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Foot-operated door opener to eliminate the door handle as a source of contamination

Fußtüröffner zur Ausschaltung der Kontaminationsquelle Türklinke

Abstract

Aim: As door handles represent a transmission route for viruses and micro-organisms, a door opening and closing mechanism should be developed without manual operation.

Method: To solve the problem, a device for opening the door with the help of a foot pedal was built into the door leaf.

Results: The design enables mechanical opening of the door with a foot pedal without manual operation. Subsequently, the door closes with the help of a mechanical locking mechanism.

Discussion: The foot-operated door opener constitutes an additional option to the door handle. Together with the equipment of a soft closing mechanism, it is possible to prevent noise emanating from the door latch impinging on the door frame. Using this construction, the door handle as a transmission vector is eliminated. In addition, the transport of goods held with two hands simultaneously is facilitated.

Conclusion: With a foot-operated door opener instead of the traditional manual door handle, it is possible to open doors with a foot pedal. This prevents contamination of door handles with pathogens.

Keywords: door handle, risk of contamination, mechanical foot-operated door opener

Zusammenfassung

Zielsetzung: Da Türklinken ein Übertragungsweg für Viren und Mikroorganismen sind, sollte ein Türöffnungs- und Schließmechanismus ohne manuelle Betätigung entwickelt werden.

Methode: Zur Lösung der Aufgabenstellung wurde in das Türblatt eine Vorrichtung zum Öffnen der Tür mit dem Fuß mit Hilfe eines Pedals eingebaut.

Ergebnisse: Die Konstruktion ermöglicht ein mechanisches Öffnen der Tür ohne manuelle Betätigung mit einem Fußpedal. Danach schließt sich die Tür mit einem mechanischen Schließmechanismus.

Diskussion: Der Fußtüröffner ist eine zusätzliche Option zur Türklinke. Als Zusatzausstattung mit einem Leiseschließmechanismus ist es möglich, die Geräuschentwicklung beim Aufschlagen der Türfalle auf den Türrahmen zu verhindern. Mit der Konstruktion ist es möglich, die Türklinke als Übertragungsvektor auszuschalten. Zusätzlich wird der Transport von mit beiden Händen zu tragenden Gegenständen erleichtert.

Schlussfolgerung: Mit einem Fußtüröffner anstelle traditioneller manueller Türöffnung ist es möglich, Türen mit einem Fußpedal zu öffnen. Dadurch wird eine Kontamination von Türklinken mit Pathogenen vermieden.

Schlüsselwörter: Türklinke, Kontaminationsrisiko, mechanischer Fußtüröffner

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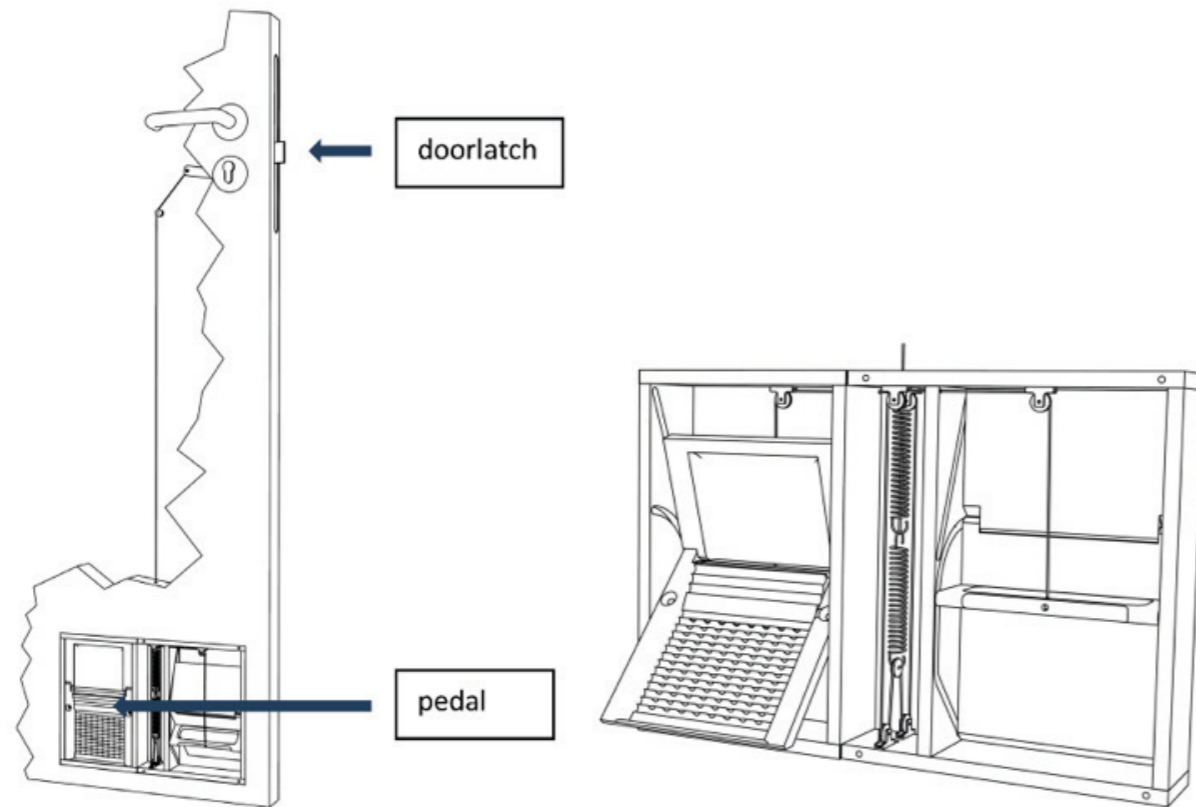
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Introduction

The increase in bacterial antibiotic resistance is a serious problem, increasing both in severity and importance [1]. Therefore, it is necessary to find means of limiting or even preventing the transmission of pathogens within medical facilities.

Surfaces in patients' surroundings, including the door knob or handle, are a relevant transmission route for viruses and microorganisms [2], [3], [4], [5]. Hospital staff, visitors, cleaning services and others are a potential source of contamination for door handles. In particular, the nursing staff – with a hand-disinfection rate of under 50% [6], [7] – can spread pathogens, as can other employees, 4.6% of whom have been found to be colonized with MRSA [8]. Furthermore, pathogens can be acquired directly by the patient.

One alternative to avoid this route of transmission is to equip doors with a foot-operated door opener rather than with a door handle.

Methods

A device for opening the door with the foot was fitted flush into the door leaf. A pedal (Figure 1) is integrated into the device, which is built into the bottom of the door leaf. To open the door, this pedal is pulled out with the foot from the inside of the device, while the foot constantly remains on the surface of the pedal. After completely pulling the pedal out, the door can be pushed open or pulled open while keeping light pressure on the pedal with the foot.

The surface design of the pedal provides the necessary grip of the shoe on the pedal during the movement to be executed. Subsequently, the door will briefly remain in the open position before the door closer starts to pull the door back into its frame.

Results

Using the foot pedal alone, this device makes it possible to open the door without manual operation. After opening of the door, there is ample time to pass through the open door. The foot-operated door opener is optionally equipped with a soft-closing mechanism. As a result, while opening the door with the foot door opener, the door latch (Figure 1) will be kept inside the door lock by a mechanism integrated into the foot door opener. Only after complete closing of the door (i.e., the door is back in its frame) is the door latch released by the mechanism: the door latch slowly and quietly returns to its normal position in the counterpart within the door frame.

Discussion

The foot-operated door opener constitutes an additional option to the door handle. The function of the door handle and the door lock itself is not affected. In both cases, opening with the door handle or foot-operated door opener, the door latch is triggered, which means a change in the mechanics of the normal door handle with its lock is not necessary. Only if the door lock itself is locked is it

impossible to open the door with either the handle or the foot door opener. Equipped with the soft closing mechanism, the noise generated by the door latch hitting the door frame is completely prevented, and the noise generated by the door latch quickly snapping back into its counterpart in the door frame is almost imperceptible. The foot door opener makes the door handle superfluous in most cases. This eliminates the risk of contamination by pathogens potentially adherent on the door handle. In addition, the transport of items that must be carried with both hands, e.g., trays, is facilitated. Another means of opening doors without using the hands is provided by door handles designed to be operated with the forearm. However, this type of handle can still be operated by hand and is thus in danger of becoming contaminated. Nevertheless, when used correctly, the forearm-operated door opener reduces the risk of cross-infection [9]. Where door handles are coated with oligodynamic effective metals such as silver and copper in nanocrystalline form, the antimicrobial action takes effect only many hours later, and a false sense of security is produced. Based on unproven efficacy within a relevant exposure time, inactivation through protein loading [10], and the absence of evaluations on possible toxic risks, coating door handles with such compounds is not a reasonable alternative to the foot-operated door opener [11]. If used correctly, the mechanical foot-operated door opener can completely avoid the transfer of pathogens. Additional advantages include:

- no electrical energy is necessary for operation
- no follow-up costs arise, e.g., from consumables
- the functionality of the existing door lock is not compromised and
- nothing protrudes from the plane of the door leaf.

Conclusion

With the foot-operated door opener described here instead of the traditional manually operated door handle, it is possible to open doors with a foot pedal. Contamination of door handles with pathogens is thus avoided.

Notes

Competing interests

Sascha Klein is responsible for production at Metiba Vertriebs GmbH

Axel Kramer declares that he has no competing interests.

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