







Schweizerische Gesellschaft für Sterilgutversorgung Société Suisse de Stérilisation Hospitalière Società Svizzera di Sterilizzazione Ospedaliera

UV light-based reprocessing of flexible endoscopes without working channel in Oto-Rhino-Laryngology

Dr. Stefan Alexander Rudhart

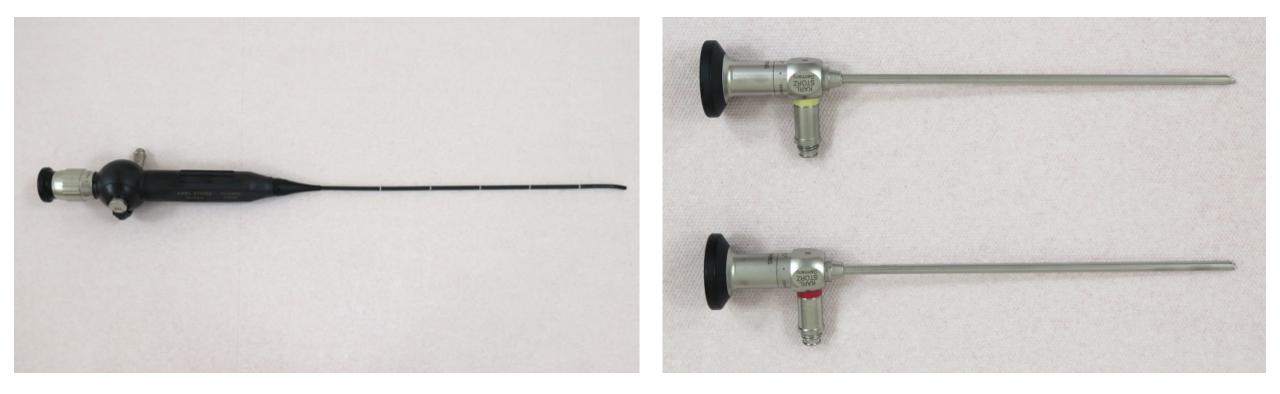
ENT Clinic at the University Hospital of Giessen and Marburg, Marburg Centre



ENT endoscopes



Schweizerleche Senstischeit für Sterfligetresmergung. Senisht Seiner de Starlitzerber Hengtheiden Societé Seksent (11 Sterfitzersione Scheidung



ENT endoscope (rhino-fibroscope 2,5 x 270mm, KARL STORZ)

30° and 70° ENT rigid endoscopes (Hopkins 3 x 140mm, KARL STORZ)





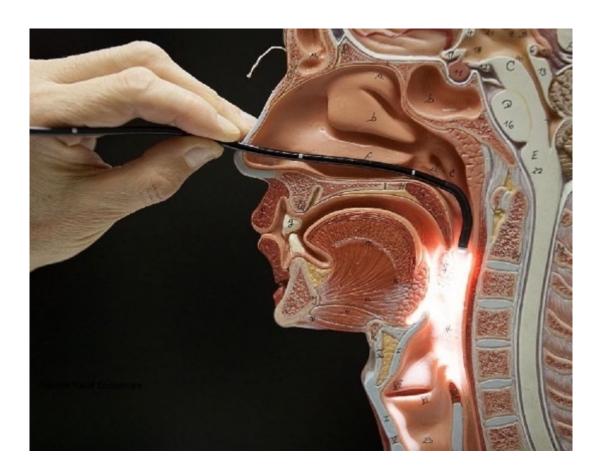
Flexible ENT endoscopy



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Flexible nasal endoscopy in outpatient ward



Flexible nasal endoscopy on anatomical model



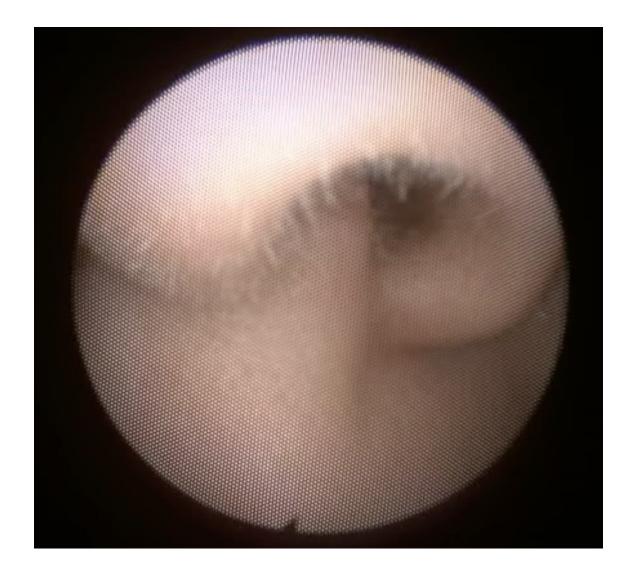
Endoscopy Workshop: Advanced Course Marti Evans, PA-C Eighth Annual ENT for the PA-C | April 25 – 29, 2018 | Scottsdale, AZ



Flexible ENT endoscopy



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Flexible endoscopy on a patient



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 ENT endoscope reprocessing processes are becoming more and more complex due to increased hygiene requirements

- Standard disinfection methods (e.g., mechanical or manual processing with chlorine wipes) are generally costly and/or time-consuming
- UV disinfection methods could represent a gain in efficiency (saving time and money) in ENT endoscopes reprocessing



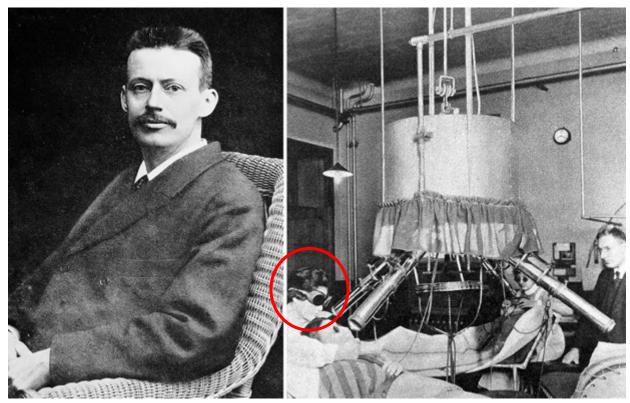


History of UV radiation



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- UV radiation was discovered in 1801 by Johann W. Ritter
- It has been used in medicine since the end of the 19th century
- 1903: Nobel Prize awarded to Niels Ryberg Finsen for UV treatment of *lupus vulgaris*
- Used in various fields today



https://www.youtube.com/watch?v=fwqdSK1ba6g. 09.10.2021

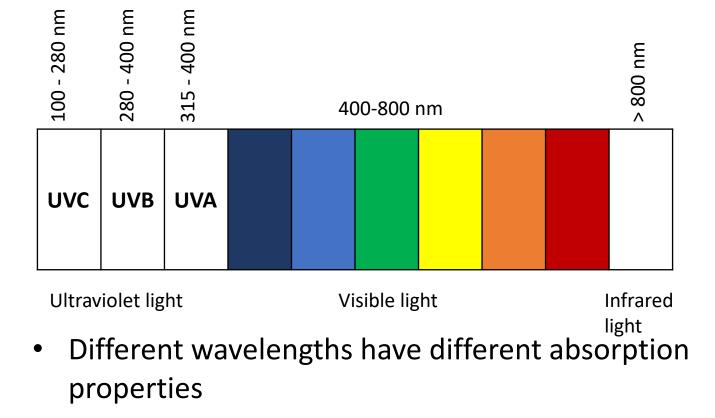




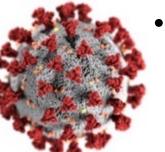


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- 1. UV rays are absorbed by DNA
- They lead to dimerization of thymine in DNA and uracil in RNA as well as to RNA-protein crosslinks
- 3. Inactivation of the irradiated microorganism/cell



253.7 nm (UV-C): most effective wavelength against viruses and spores (the most difficult to eliminate by UV radiation)



https://www.pexels.com/de-de/foto/coronavirus-3992933. 09.10.2021



Preliminary study





Promising results in UV reprocessing of ENT endoscopes:

- Colony-forming units (cfu) Ø 66.908 before disinfection
 → cfu Ø 1.2 after disinfection (90% sterile)
- Log 7 reduction for standardized challenge devices







Objective



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Study of the usefulness of UV light in reprocessing flexible endoscopes [System D 60 UV, UV-Smart Technologies B.V.] :

- Bacterial contamination after use without reprocessing?
- 2. Bacterial contamination and protein residues after use and reprocessing?
- 3. Reduction of bioburden on standardized challenge devices after reprocessing?







Equipment and methods

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For each case study, 50 flexible endoscopes (nasofibroscope 2,5 x 270mm, KARL STORZ) and 50 contaminated test devices were examined (RAMS)

Reprocessing process :

1. Pre-cleaning with a standard water-based wipe for 20 seconds

2. UV-C disinfection for 60 seconds









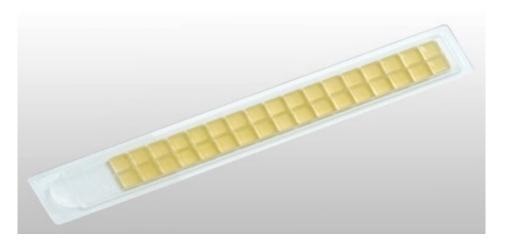
Equipment and methods



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Microbiological analysis

- Surface examination of endoscopes using agar strips [HYCON[®], Merck KGaA].
- Protein residue indicators change color [MediCheckTM, Hygiena LLC]
- Determination of residual bacterial contamination on PCD
- Analysis carried out by the Institute of Hospital Hygiene





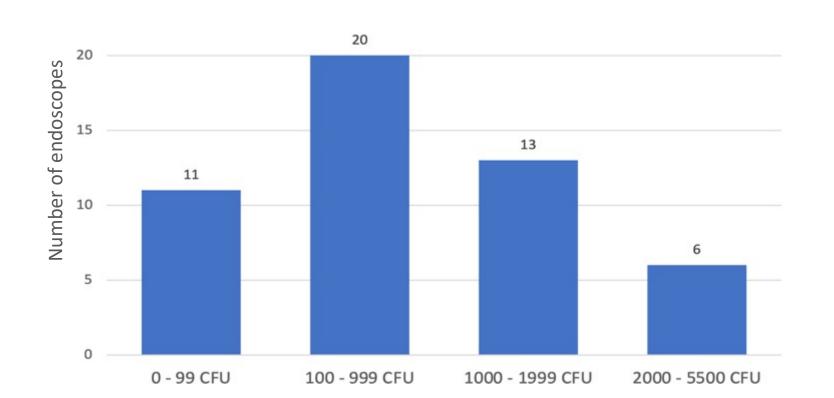




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- High bacterial contamination after use with cfu Ø 917 (± 1057; Xmed: 700; 10– 5500 cfu)
- Broad bacterial spectrum from the usual mucosal flora to potentially pathogenic bacteria (e.g. genus Klebsiella)





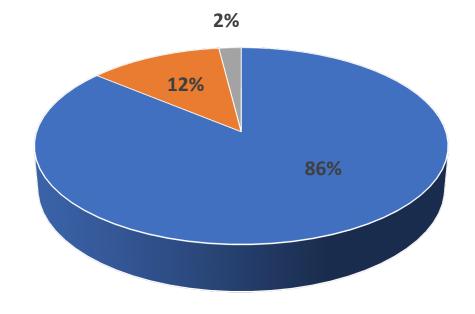


Results after reprocessing



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- 86% (n = 43) of endoscopes are sterile
- Minimal residual bacterial contamination on 14% of endoscopes (Ø 0.3 CFU)
- Only bacteria from the usual mucous membrane flora
- All endoscopes are free or nearly free of protein (<1 μg)
- All PCDs are sterile after reprocessing
 - Significant reduction of contamination (7 log levels)



• 0 CFU • 1 CFU = 8 CFU







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UV disinfection appears to be an effective and fast method for reprocessing flexible endoscopes

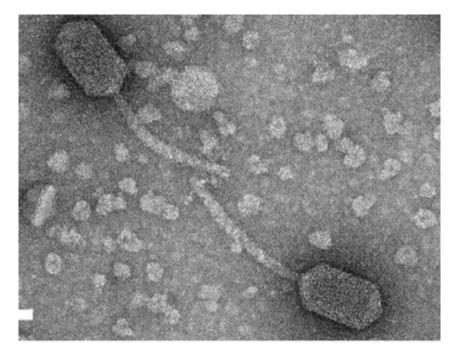






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- Analyzes of the virucidal efficiency of the D 60 system using the bacteriophage model
- Approval of UV reprocessing procedures for semi-critical medical devices in Germany





Tan CW et al. (2021) Isolation and Characterization of Six Vibrio parahaemolyticus Lytic Bacteriophages From Seafood Samples. Front. Microbiol. 12:616548. 09.10.2021