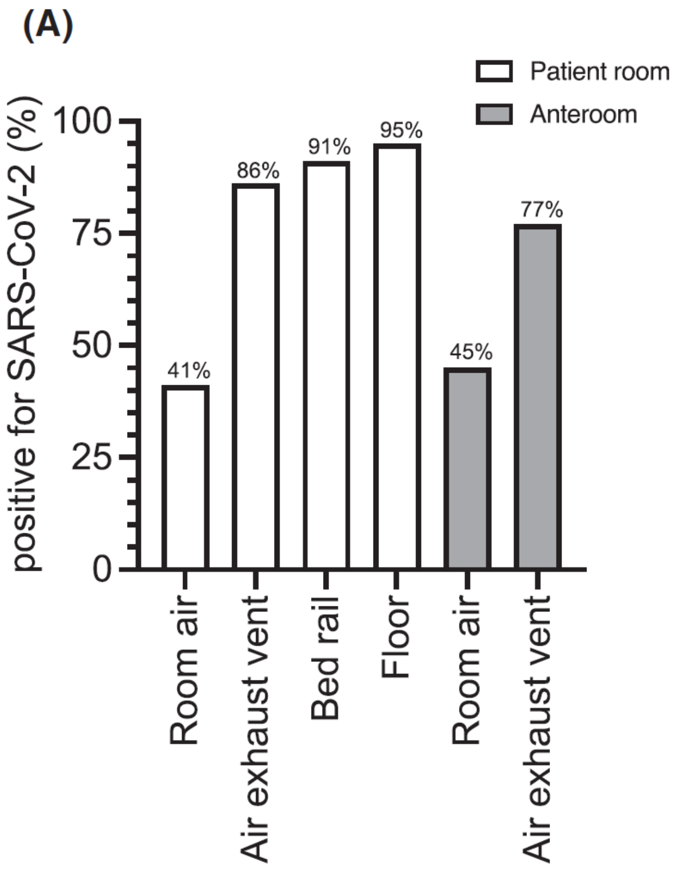



**TABLE 4** Detection of SARS-CoV-2 by PCR and plaque assay

| Detection | Patient room | Anteroom | Patient room and adjoining anteroom |
|---|---|---|---|
| hid-RT-PCR | 9/22 (41%) | 10/22 (45%) | 6/11 (54%) |
| PFU recovery | 3/9 (33%) | 8/10 (80%) | 3/6 (50%) |

*Note:* Summary of the detection of SARS-CoV-2 in the air in the sampled patient rooms and anterooms by PCR and their respective PFU recovery. Percentages (%) given.

**Odanın saatlik hava değişim sayısı 12'den az !!!**

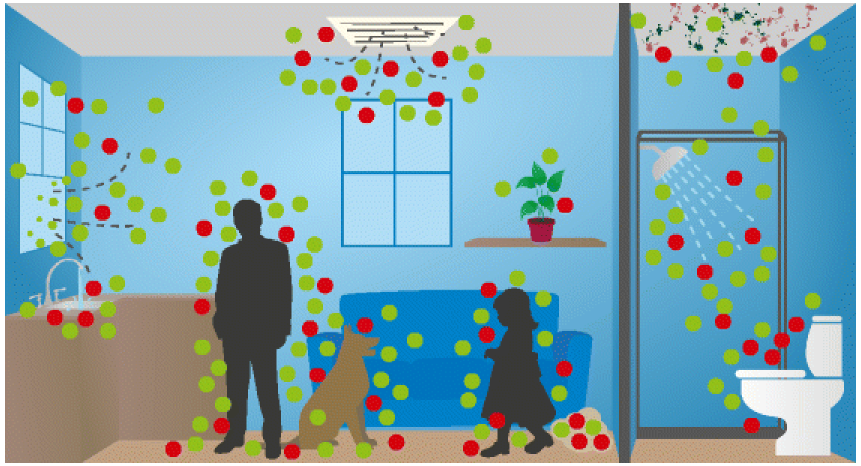
COVID-19 patient rooms, and in adjoining anterooms in the infectious disease ward of a major Swedish hospital. Importantly, our study is the first to recover PFUs of SARS-CoV-2 from air. SARS-CoV-2 RNA and active virus particles were detected at more than 2 meters from the patient, the only occupant and productive reservoir of virus in the room. Cumulatively, our results provide support

munocompromised patients. Unfortunately, the air filtration in the investigated patient rooms was well below the recommended 12 air-changes-per-hour. This probably increased our ability to cul-

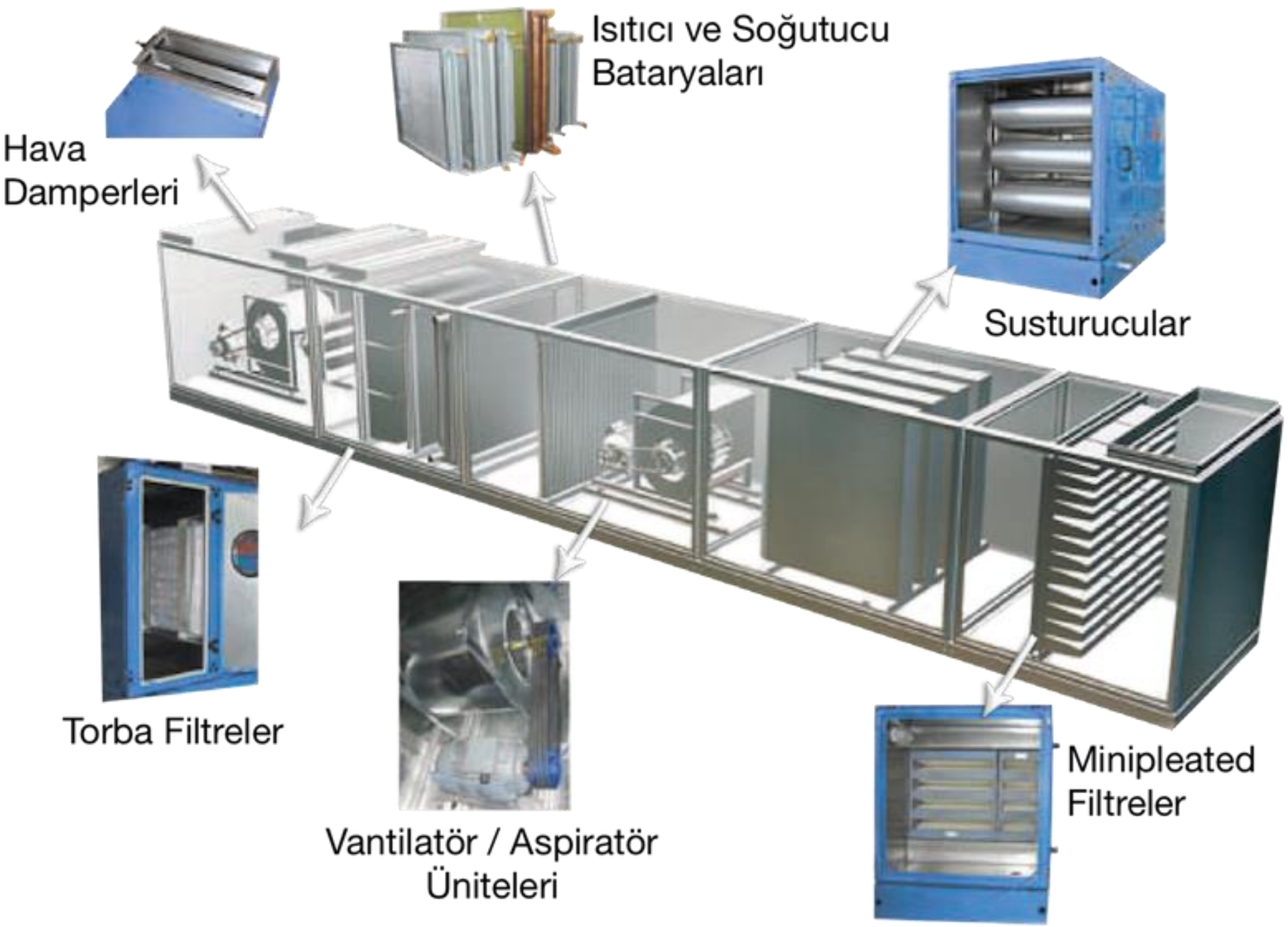
RUFINO de SOUSA et al. Indoor Air. 2022;32:e13023.

- SARS-CoV-2 esas olarak damlacık yoluyla bulaşmakla birlikte aerolize olan solunum sekresyonları nedeniyle HAVA YOLUYLA da bulaşmaktadır
- YBÜ ünitelerinde solunum sekresyonu aerolizasyonu oluşturan çok sayıda işlem uygulanmaktadır.
- YBÜ de çalışan personel SARS-COV-2 bulaşı açısından yüksek risk altındadır.
- YBÜ de yatan hastalar nozokomiyal SARS-CoV-2 bulaşı açısından risk altındadırlar

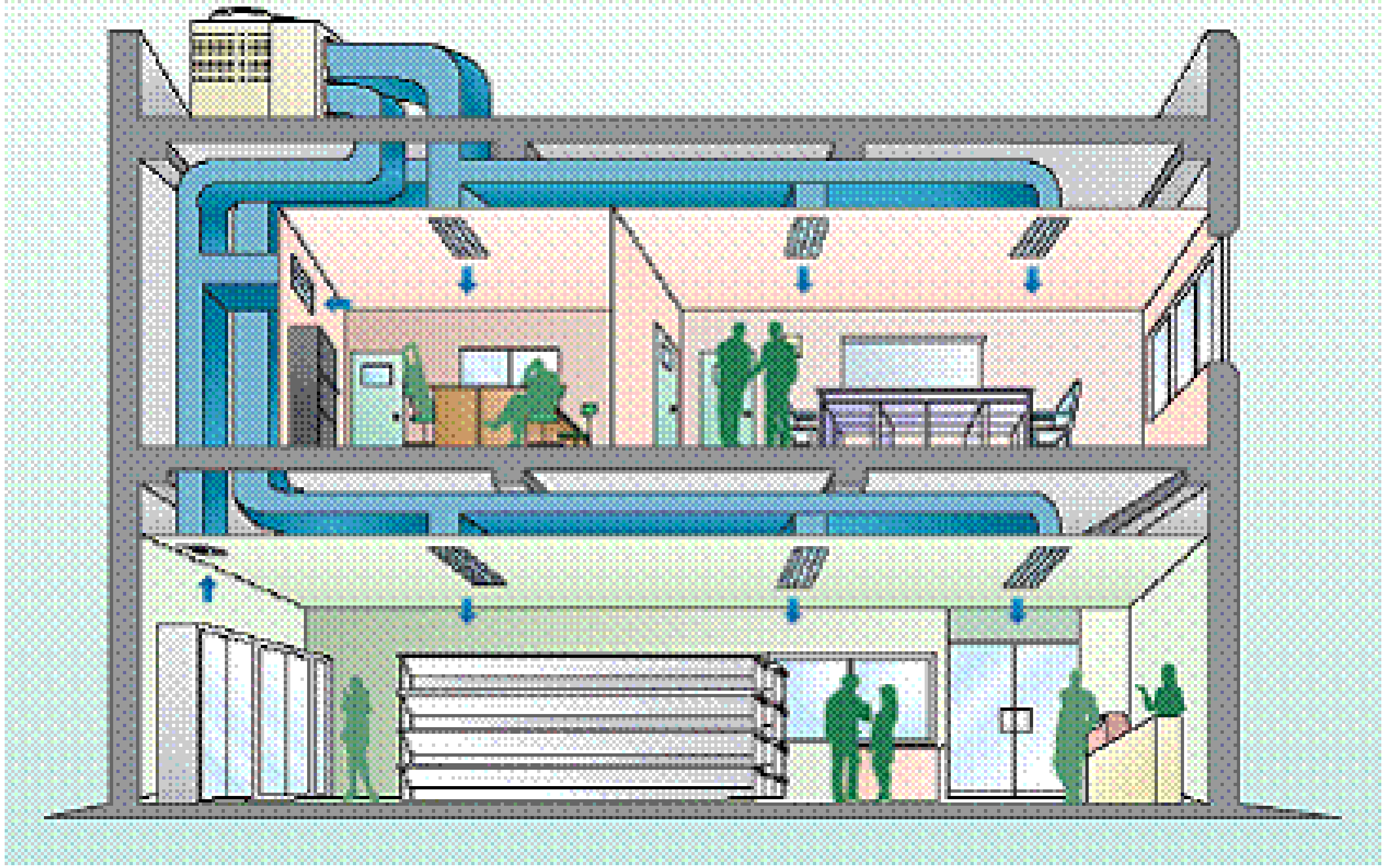
Lancet Infect Dis 2022;




**Mikroorganizmalar havadaki partikülüler vasıtasıyla taşınır**



Isıtıcı ve Soğutucu
Bataryaları
Hava
Damperleri
Susturucular
Torba Filtreler
Vantilatör / Aspiratör
Üniteleri
Minipleated
Filtreler



**Klasik konfor klimasında parametreler;**

- Sıcaklık ve nemdir.

**Temiz oda klimasında;**

- Sıcaklık
- Nem
- Canlı ve cansız partiküller
- Hava akım hızı ve yönleri,
- Ortam basıncı

gibi parametrelerin kontrolü gerekmektedir.

# Temiz oda

Uluslararası kabul edilen temizlik standartlarına göre;

- Toz,
- Partikül,
- Atık anestezik gaz
- Kötü koku gibi cansız parçacıklardan
- Mikroorganizma gibi canlı parçacıklardan korunmak üzere;

**sıcaklık, nem, basınç, gürültü seviyesi** ve **hava hareketi** belirli standartlar içerisinde olan hijyenik ortamdır

Temiz oda standardı: **ISO 14644-1:1999(E)**
***(****Cleanrooms and associated controlled environments Part 1: Classification of air cleanlines)*

Tıp Teknolojileri Kongresi, 27-29 Ekim 2016, Antalya

Saran et al. Critical Care (2020) 24:194


HEPA
99.9%

# HEPA Filtre

HEPA filtre (**H**igh **E**fficiency **P**articulate **A**ir Filter)
(Yüksek Verimlilikte Partikül Tutucu Hava Filtresi)

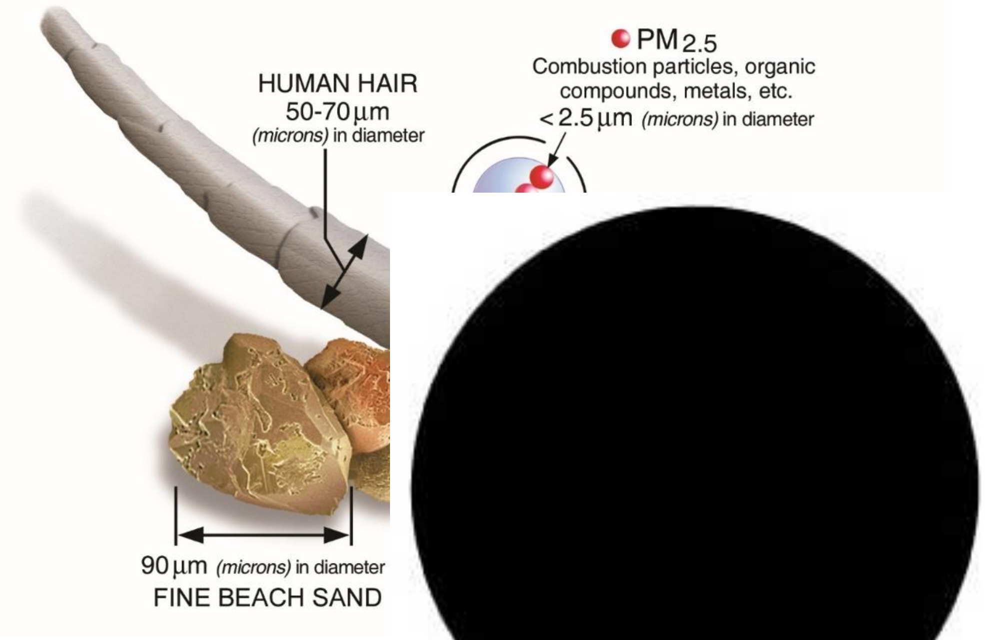
- **0,3 mikrondan** büyük partiküllerin **%85'den fazlasını** havadan arındırabilen filtrelerdir.
- Partikülleri **%99,97** oranında tutabilen filtrelere **True Hepa (Gerçek Hepa)** filtre denir.
- Partikülleri **%99,99** oranında tutabilen filtrelere ise **ULPA** filtre denir.

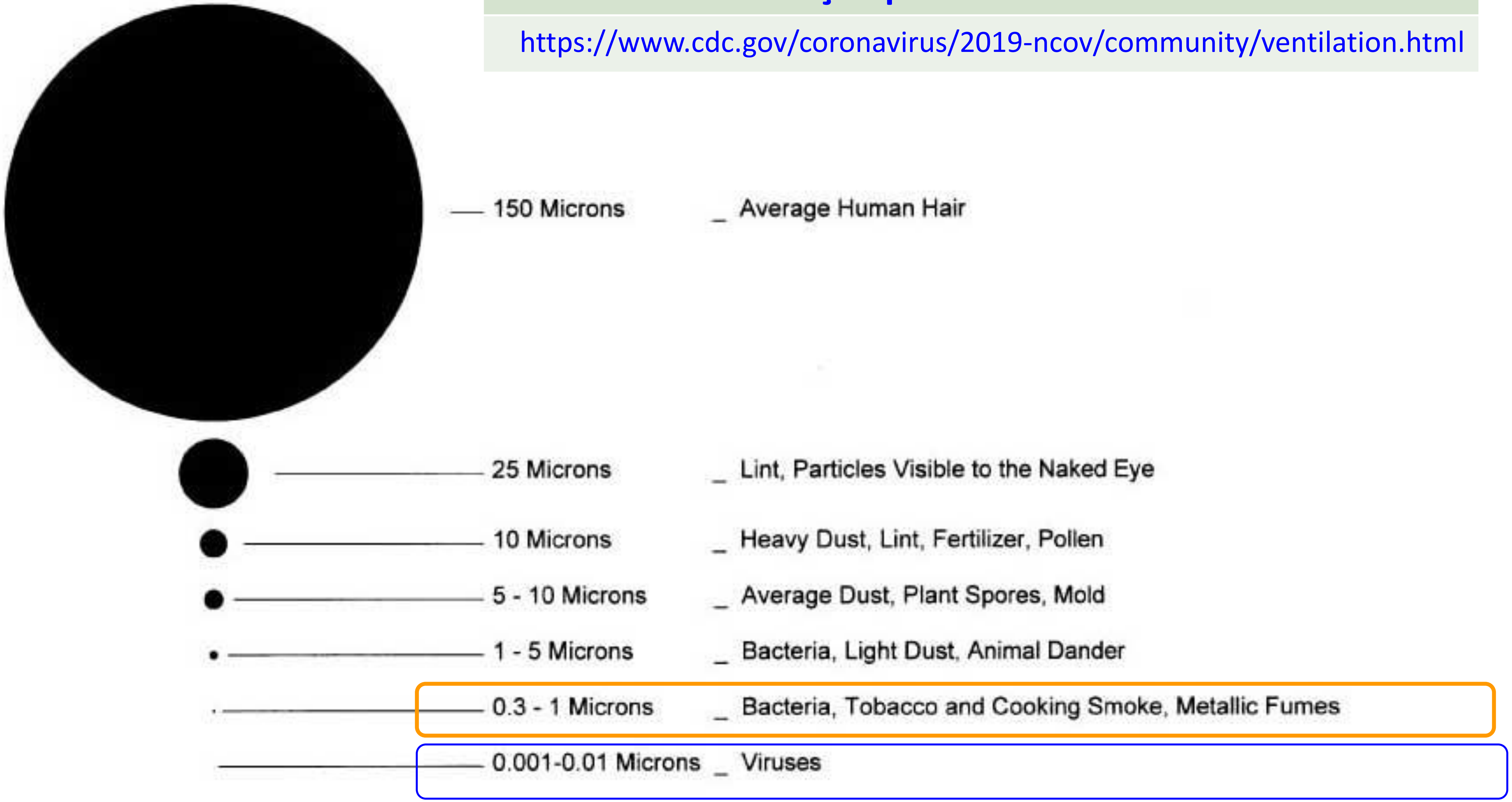
HEPA filtrelerinin etkinliği "dioctyl phthalate" (DOP) testi ile değerlendirilir.

DOP testinde filtrenin **0,3μ** büyüklüğündeki partikülleri tutması test edilir.

**Mikroorganizmalar havada kendi başına hareket etmez. Havada dolaşan partiküller üzerinde bulunur**

https://www.cdc.gov/coronavirus/2019-ncov/community/ventilation.html



# Hastanelerde niçin özel tasarlanmış havalandırma sistemleri gerekli?

Bir çok çalışmada; bazı bakterilerin **hava yoluyla da taşınabileceği** ve enfeksiyon gelişimi için **potansiyel risk oluştuğu** gösterilmiştir.

- Yanık ünitelerinde MRSA
- YBÜ ünitesinde acinetobacter
- Clostridium difficile sporları
- Lejyonella
- Aspergillus

Hastanelerde havada bulunan mikroorganizmalar;

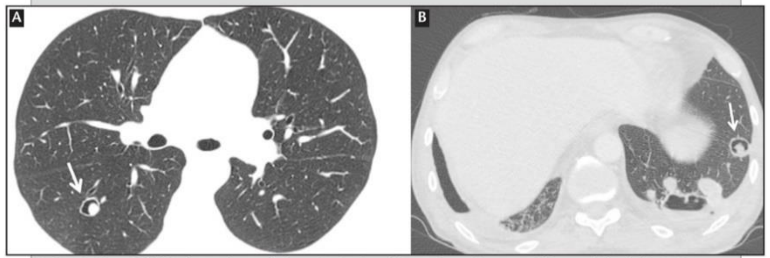
- Akciğer enfeksiyonu (Özellikle bağışıklık sistemi baskılanmış hastalarda fungal pnömoniler)
- Cerrahi alan enfeksiyonu (CAİ) gibi enfeksiyonlara neden olabilir.

**Damlacık yoluyla (droplet-borne) bulaşanlar**

- Boğmaca
- İnfluenza
- *S aureus*
- *N. meningitis*
- *SARS-CoV-2*

**Hava yoluyla (air-borne) bulaşanlar**

- Tüberküloz
- Suçiçeği
- Norovirüs
- Aspergillus
- *SARS-CoV-2*



Resim 2. Hava hilal bulgusu (ayça bulgusu). A. Geç dönem invaziv aspergillus nodülü (ok). B. Romatoid artritli olguda sol alt lobda kaviter nekrobiyotik nodüllerden birinde hava hilal bulgusu (ok).

Saran et al. Critical Care (2020) 24:194

# Hastanelerde niçin özel tasarlanmış havalandırma sistemleri gerekli?

Hastanede kritik alanlarda havanın partiküllerden «büyük ölçüde» arındırılmış olması hedeflenir.
Havalandırma sistemleri bu esasa göre kurulur.

**Anestezik ve toksik gazların** ortamdan uzaklaştırılması

**Isı ve nem** ile ortam konforunun arttırılması

Hastadan sağlık personeline hava yoluyla mikroorganizmalar bulaşabilir (Tbc.vb)
Bu hastalara bakım veren **sağlık personelini korumak**

**Hasta ve personel açısından**
**güvenli ve konforlu bir iklimlendirme sistemi**

# Pozitif Basınçlı Oda (Koruyucu Ortam)

| |
|---|
| Özellikle **invaziv fungal enfeksiyon** gelişme riski yüksek olan hastaların bulunduğu ortamlar için |
| Allojenik kemik iliği alıcıları için hazırlanan odalardaki havalandırma sisteminde; **≥0,3 mikron büyüklüğündeki partikülleri filtre edebilen HEPA** filtreleri bulunmalıdır |
| Hasta odası ile oda dışındaki alanlar arasında **>2,5 Pa'lık bir basınç farkı** bulunmalı **Saatte ≥12 hava değişimi** sağlanmalıdır. |
| Filtre edilen havanın akım yönü **hastadan koridora doğru** olmalıdır (temiz→kirli). |

# Negatif Basınçlı Oda

Hava yoluyla bulaşan bir enfeksiyon hastalığı olan hastaların negatif basınçlı odada yatırılması gerekir.

- Tüberküloz
- Kızamık
- Suçiçeği
- SARS

Bu amaçla oluşturulacak izolasyon odalarında hastanın bulunduğu bölüm "kirli" olarak kabul edilir. Hasta odasının, oda dışındaki alanlara oranla negatif basınçta tutulması gerekir.

Oda havasının hastane içinde **resirküle olması engellenmeli** ve **hastane dışına verilmelidir**

Eğer odadan çıkan **hava resirküle edilecekse mutlaka HEPA filtreden** geçirilmelidir

Saatte **en az 12 kez hava değişimi** sağlanmalıdır.

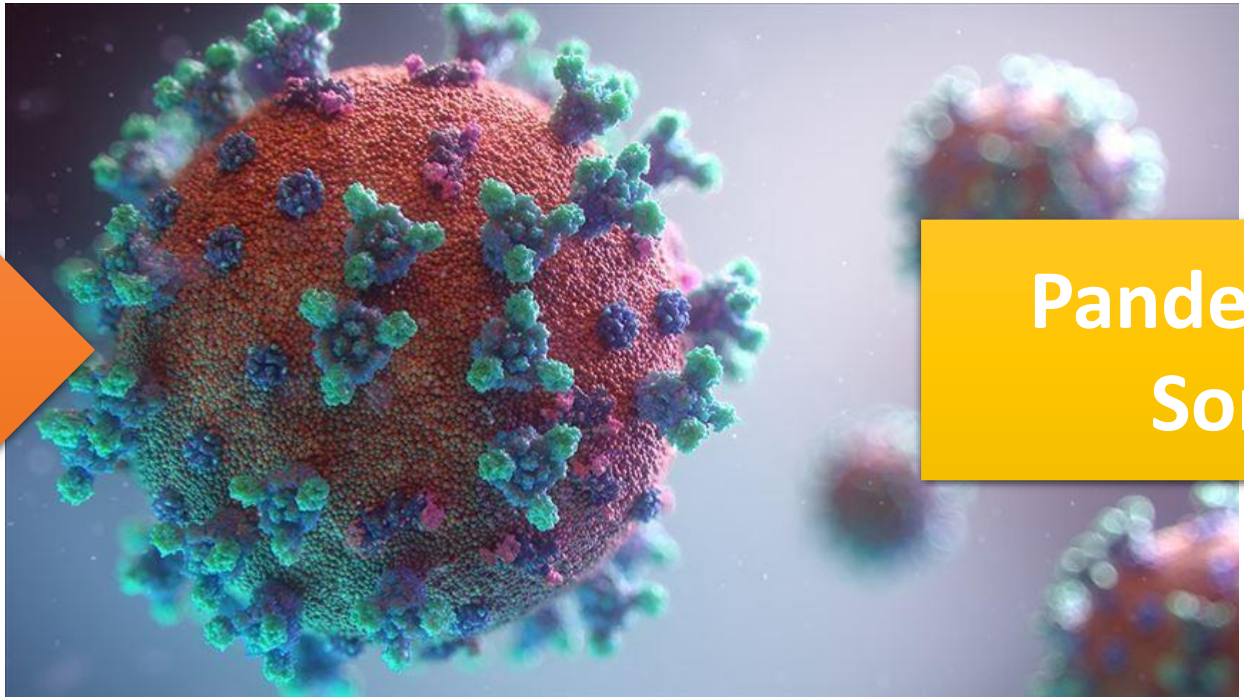
## Hastanede özel havalandırma sistemi gereken üniteler

| | Negatif Basınçlı İzolasyon Odası | Pozitif Basınçlı Oda (Koruyucu Ortam) | YBÜ | Ameliyathane |
|---|---|---|---|---|
| **Oda içi basınç** | Negatif | Pozitif | Pozitif, negatif veya nötr | Pozitif |
| **Hava değişimi (saat)** | ≥12 | ≥12 | ≥6 | ≥15 |
| **Hava akımının yönü** | Temiz→kirli (Hasta kirli tarafta) | Temiz→kirli (Hasta temiz tarafta) | Odanın kullanım amacına göre değişir | Temiz→kirli (Hasta temiz tarafta) |
| **Filtrasyon** | %90 | %99.97 | ≥%90 | %90 |
| **Resirkülasyon** | - | + | + | + |

**Table 4** Comparison of various standards for HVAC in ICUs across the world

| Country | Recommendation society/ association (reference) | Temperature | Relative humidity | Filtration | Pressurization | Air change (outside air/ total) per hour [ACH] | Specific highlights/key differences |
|---|---|---|---|---|---|---|---|
| **Type of ICU—general** | | | | | | | |
| Australia | QHFG [5] | 21–24 °C | 30–60% | G4–F8 | Positive | 2/6 | Filtration: Standards varied from MERV 7–8 to MERV 15. Few recommend HEPA filters (MERV ≥ 17). Pressurization: Positive pressure inside the ICU zone is recommended by Australian, UAE and UK societies, while neutral pressure is recommended in Germany, India, USA and recent UK HTM 2025. Temperature: Wide range varying from 16 to 25 °C. Relative humidity: Majority suggests 30–60% range whereas Indian and German recommendations remain silent. ACH: HTM 2025 (UK) strongly discourages the use of re-circulation type HVAC, presumably to avoid recirculation of airborne pathogens. Air distribution pattern: There exists no specific recommendation of air distribution pattern |
| Germany | VDI [6] | – | – | F9 | Neutral | – | |
| India | ISCCM [7, 8] | 16–25 °C | – | 99% efficiency till 5 μm | Neutral | 2/6 | |
| UAE | DHA [9] | 21–24 °C | 30–60% | HEPA | Positive | 2/6 | |
| UK | DHF [10, 11] | 18–25 °C | – | F7 | Positive[a] | 10 (total)[b] | |
| UK | HTM 2025 [12] | 20–22 °C | 40–60% | – | Neutral | 100% FA | |
| USA | AIA [13] | 21–24 °C | 30–60% | – | Neutral | 2/6 | |
| USA | ASHRAE [14] | 21–24 °C | 30–60% | – | Neutral | 2/6 | |
| **Type of ICU—burn** | | | | | | | |
| Australia | QHFG [5] | 21–32 °C | 30–95% | G4–F8 | Positive | 3/6 | Filtration: Australian recommendations suggest filtration similar to general ICUs whereas the USA recommends HEPA filtration of incoming air. |
| USA | ASHRAE [14] | – | 40–60% | HEPA | Positive | 3/6 | |

Pandemiden Önce



Pandemiden Sonra

## Coronavirus disease 2019 (COVID-19) and HVAC system

With the recent pandemic of coronavirus (COVID-19), the importance of HVAC system in infection control is further highlighted by various interim guidelines (updated till 20 March 2020) [47–51] (Table 5). CDC recommends to isolate patients with suspected COVID-19 in airborne infection isolation rooms (AIIRs) with a minimum ACR of 6 per hour (12 ACR for new construction or renovation), along with the use of HEPA filtration of the incoming air, if re-circulated [47]. World Health Organization (WHO) recommends COVID-19 patients to be isolated in an adequately ventilated negative pressure rooms with a minimum of 12 ACH, especially if aerosol-generating procedures are planned [48, 49].

| COVID-19 Pandemisi ve Değişen Öneriler |
| --- |
| • **Hava değişim sayısı** |
| • **Hepafiltre** |

Saran et al. Critical Care (2020) 24:194

**Table 5** Leading organizations/societies recommendations for HVAC system in the management of COVID-19 patients [updated till 20 March 2020]

| | Name of the organization/society (reference) | | | |
|---|---|---|---|---|
| | CDC [47] | WHO [48, 49] | ESICM/SCCM [50] | ECDC [51] |
| Pressurization | Negative | Negative | Negative | No mention |
| Temperature | No mention | No mention | No mention | No mention |
| Relative humidity | No mention | No mention | No mention | No mention |
| Air change (outside air/ total) per hour (ACH) | Minimum of 6, while 12 in new construction or renovation | At least 12 | At least 12 | No mention |
| Filtration | HEPA filtration if re-circulated | No mention | HEPA filtration if re-circulated | No mention |
| Air distribution pattern | Appropriate directionality | Controlled direction of airflow | No mention | No mention |
| Special comments | – | – | – | Increase frequency of cleaning and maintenance of HVAC systems should be considered |

*WHO* World Health Organization, *CDC* Center for Disease Control and Prevention, *ESICM* European Society of Intensive Care Medicine, *SCCM* Society of Critical Care Medicine, *ECDC* European Centre for Disease Prevention and Control, *HEPA* high-efficiency particulate air filter, *COVID-19* coronavirus disease 2019

Saran et al. Critical Care (2020) 24:194

Journal of Environmental Health Science and Engineering (2020) 18:1699–1707
https://doi.org/10.1007/s40201-020-00580-y

REVIEW ARTICLE

# Architectural design strategies for infectior
# (IPC) in health-care facilities: towards curbi

Udomiaye Emmanuel[1] · Eze Desy Osondu[1] · Kalu Cheche Kalu

**Table 1** The decay of droplet nuclei concentration for different ventilation rates and duration of time in a room. Hua et al. [30]

| Time (min) | Ventilation rate (%) | | | |
|---|---|---|---|---|
| | 6 ACH | 12 ACH | 18 ACH | 24 ACH |
| 0 | 100 | 100 | 100 | 100 |
| 5 | 60.7 | 36.8 | 22.37 | 13.5 |
| 10 | 36.8 | 13.5 | 5.0 | **1.8** |
| 15 | 22.3 | 5.00 | **1.1** | 0.3 |
| 20 | 13.5 | **1.8** | 0.3 | 0.03 |
| 25 | 8.2 | 0.7 | 0.06 | 0.00 |
| 30 | 5.0 | 0.3 | 0.01 | 0 |
| 40 | **1.8** | 0.03 | 0 | 0 |
| 50 | 0. 7 | 0 | 0 | 0 |
| 60 | 0.3 | 0 | 0 | 0 |

Udomiaye Emmanuel. Journal of Environmental Health Science and Engineering (2020) 18:1699–1707

Building and Environment 45 (2010) 559–565

Contents lists available at ScienceDirect

Building and Environment

journal homepage: www.elsevier.com/locate/buildenv

# Natural ventilation for reducing airborne infection in hospitals

Hua Qian [a,b,*], Yuguo Li [b], W.H. Seto [c], Patricia Ching [c], W.H. Ching [b], H.Q. Sun [b]

A B S T R A C T

High ventilation rate is shown to be effective for reducing cross-infection risk of airborne diseases in hospitals and isolation rooms. Natural ventilation can deliver much higher ventilation rate than mechanical ventilation in an energy-efficient manner. This paper reports a field measurement of naturally ventilated hospital wards in Hong Kong and presents a possibility of using natural ventilation for infection control in hospital wards. Our measurements showed that natural ventilation could achieve high ventilation rates especially when both the windows and the doors were open in a ward. The highest ventilation rate recorded in our study was 69.0 ACH. The airflow pattern and the airflow direction were found to be unstable in some measurements with large openings. Mechanical fans were installed in a ward window to create a negative pressure difference. Measurements showed that the negative pressure difference was negligible with large openings but the overall airflow was controlled in the expected direction. When all the openings were closed and the exhaust fans were turned on, a reasonable negative pressure was created although the air temperature was uncontrolled.

The high ventilation rate provided by natural ventilation can reduce cross-infection of airborne diseases, and thus it is recommended for consideration of use in appropriate hospital wards for infection control. Our results also demonstrated a possibility of converting an existing ward using natural ventilation to a temporary isolation room through installing mechanical exhaust fans.

Building and Environment 45 (2010) 559–565

Contents lists available at ScienceDirect

Building and

journal homepage: www.e

# Natural ventilation for reducing airborn

Hua Qian [a,b,*], Yuguo Li [b], W.H. Seto [c], Patricia Chin

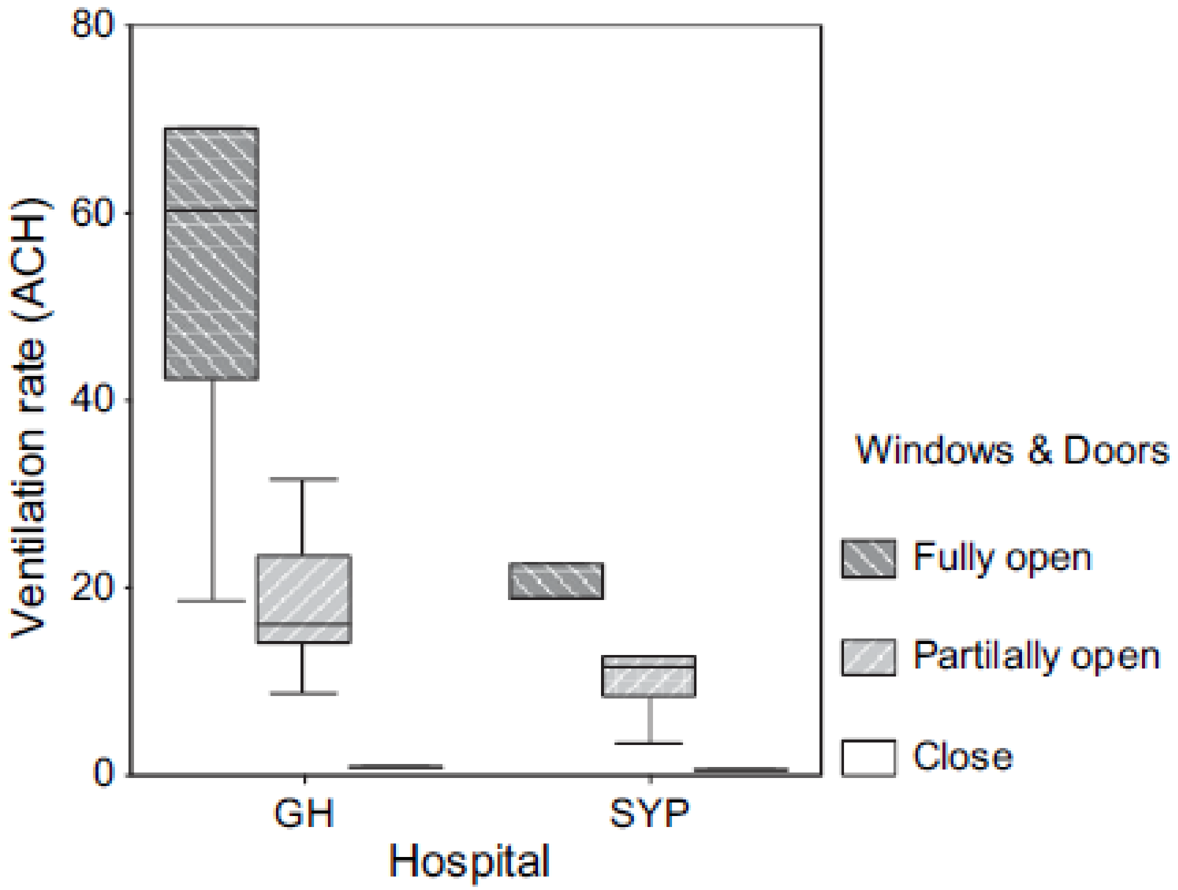



Fig. 2. Comparison of the measured ventilation rate at Hospital GH and Outpatient Clinic SYP when all the fans were switched off.

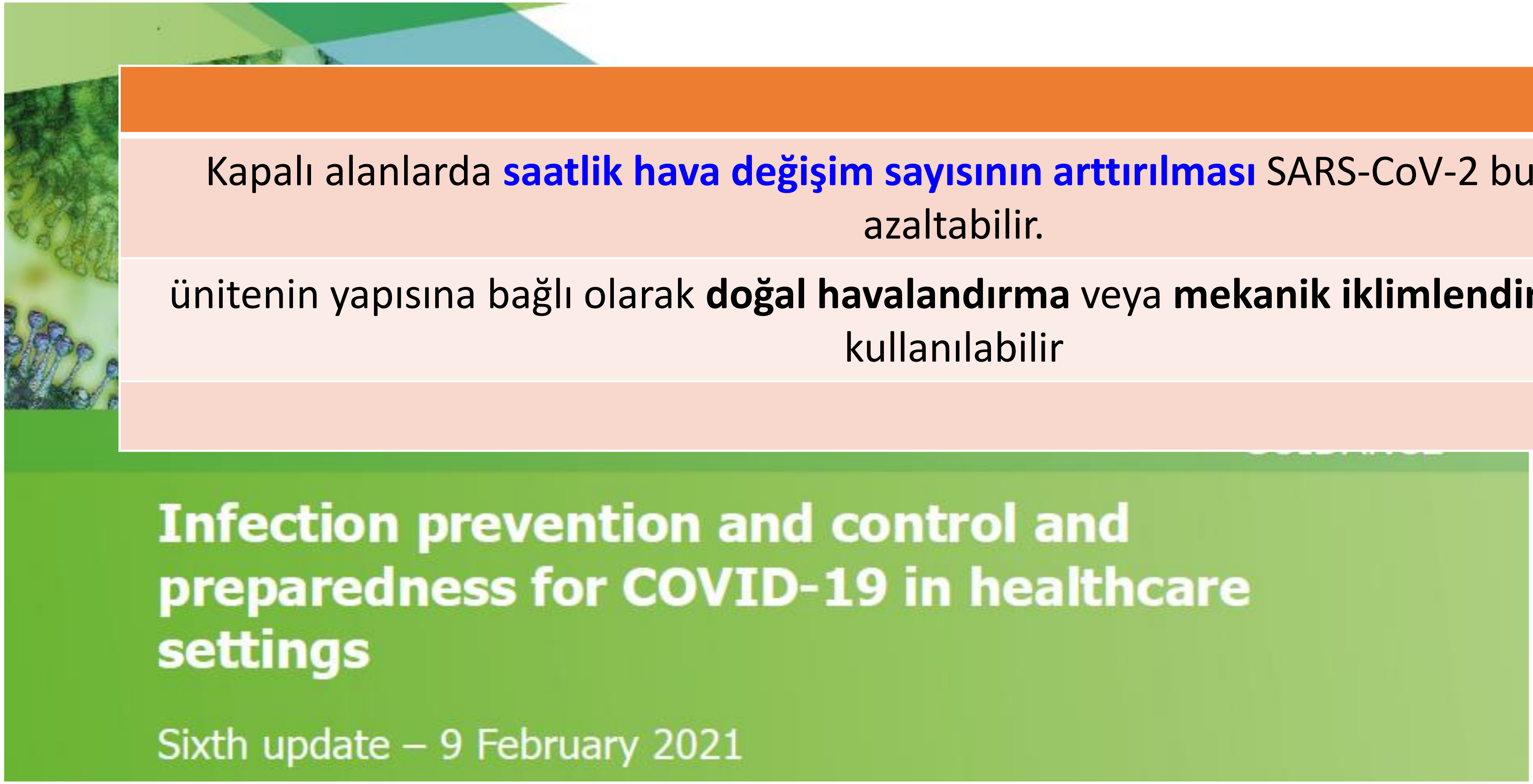
# Natural Ventilation for Infection Control in Health-Care

Table 2.1 Summary of advantages and disadvantages of different types of ventilation systems for hospitals

| | Mechanical ventilation | Natural ventilation | Hybrid (mixed-mode) ventilation |
|---|---|---|---|
| Advantages | Suitable for all climates and weather with air-conditioning as climate dictates | Suitable for warm and temperate climates — moderately useful with natural ventilation possible 50% of the time | Suitable for most climates and weather |
| | More controlled and comfortable environment | Lower capital, operational and maintenance costs for simple natural ventilation | Energy-saving |
| | Smaller range of control of environment by occupants | Capable of achieving high ventilation rate<br>Large range of control of environment by occupants | More flexible |

World Health Organization. Natural Ventilation for Infection Control in Health-Care Settings Geneva: WHO; 2009. Available from: https://www.who.int/water_sanitation_health/publications/natural_ventilation.pdf

| |
|---|
| Kapalı alanlarda **saatlik hava değişim sayısının arttırılması** SARS-CoV-2 bulaş riskini azaltabilir. |
| ünitenin yapısına bağlı olarak **doğal havalandırma** veya **mekanik iklimlendirme sistemi** kullanılabilir |
| |



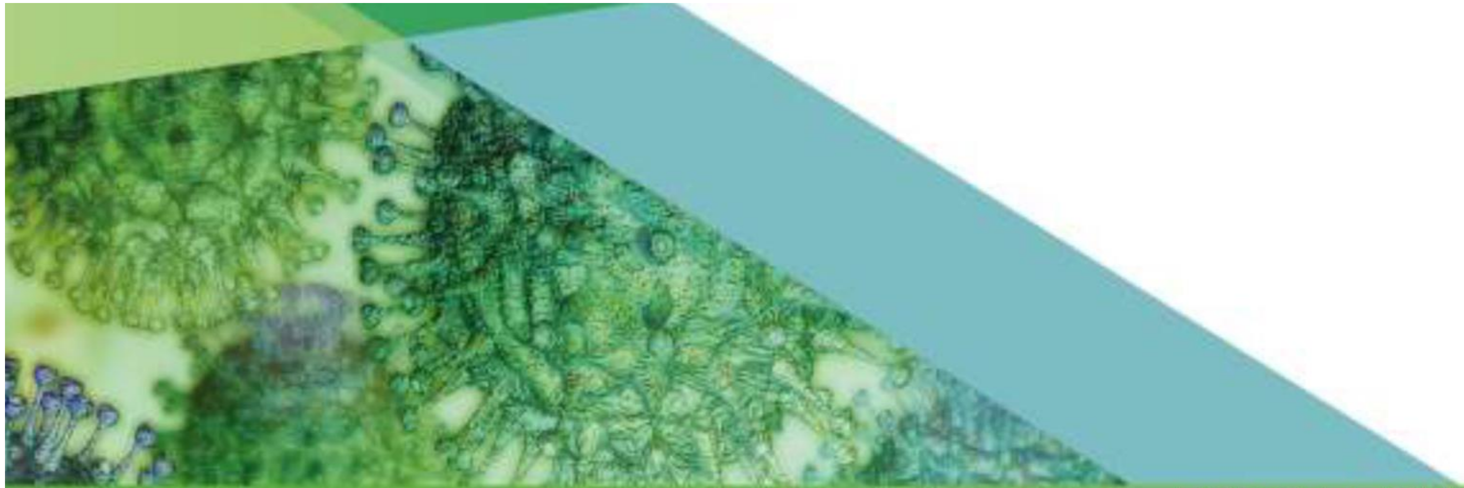

Ventilation plays a key role for the prevention of respiratory infections in healthcare settings [67]. The minimum number of air exchanges per hour, in accordance with the applicable hospital regulations, should be ensured at all times. **Increasing the number of air exchanges per hour will reduce the risk of transmission in closed spaces.** **This may be achieved by means of natural or mechanical ventilation, depending on the setting.** Air recirculation without filtration should be avoided as much as possible;

# Cleaning and disinfection of environmental surfaces in the context of COVID-19

Interim guidance

15 May 2020

World Health Organization



ECDC TECHNICAL REPORT

# Disinfection of environments in healthcare and non-healthcare settings potentially contaminated with SARS-CoV-2

March 2020

# Evidence of environmental persistence

Recent publications have evaluated the survival of SARS-CoV-2 on different surfaces. According to van Doremalen et al., the environmental stability of SARS-CoV-2 is up to three hours in the air post-aerosolisation, up to four hours on copper, up to 24 hours on cardboard and up to two to three days on plastic and stainless steel, albeit with significantly decreased titres [3]. These findings are comparable with results obtained for environmental stability of SARS-CoV-1. These findings resulted from experiments in a controlled environment and should be interpreted with caution in the real-life environment.

| SARS-CoV-2<br>Çevresel ortama dayanıklılık | Süre |
|---|---|
| • Aerolize partikül içinde | 3 saat |
| • Bakır yüzeyde | 4 saat |
| • Karton | 24 saat |
| • Plastik yüzey | 2-3 gün |

# Cleaning options for healthcare settings after the management of a suspected or confirmed case of COVID-19

- Healthcare setting areas (patient roon suspected or confirmed case of COVIL
  - Rooms where aerosol generatin intubation, administration of ne fresh air for 1–3 hours, if they a admitting new patient(s).
  - In buildings where windows do (H

## SAR-CoV-2 ile «enfekte/şüpheli» hasta odası

- Çevresel temizlik işlemine başlamadan önce oda «yeterince» havalandırılmalıdır
- n do
  - emi anın HEPA
  - si g
  - Portable hava temizleme cihazları «istisnai durumlarda» bir seçenek olabilir
- Deterjan içeren bezler ile çevresel temizlik
- Dezenfektan içeren bezler ile dezenfeksiyon

Havalandır → Temizle → Dezenfekte et

**Table 1. Cleaning options for different settings.**

**S: Suggested, O: Optional.**

| | Healthcare setting |
|---|---|
| **Surfaces** | • Neutral detergent AND<br>• Virucidal disinfectant OR<br>• 0.05% sodium hypochlorite OR<br>• 70% ethanol<br>**[S]** |
| **Toilets** | • Virucidal disinfectant OR<br>• 0.1% sodium hypochlorite<br>**[S]** |
| **Textiles** | • Hot-water cycle (90°C) AND<br>• regular laundry detergent<br>• alternative: lower temperature cycle + bleach or other laundry products<br>**[S]** |
| **Cleaning equipment** | • Single-use disposable OR<br>• Non-disposable disinfected with:<br>  • Virucidal disinfectant OR<br>  • 0.1% sodium hypochlorite<br>**[S]** |

| | |
|---|---|
| **PPE for cleaning staff** | • Surgical mask<br>• Disposable long-sleeved water-resistant gown<br>• Gloves<br>• FFP2 or 3 when cleaning facilities where AGP have been performed<br>**[S]** |
| **Waste management** | • Infectious clinical waste category B (UN3291)<br>**[S]** |

RESEARCH ARTICLE

# Effectiveness of various cleaning strategies in acute and long-term care facilities during novel corona virus 2019 disease pandemic-related staff shortages

**Emil Lesho[1]*, Donn**
**Jennifer Gutowski[1], St**
**Robert Mayo[1]**

**Farklı temizlik stratejilerinin etkinliği?**
**SARS-CoV-2**

## Implications

Previous reports have shown time spent cleaning by hospital employed environmental services staff did not correlate with cleaning thoroughness. However, time spent cleaning by a commercial remediation company in this study was associated with cleaning effectiveness. These findings may be useful for optimizing allocation of cleaning resources during staffing shortages.

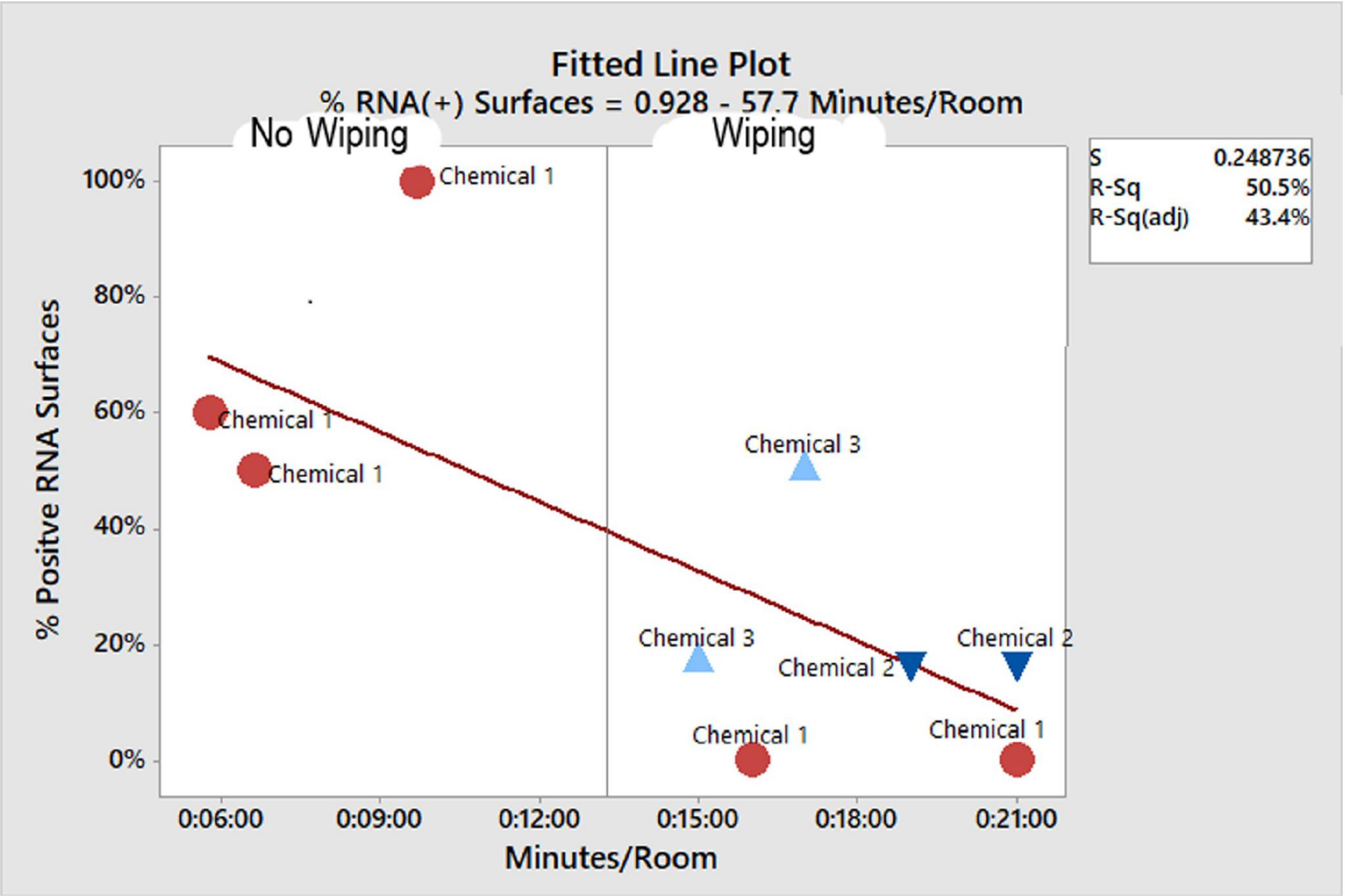



**Fig 4. Effect of chemical type and cleaning time on percent of surfaces detected.**

*Infection Control & Hospital Epidemiology* (2021), 1–6
doi:10.1017/ice.2021.95

# SARS-CoV-2
# Oda dezenfeksiyonu için UV uygulamasının etkinliği

**Original Article**

Feasibility of ultraviolet light-emitting diode irradiation robot for terminal decontamination of coronavirus disease 2019 (COVID-19) patient ...

Hee Kyo...
Man-Se...
[1]Division o...
Institute fo...

- UV öncesi PCR pozitiflik oranı %18.5
- UV sonrası PCR pozitiflik oranı
  - Eşya yoğunluğu fazla odalarda %8.6

**Abstract**

Objective: To investigate the feasibi...
coronavirus disease 2019 (COVID-1...

Methods: We assessed the presence o...
patient rooms after patient discharg...

Results: We analyzed 216 environme...
(ICU) and 15 from isolation rooms in the community treatment center (CTC). Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) RNA was detected in 40 (18.5%) of 216 samples after patient discharge: 12 (33.3%) of 36 samples from AIIRs in the ICU, and 28 (15.6%) of 180 samples from isolation rooms in the CTC. In 1 AIIR, all samples were PCR negative after UV LED irradiation. In the CTC rooms, 14 (8.6%) of the 163 samples were PCR positive after UV LED irradiation. However, viable virus was not recovered from the culture of any of the PCR-positive samples.

Conclusions: Although no viable virus was recovered, SARS-CoV-2 RNA was detected on various environmental surfaces. The use of a UV LED disinfection robot was effective in spacious areas such as an ICU, but its effects varied in small spaces like CTC rooms. These findings suggest that the UV LED robot may need enough space to disinfect rooms without recontamination by machine wheels or insufficient disinfection by shadowing.

*The Journal of Infectious Diseases*

MAJOR ARTICLE

Infectious Diseases Society of America
hiv medicine association
OXFORD

# Rapid SARS-CoV-2 Inactivation in a Simulated Hospital Room Using a Mobile and Autonomous Robot Emitting Ultraviolet-C Light

**Cristina Lorca-Oró,[1] Jordi Vila,[2,3] Patricia Pleguezuelos,[1] Júlia Vergara-Alert,[1] Jordi Rodon,[1] Natàlia Majó,[1,4] Sergio López,[1] Joaquim Segalés,[1,4] Francesc Saldaña-Buesa,[5] Maria Visa-Boladeras,[6] Andreu Veà-Baró,[2,5] Josep Maria Campistol,[2,3] and Xavier Abad[1]**

[1]Centre de Recerca en Sanitat Animal, Institut de Recerca i Tecnologia Agroalimentàries, Campus de la Universitat Autònoma de Barcelona, Barcelona, Spain, [2]Hospital Clínic, University of Barcelona, August Pi i Sunyer Biomedical Research Institute, Barcelona, Spain, [3]Institute for Global Health (ISGlobal) - Hosp
Sanitat i Anatomia Animals, Facultat de Veterinària, Universitat Autònoma de Barcelona, Barcelona, Spain, [5]CovidWarriors,

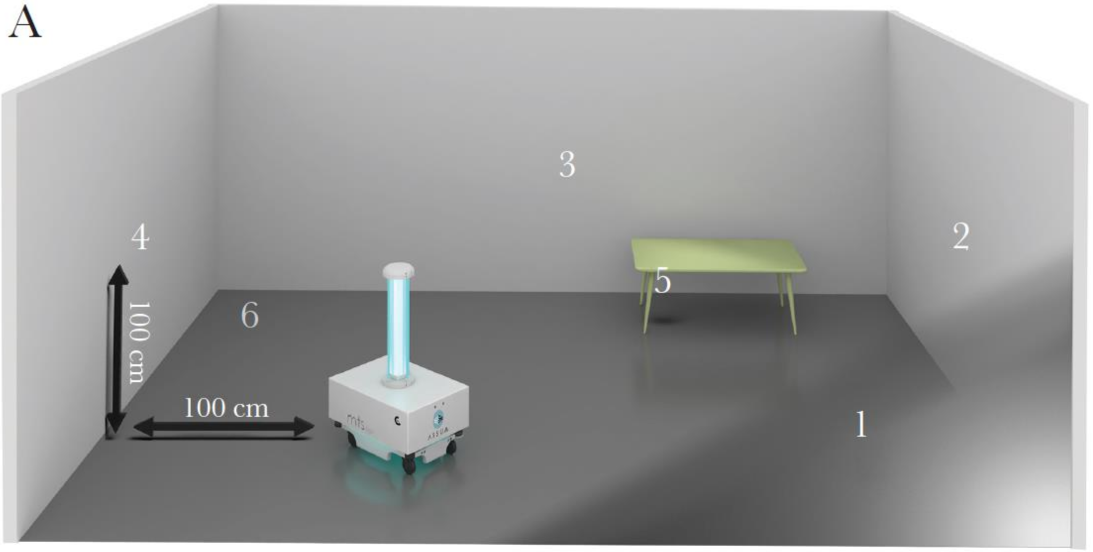


**Table 1. SARS-CoV-2 Titration Results Expressed as $TCID_{50}$/mL**

| Sample Location | | | Reduction Range, % |
|---|---|---|---|
| UV-C robot working time 20 min | | | |
| Wall 1, at 100 cm height | | | ≥ 99.91 to ≥ 99.99 |
| Wall 2, at 100 cm height | | | ≥ 99.91 to ≥ 99.99 |
| Wall 3, at 100 cm height | | | ≥ 99.91 to ≥ 99.99 |
| Wall 4, at 100 cm height | | | ≥ 99.91 to ≥ 99.99 |
| On the floor | | | ≥ 99.91 to ≥ 99.99 |
| Under the edge of a table | | | 67.64 to 98.41 |
| UV-C robot working time 12 min | | | |
| Wall 1, at 100 cm height | | | ≥ 99.91 to ≥ 99.99 |
| Wall 2, at 100 cm height | | | ≥ 99.91 to ≥ 99.99 |
| Wall 3, at 100 cm height | | | ≥ 99.91 to ≥ 99.99 |
| Wall 4, at 100 cm height | | | ≥ 99.91 to ≥ 99.99 |
| On the floor | [illegible] | [illegible] | 99.47 to 99.93 |
| Under the edge of a table | 2.58 | 0.84 to 1.69 | 85.54 to 98.00 |
| UV-C robot working time 5 min | | | |
| Wall 1, at 100 cm height | 2.27 | 1.22 to ≥3.74 | 94.11 to ≥ 99.99 |
| Wall 2, at 100 cm height | ≤0.45 | ≥3.04 to ≥3.74 | ≥ 99.91 to ≥ 99.99 |
| Wall 3, at 100 cm height | ≤0.45 | ≥3.04 to ≥3.74 | ≥ 99.91 to ≥ 99.99 |
| Wall 4, at 100 cm height | 0.45 | 3.04 to ≥3.74 | 99.91 to ≥ 99.99 |
| On the floor | 2.20 | 1.59 to 1.69 | 97.43 to 98.00 |
| Under the edge of a table | 3.37 | 0.44 to 0.51 | 63.70 to 69.80 |

- Işık huzmeleri doğrusal yayılır.
  - Sadece UV gören yüzeylere etkili !
- Organik madde varlığında etkinlik?
- UV öncesi temizlik gereksinimi?

# Infection control in the intensive care unit: expert consensus statements for SARS-CoV-2 using a Delphi method

Prashant Nasa, Elie Azoulay, Arunaloke Chakrabarti, Jigeeshu V Divatia, Ravi Jain, Camilla Rodrigues, Victor D Rosenthal, Waleed Alhazzani, Yaseen M Arabi, Jan Bakker, Matteo Bassetti, Jan De Waele, George Dimopoulos, Bin Du, Sharon Einav, Laura Evans, Simon Finfer, Claude Guérin, Naomi E Hammond, Samir Jaber, Ruth M Kleinpell, Younsuck Koh, Marin Kollef, Mitchell M Levy, Flavia R Machado, Jordi Mancebo, Ignacio Martin-Loeches, Mervyn Mer, Michael S Niederman, Paolo Pelosi, Anders Perner, John V Peter, Jason Phua, Lise Piquilloud, Mathias W Pletz, Andrew Rhodes, Marcus J Schultz, Mervyn Singer, Jéan-François Timsit, Balasubramanian Venkatesh, Jean-Louis Vincent, Tobias Welte, Sheila N Myatra

- Konsensüs raporu hazırlama çekirdek komitesi (8 kişi, çok uluslu)
- 22 ülkeden 35 uzmandan görüş alınmış
  - 32’si üniversite hastanesinde,
  - enfeksiyon kontrol programında deneyimli
- Nisan 2021 de konu başlıkları gönderilmiş ve görüşleri alınmış

Prashant Nasa. Lancet Infect Dis. Vol 22 March 2022

# COVID-19 olguları hasta odalarına nasıl yerleştirilmeli?

| | Agree |
|---|---|
| **Design and engineering** | |
| Patients with suspected or confirmed COVID-19 in ICUs should be separated from patients without COVID-19 to reduce the cross transmission of SARS-CoV-2 | 91·0% |
| AGPs for patients with COVID-19 should preferably be performed in AIIRs | 97·1% |
| Telemedicine ICU or remote monitoring can be used for patients with COVID-19 to reduce the cross-transmission risk to health-care workers by limiting avoidable patient contact | 100% |
| Which of the following patient placement method in ICU is acceptable for patients with COVID-19? | .. |
| Only in AIIRs | 35·3% |
| AIIRs only for AGPs, otherwise in a single room with a closed door | 44·1% |
| Preferably in AIIRs, otherwise grouping patients with standard distance | 82·4% |
| No separation of patients with COVID-19 and patients without COVID-19 (use of standard and droplet precautions only) | 0% |

How many fresh air changes per hour are required in COVID-19 ICUs to reduce cross transmission of SARS-CoV-2? ..

## COVID-19 YBÜ - saatlik hava değişim sayısı kaç olmalıdır?

| | |
|---|---|
| <6 h | 0% |
| ≥6 h | 100% |
| Air changes per hour is not important | 0% |

## COVID-19 YBÜ - dizaynı nasıl olmalıdır?

Which of the following ICU designs are required for managing patients with COVID-19? ..

| | |
|---|---|
| Separate entry and exit for ICUs | 38·2% |
| Separate area for PPE donning and doffing | 70·6% |
| Separate area for isolation of suspected patients | 91·2% |
| Physical barriers between patients and health-care workers | 32·4% |

## Hava yoluyla bulaşan enfeksiyonlar için izolasyon odası standardı ne olmalıdır?

Which of the following design standards are optimal for AIIRs? ··

| | |
|---|---|
| Negative pressure | 97·1% |
| Air outlets to the outside of the hospital premises | 55·9% |
| Use of a high efficiency particulate air filter with the air outlet | 38·2% |
| Use of a high efficiency particulate air filter with both the air inlet and outlet | 14·7% |
| Optimal fresh air changes per hour | 82·4% |
| No recirculation | 11·8% |

# COVID-19 YBÜ – çalışma şifleri nasıl olmalıdır

| Health-care workers and visitors | |
|---|---|
| What is the optimal number of shift hours for health-care workers working in COVID-19 ICUs? | .. |
| < 6 h | 0% |
| 6–12 h | 100% |
| >12 h | 0% |
| Cannot comment | 0% |
| Health-care workers (nursing staff) managing patients with COVID-19 should not manage patients without COVID-19 during the same shift | 91·2% |

## AŞISIZ sağlık personeli SARS-CoV-2 RT-PCR ile ne sıklıkta taranmalıdır

| How frequently should non-vaccinated health-care workers be screened for SARS-CoV-2 by RT-PCR to reduce cross transmission in health care? | .. |
|---|---|
| Once every 14 days | 0% |
| Once every week | 11·8% |
| Screening in case of unprotected exposure to a patient with COVID-19 or if symptomatic | 94·1% |
| Cannot comment | 0% |

## AŞILI sağlık personeli SARS-CoV-2 RT-PCR ile ne sıklıkta taranmalıdır

| How frequently should vaccinated health-care workers be screened for SARS-CoV-2 by RT-PCR to reduce cros | .. |
|---|---|
| Once every 14 days | 0% |
| Once every week | 2·9% |
| Screening in case of unprotected exposure to patients with COVID-19 or if symptomatic | 100% |
| Cannot comment | 0% |

# COVID-19 YBÜ – hava yoluyla bulaşı önlemek için hangi önlemler?

| The following measures might be considered in ICUs to prevent aerosol transmission of SARS-CoV-2 | .. |
|---|---|
| Ventilatory circuit with viral filters for non-invasive or invasive mechanical ventilation | 88·2% |
| Closed suction system | 100% |
| Video laryngoscopy instead of conventional laryngoscopy for intubation | 94·1% |
| Intubation boxes | 32·4% |
| Helmet continuous positive airway pressure | 58·8% |
| AIIRs | 91·2% |
| Increasing outdoor air ventilation rates (opening windows of ICUs) | 52·9% |

# COVID-19 YBÜ – trakeal entübasyon esnasında hangi önlemler?

| The following measures are recommended to reduce aerosol transmission during tracheal intubation | .. |
| --- | --- |
| Adequate PPE (gloves, a gown, an N95 mask or equivalent, and googles or a face shield) | 100% |
| Intubation boxes | 14·7% |
| Video laryngoscope | 88·2% |
| Experienced intubator (airway operator) | 94·1% |

# COVID-19 YBÜ – trakeastomi zamanlaması?

When should tracheostomy be considered to facilitate weaning from invasive mechanical ventilation and to reduce the risk of cross transmission of SARS-CoV-2 to health-care workers?

| | |
|---|---|
| Early (<10 days of ventilation) | 5·9% |
| Delayed (≥ 10 days of ventilation) | 14·7% |
| Same timing as in patients without COVID-19 | 94·1% |

# COVID-19 YBÜ – trakeastomi tekniği?

Which of the following technique of performing tracheostomy is preferred in patients with COVID-19-related acute respiratory failure?

| | |
|---|---|
| Surgical tracheostomy in the operation theatre | 17·6% |
| Surgical tracheostomy at the bed side | 14·7% |
| Percutaneous tracheostomy with or without bronchoscopy | 100% |

## COVID-19 YBÜ – hastadan hastaya geçerken el hijyeni?

| | |
|---|---|
| How should hand hygiene be practiced between patients with COVID-19? | .. |
| Wear a double pair of gloves and replace outer gloves between patients, and with hand hygiene | 17·6% |
| Remove gloves, followed by hand hygiene, and wear a fresh pair of gloves | 88·2% |
| Use a hand rub on the gloves between patients | 2·9% |

## COVID-19 YBÜ – izolasyonun sonlandırılması?

| | |
|---|---|
| When can you stop transmission-based precautions for a patient in ICU with severe COVID-19? | .. |
| 20 days from the onset of symptoms (with substantial resolution of symptoms) or 10 days from the onset of symptoms with two negative RT-PCR tests (acceptable depending on the resources) | 82·4% |
| 20 days from the onset of symptoms (with substantial resolution of symptoms) and two negative RT-PCR tests | 23·5% |

# COVID-19 YBÜ –
# Pandemi döneminde YBÜ'de
# SHİE sürveyansını kim yürütmeli?

Which team members should be physically present in ICUs for monitoring and surveillance of infection control practices in patients with COVID-19? ..

| | |
|---|---|
| Intensivist | 91·2% |
| Infection preventionist (eg, infection control nurse, doctor, or clinical microbiologist) | 61·8% |
| Infectious disease specialist | 8·8% |
| ICU nurse | 85·3% |

# COVID-19 YBÜ – Atık yönetimi nasıl yapılmalı?

| | |
|---|---|
| Waste segregation and management for patients with COVID-19 should be similar to the waste for any other infectious disease | 94·1% |

# COVID-19 YBÜ –
# N95 maske «tasarruf amacıyla» nasıl kullanılmalı?

| Disinfection and sterilisation | |
|---|---|
| What are the most suitable strategies for optimising the supply of N95 masks during shortages? | .. |
| Reuse of N95 masks every 5th day | 2·9% |
| Use of reusable elastomeric respirators | 8·8% |
| Resterilisation of N95 masks with vaporised hydrogen peroxide (plasma steriliser) or ultraviolet irradiation | 11·8% |
| Extended use of N95 masks during the complete shift | 91·2% |
| Use of surgical face masks | 5·9% |
| Cannot comment | 2·9% |

## COVID-19 YBÜ –
## Hasta taburcu olduktan sonra
## odanın temizlik/dezenfeksiyonu nasıl yapılmalı?

Which methods of terminal cleaning in ICUs are acceptable (after discharge of patients with COVID-19)? ··

| | |
|---|---|
| Use of sodium hypochlorite-based surface cleaning | 94·1% |
| Ultra-violet irradiation after surface cleaning | 8·8% |
| Vaporised hydrogen peroxide after surface cleaning | 20·6% |

## COVID-19 YBÜ –
## Hangi dezenfektan?

What methods of surface cleaning and disinfection are acceptable when a patient with COVID-19 is present in the cubicle? ··

| | |
|---|---|
| Surface cleaning with diluted sodium hypochlorite | 94·1% |
| Surface cleaning with 70% alcohol | 55·9% |
| Surface cleaning with quaternary ammonium compounds | 11·8% |

# COVID-19 YBÜ – Isıya duyarlı (otoklavlanamayan) yarı kritik aletler nasıl dezenfekte edilmeli?

Which of these agents are acceptable for disinfection of (reusable heat sensitive or non-autoclavable) instruments used for airway management (eg, video laryngoscopes) of patients with COVID-19?*

| | |
|---|---|
| Plasma sterilisation | 55·9% |
| Glutaraldehyde (Cidex) | 67·6% |
| Para-acetic acid | 5·9% |
| Alcohol wipes (70%) | 79·4% |

# Teşekkürler