STERİLİZASYON UYGULAMALARINDA YENİLİKLER

Dr. Duygu PERÇİN

Erciyes Üniversitesi Tıp Fakültesi
Tıbbi Mikrobiyoloji AD, Kayseri

Neler var?

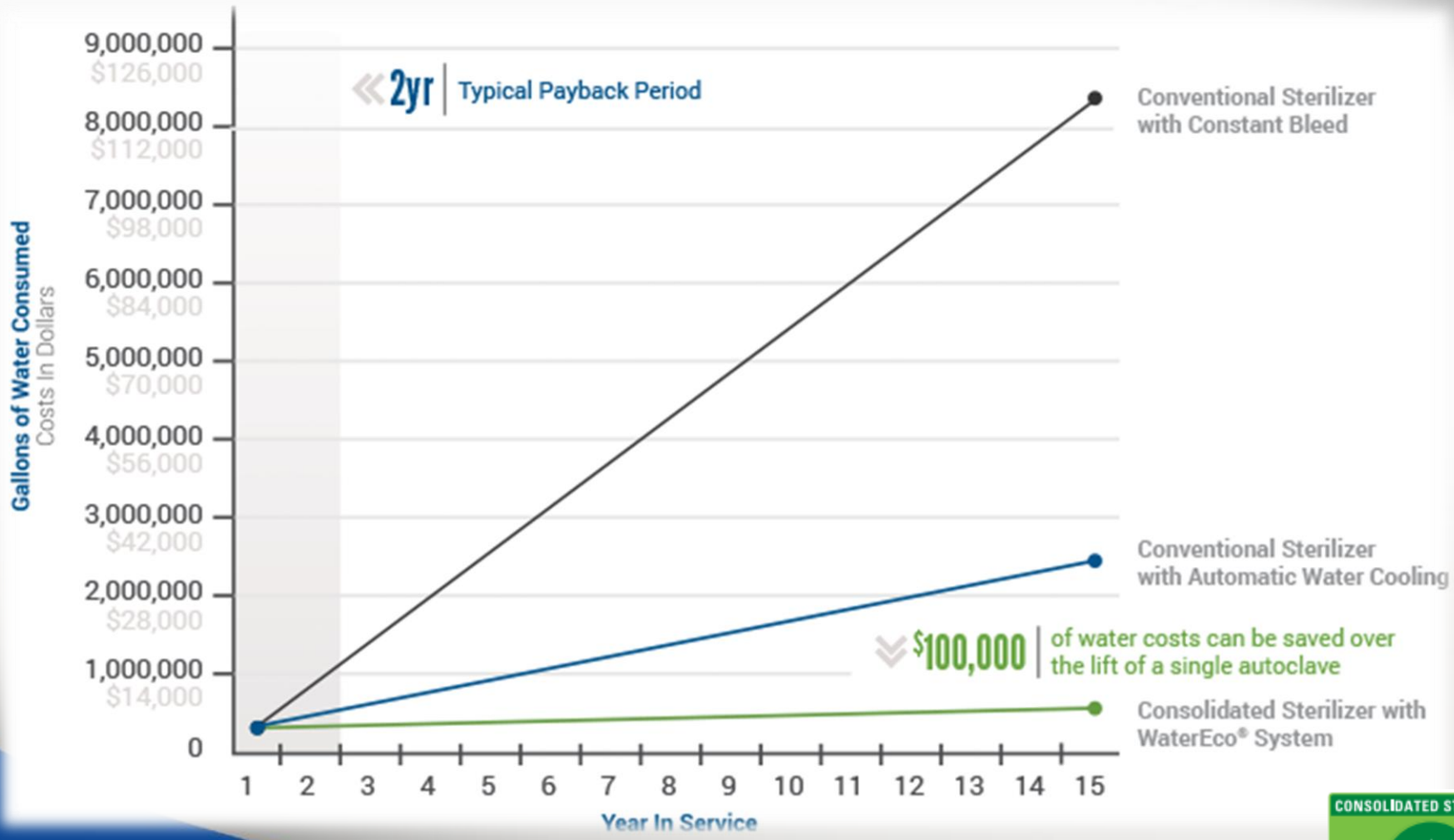
- Sürdürülebilir sterilizasyon
- Yeni düşük sıcaklıkta sterilizasyon yöntemleri
- Sterilizasyonda robotların kullanımı
- RFID
- Süreç kontrolünde yenilikler
- Paketleme malzemelerindeki yenilikler
- Merkezi endoskop dekontaminasyon üniteleri
- Süper MSÜ
- Yeni lojistik yaklaşımlar

Sürdürülebilir sterilizasyon

- Tipik buhar sterilizatörler sterilizasyon sırasında oluşan sıcak yoğunlaşmış buharı drenaja göndermeden önce soğutmak için dakikada 4-20 L su kullanır
- Retrofit kit adı verilen sistemler kondanseyi standby modunda toplayarak hızla soğumasını sağlar
- Böylece kondanseyi soğutmak için gereken su kullanımı azalır

U.S. DEPARTMENT OF ENERGY

Green sterilizers (WaterEco®)



CONSOLIDATED STERILIZERS
WaterEco®

Su tasarruflu sterilizatörler

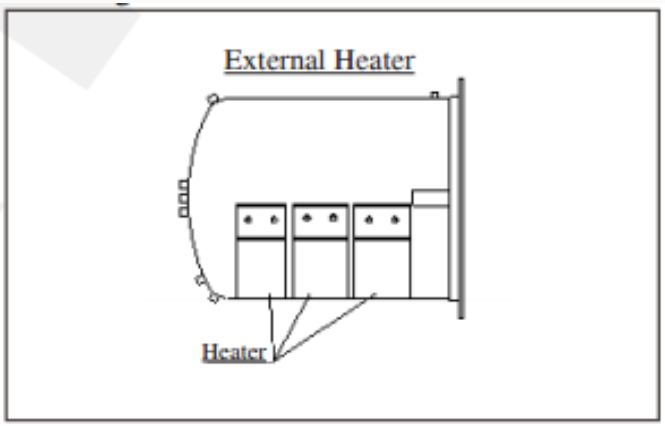
- Buhar üretimi, kondansasyonu ve vakum sırasında kullanılan suyun geri kazanılması
- İnternal su rezervuarı sayesinde su basıncındaki değişikliklere bağlı oluşan başarısız döngü ve ıslak paket ihtimali azalır
- Rezervuardaki su sıcaklığı kontrol edilebildiğinden drenaj için ek soğuk su ihtiyacı ortadan kalkar

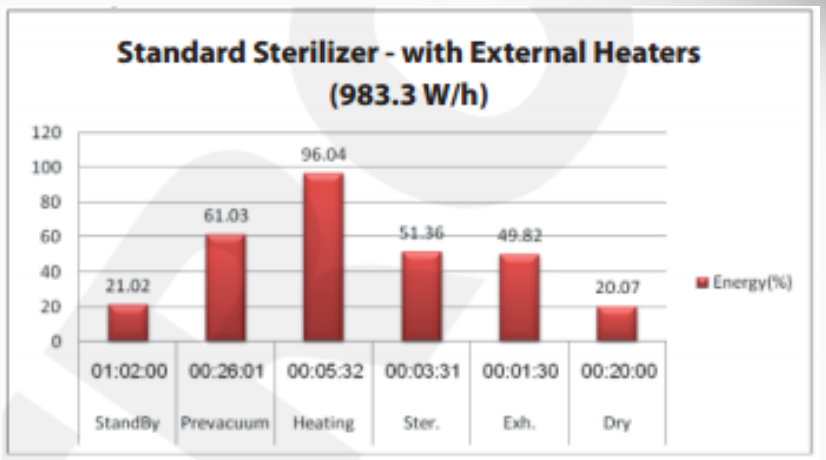
Water Recirculation System

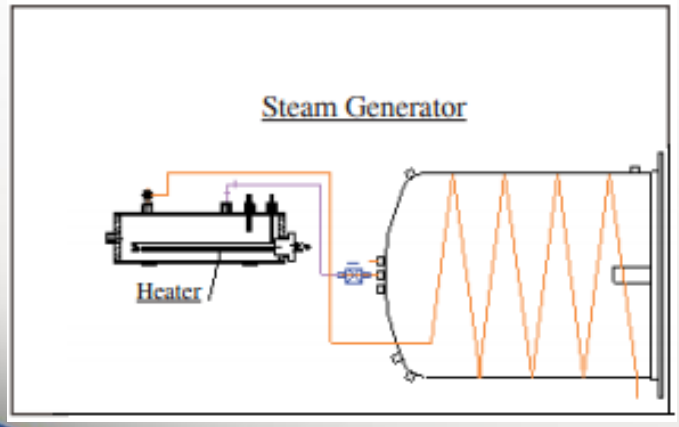
Su tüketiminde
%35 – 65 azalma

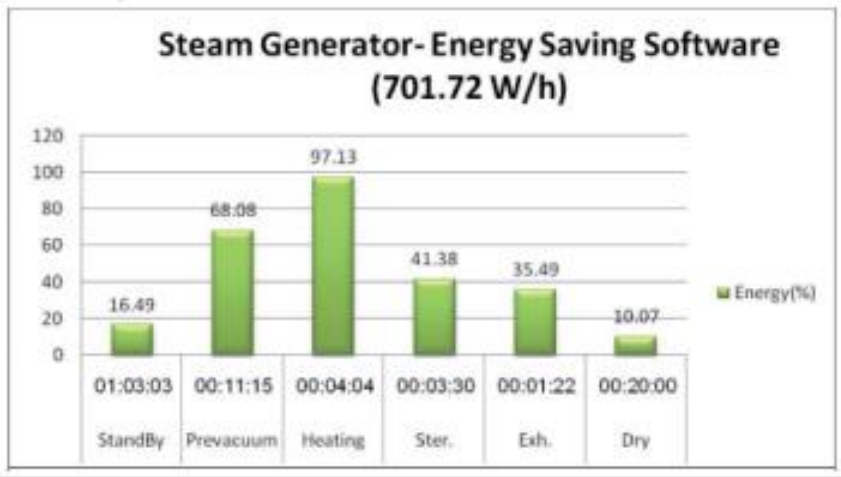
SKYTRON
TRUSTED PARTNER | PROVEN SOLUTIONS

Enerji tasarruflu sterilizatörler





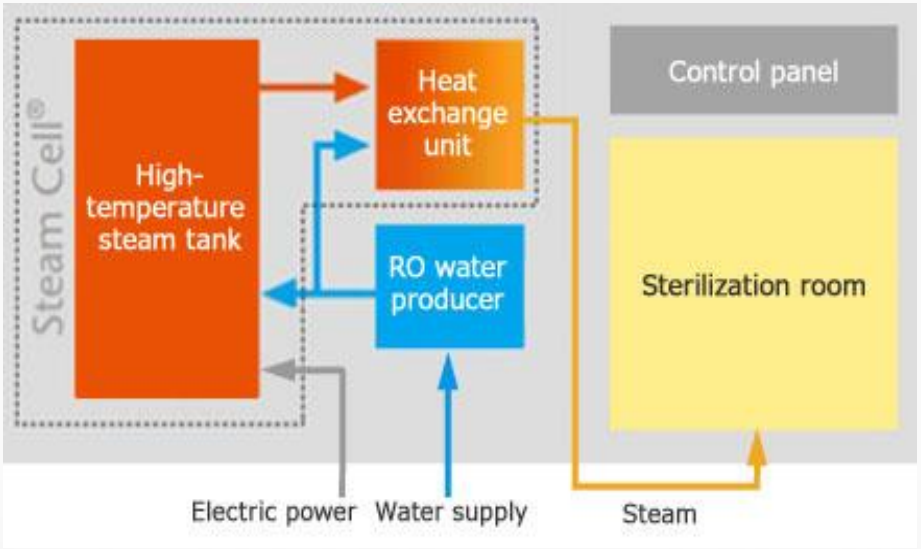




Enerji tüketiminde ~%32 azalma

celitron
medical technologies
WE THINK GREEN!

Hibrid sistemler



“Steam Cell®”

Buhar jeneratörü, revers ozmoz su jeneratörü buhar sterilizatörün içinde

SAKURA

J Health Serv Res Policy OnlineFirst, published on January 13, 2016 as doi:10.1177/1355819615625698

Original Research

Journal of Health Services Research & Policy
0(0) 1–6

DOI: 10.1177/1355819615625698
jhsrp.rsmjournals.com
SAGE

Hospital steam sterilizer usage: could we switch off to save electricity and water?

Forbes McGain[1], Graham Moore[2] and Jim Black[3]

Abstract

Objectives: Steam sterilization in hospitals is an energy and water intensive process. Our aim was to identify opportunities to improve electricity and water use. The objectives were to find: the time sterilizers spent active, idle and off; the variability in sterilizer use with the time of day and day of the week; and opportunities to switch off sterilizers instead of idling when no loads were waiting, and the resultant electricity and water savings.

Methods: Analyses of routine data for one year of the activity of the four steam sterilizers in one hospital in Melbourne, Australia. We examined active sterilizer cycles, routine sterilizer switch-offs, and when sterilizers were active, idle and off. Several switch-off strategies were examined to identify electricity and water savings: switch off idle sterilizers when no loads are waiting and switch off one sterilizer after 10:00 h and a second sterilizer after midnight on all days.

Results: Sterilizers were active for 13,430 (38%) sterilizer–hours, off for 4822 (14%) sterilizer–hours, and idle for 16,788 (48%) sterilizer–hours. All four sterilizers were simultaneously active 9% of the time, and two or more sterilizers were idle for 69% of the time. A sterilizer was idle for two hours or less 13% of the time and idle for more than 2 h 87% of the time. A strategy to switch off idle sterilizers would reduce electricity use by 66 MWh and water use by 1004 kl per year, saving 26% electricity use and 13% of water use, resulting in financial savings of AUD$13,867 (UK£6,517) and a reduction in 79 tonnes of CO_2 emissions per year. An alternative switch-off strategy of one sterilizer from 10:00 h onwards and a second from midnight would have saved 30 MWh and 456 kl of water.

Conclusions: The methodology used of how hospital sterilizer use could be improved could be applied to all hospitals and more broadly to other equipment used in hospitals.

Keywords

energy, sterilization, sustainability, water

Mevcut düşük sıcaklıkta sterilizasyon yöntemleri

- Etilen oksit
- Formaldehid buhar
- Hidrojen peroksit gaz
- Ozon
- Klorin dioksit
- Sıvı kimyasallarla sterilizasyon????

Yeni yöntemler

Adı	**Yöntem**	**Firma, ülke**
Sterizone VP4	Ozon & H_2O_2	TSO_3 Inc, Kanada
Revox	Vaporized peracetic acid	Revox Sterilization Solutions, ABD
Noxilizer	Nitrogen dioxide	Noxilizer Inc. ABD

Sterizone VP4

- Dual sterilan, vaporize H_2O_2 ve ozon
- Malzeme uyumu iyi
- *Dynamic Sterilant Delivery System*™ yüke, ağırlığına ve sıcaklığa göre enjekte edilecek sterilanı ayarlar
- Oda sıcaklığında 46 dk'lık döngü

Revox VPA

- Oda sıcaklığında sterilizasyon
- Zararlı kalıntı yok
- PAA → CO_2, H_20, O_2
- Havalandırma gerekmez
- Biyolojik materyal sterilizasyonu için uygun
- Donör doku sterilizasyonunda kullanılabilir

Noxilizer

- Nitrojen dioksit plazma sterilizasyon
- Oda sıcaklığında 80dk’lık döngü
- Kalıntı bırakmaz
- Havalandırma gerekmez
- Güvenli
- Materyal uyumu iyi


注射薬払出ロボットシステム
02:51
パナソニックグループのヘルスケア事業

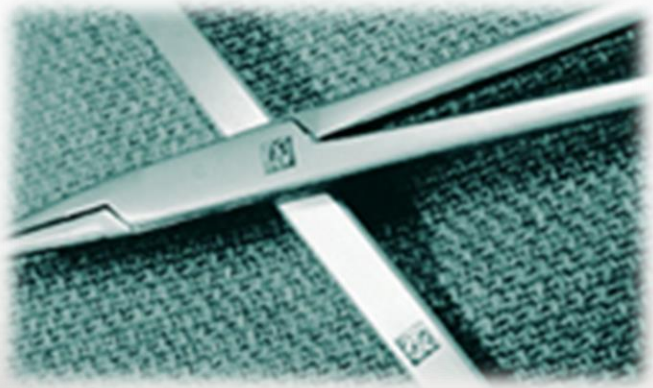
Sterilizasyonda robotlar

- French Centre Hospitalier Universitaire (CHU) de pilot çalışma
- “Betty” ve “Daisy”
- Steril endoskopların YBÜne taşınması
- YBÜ lojistiğine esneklik kazandırıyor

Sterilizasyonda robotlar

- Ameliyathaneler hastanenin en hızlı büyüyen ve en fazla para harcayan bölümü
  - Hastane bütçesinin %30-50si
- Alet sayım ve tanımlamanın otomatize yapılması hastane giderlerini azaltıyor

Data matrix kodlama ve alet takip

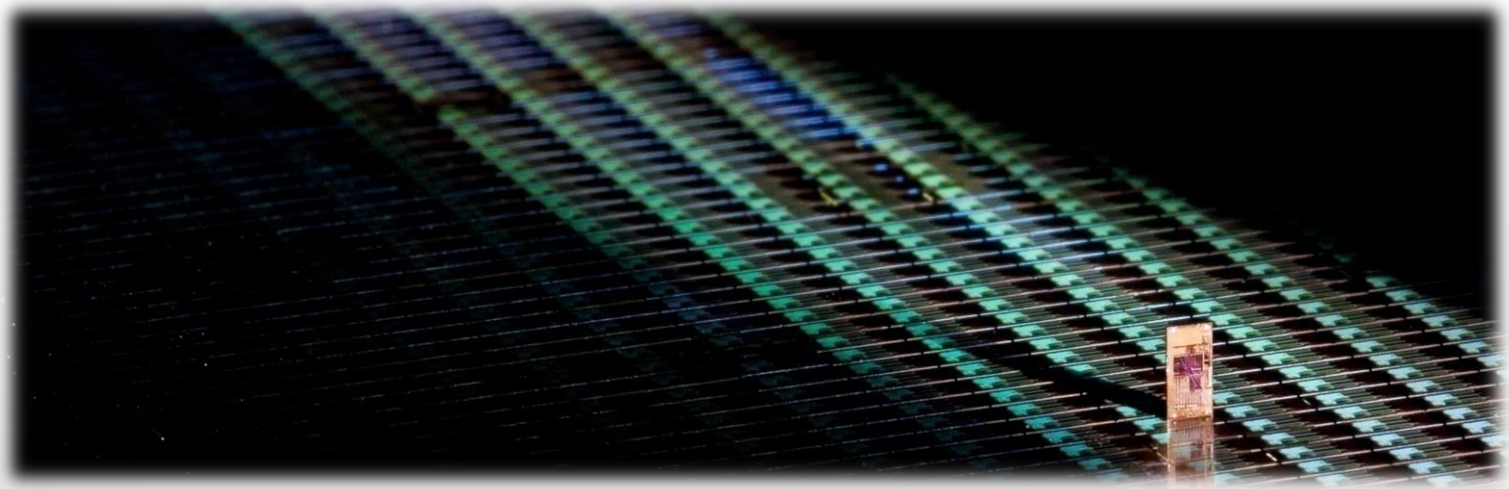


C. Lambert, France

RFID etiketler

Super-Rugged RFID

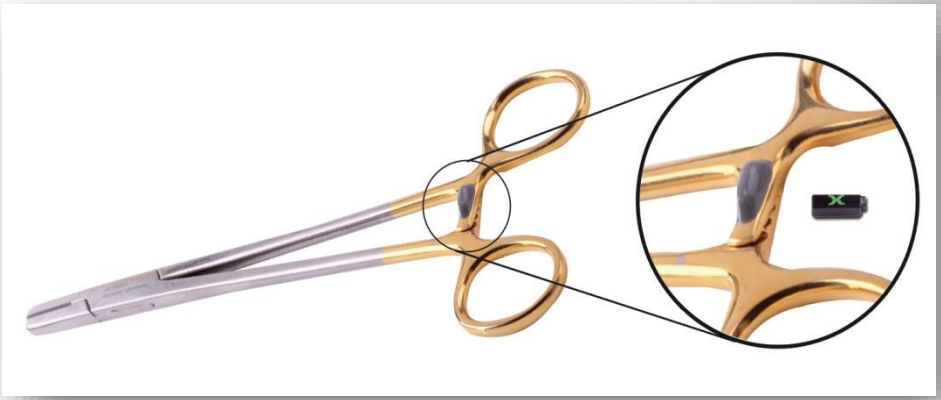
- Tüm sterilizasyon yöntemlerine dayanıklı RFID etiket



http://www.qmed.com/mpmn/medtechpulse

RFID etiketlerin avantajları

- Tepsideki tüm aletlerin aynı anda okunması
- Ameliyat sırası ve sonrasında alet sayımında hız ve kolaylık
- Paket içindeki kanlı aletlerin bile okunabilir olması
- Her bir ürün için tek tanımlayıcı kod imkanı
- Alet ömrünün takibi



RFID for Surgical Instrument Tracking Saves Estimated 31,000 Hours for Rigshospitalet During Trial

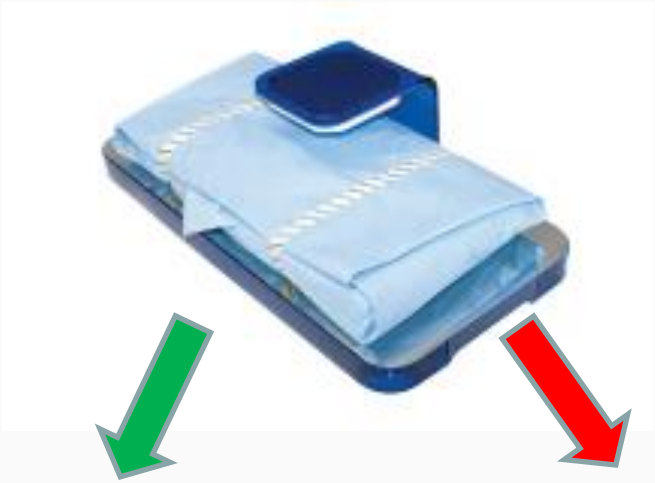
Posted on **April 2, 2015**

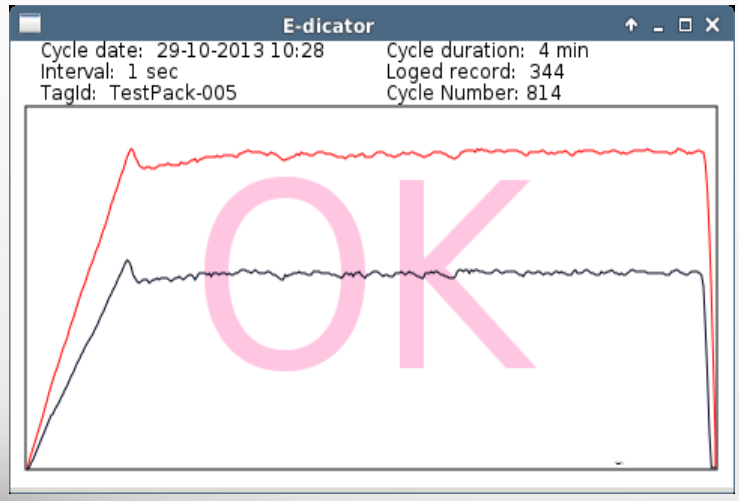
Innovative Solution from Caretag Surgical and Xerafy Shows RFID is Highly Effective for Managing Sterilization and other Track-and-Trace Processes

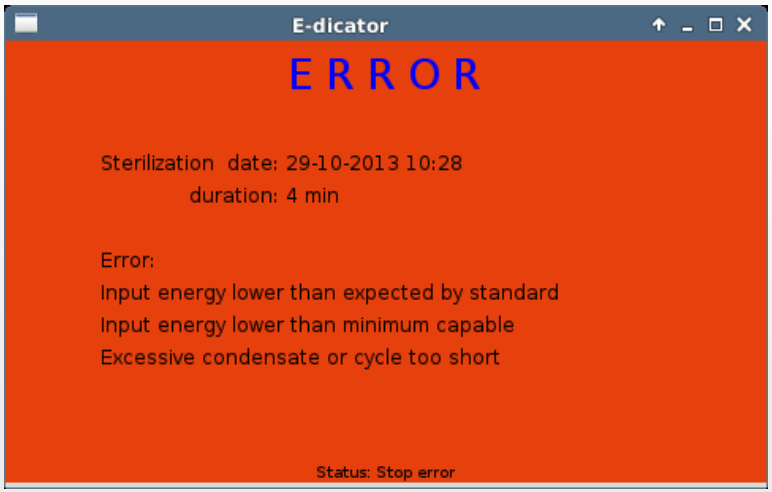
HONG KONG, April 02, 2015 – Read-on-metal UHF RFID tags from Xerafy proved their suitability and value for surgical instrument tracking during an 18-month trial at New Rigshospitalet hospital in Copenhagen, Denmark. Tracking surgical instruments with RFID could save the hospital 31,000 hours a year in operating room procedures alone while also improving patient safety and providing additional time saving and infection control benefits during sterilization and other processes. Dr. Henrik Eriksen, project director for the RFID trial, announced the results last month during a press conference in Copenhagen.

When surgical trays were prepared for use in the operating room (OR), an RFID reader was used to automatically identify and record all the items that were contained in the tray. The trays were read at several more process points before entering the OR to make sure counts were accurate. Trays were read again before they left the OR after surgery to make sure no surgical instruments were missing, and were read at the hospital's central sterile processing department to document the sterilization process for each item.

Elektronik indikatör

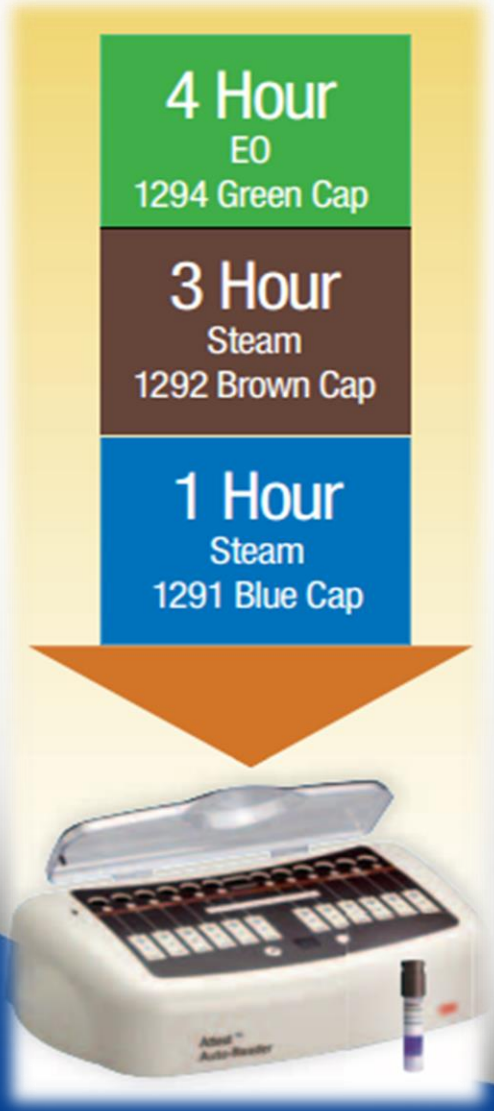






ARROWPACK Endicata

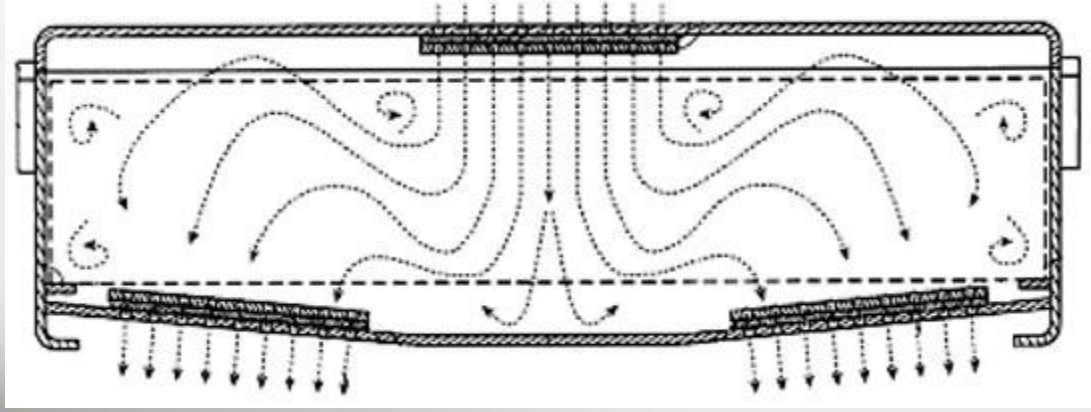
Yeni biyolojik indikatörler



★*New FDA approval*

- 3M Attest Rapid Readout BI 1295 & Autoreader 490H
- Vaporized hydrogen peroxide sterilization yöntemini kullanan STERRAD® NX ve 100NX sistemlerinin rutin monitörizasyonu için 1 saatlik indikatör

Konteynır dizaynında değişiklikler



Contents lists available at ScienceDirect

American Journal of Infection Control

journal homepage: www.ajicjournal.org

Major article

Sterility maintenance study: Dynamic evaluation of sterilized rigid containers and wrapped instrument trays to prevent bacterial ingress

Harry L. Shaffer MS[a,*], Delbert A. Harnish MS[b], Michael McDonald MS[b], Reid A. Vernon BS[c], Brian K. Heimbuch MS[b]

[a] Sterilization Consulting Services, LLC, Highlands Ranch, CO
[b] Engineering Science Division, Applied Research Associates, Panama City, FL
[c] United States Air Force Academy, Colorado Springs, CO

particle size of 1 μm, while simultaneously experiencing air volume exchanges due to vacuum cycles—two 1-psi cycles, three 0.7-psi cycles, and three 0.4-psi cycles—to simulate air exchange events occurring during the sterilization, transportation, and storage of sterilized instrument trays in health care facilities.

Results: Of 111 rigid containers tested, 97 (87%) demonstrated bacterial ingress into the container. Of 161 wrapped trays, 0 (0%) demonstrated bacterial ingress into the tray. Contamination rates of rigid containers increased significantly with increasing duration of use.

Conclusions: In this study using a dynamic bacterial aerosol challenge, sterilized wrapped trays demonstrated significantly greater protection than sterilized rigid containers against the ingress of airborne bacteria.

Results: Of 111 rigid containers tested, 97 (87%) demonstrated bacterial ingress into the container. Of 161 wrapped trays, 0 (0%) demonstrated bacterial ingress into the tray. Contamination rates of rigid containers increased significantly with increasing duration of use.

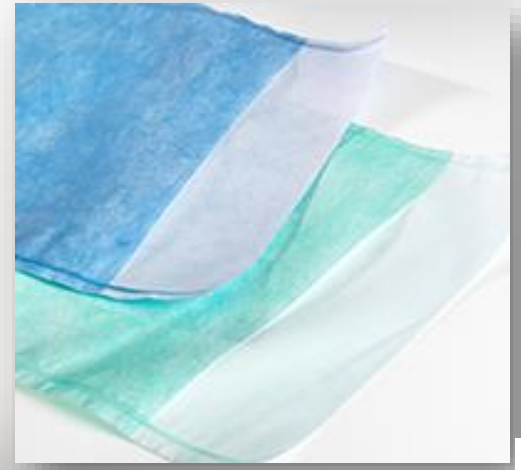
broken gasket

damage

Dunkelberg H., Germany

Yeni paketleme materyalleri: Kuru, daha kuru, kupkuru

- Amaç ıslak paketi engellemek
- İç yüzey absorban, dış yüzey ise su ve alkolü itici özelliğe sahip
- Absorban iç yüzey vakum sırasında kondansasyonun hızla buharlaşarak yok edilmesini sağlıyor

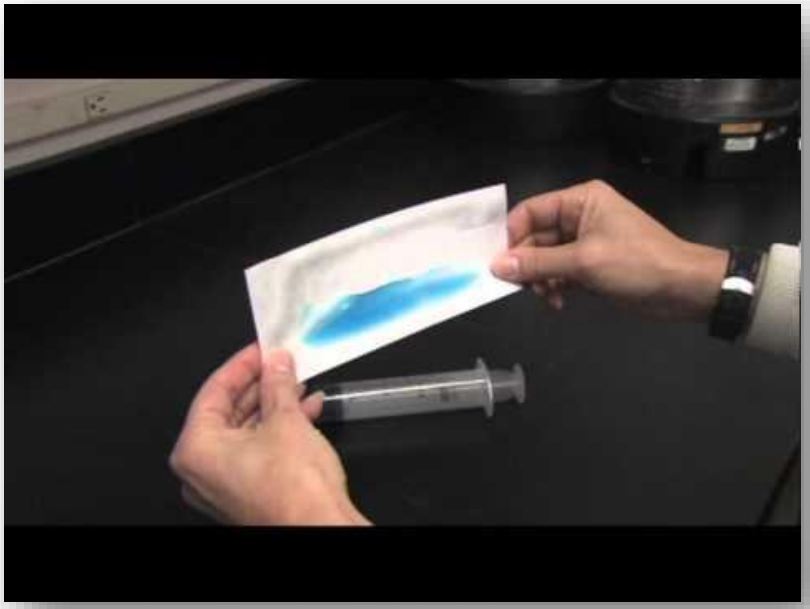


CLINIPAK
trusted solutions at every step

Paket koruyucular

ARJOWIGGINS
HEALTHCARE

Paketlemenin kontrolü



Push Indicator Dye Test

1. Step one

Put the test in The pouch or sleeve

2. Step two

Seal the pouch or sleeve

3. Step three

Press the test in the direction of arrow

4. Step four

4. Observe 5 sec per seal

ARROWPACK

Yarı kritik aletlerin dekontaminasyonu ile ilgili güncel sorunlar

- Endoskoplarla ilişkili salgınlar
  - Flexible duedonoskoplarda MDRO
  - İntrakaviter ultrason problarında HPV
- Endoskop dekontaminasyonunda validasyon eksikliği
- Endoskop üreticisinin yıkama ve dezenfeksiyona ilişkin talimat eksikliği
- Yıkamanın kontrolü ile ilgili problemler
- Organik materyal varlığında mikroorganizmaların YDD ve sterilizasyona direnci

Withdrawal of a novel-design duodenoscope ends outbreak of a VIM-2-producing *Pseudomonas aeruginosa*

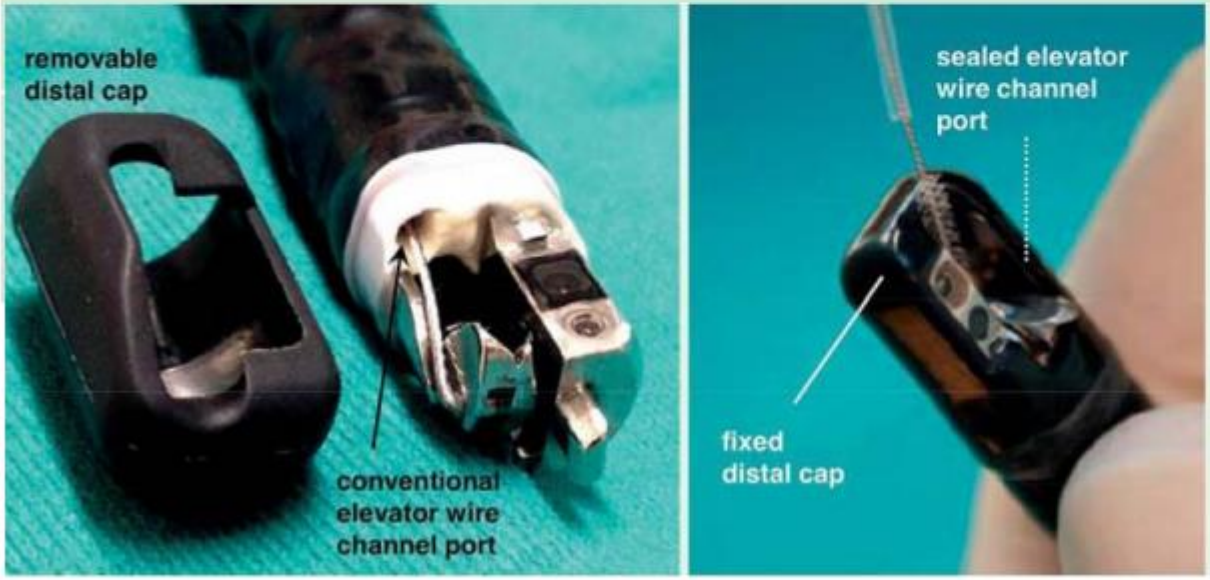


Fig. 1 Differences in the distal end design between the TJF-160VR (left) and the novel TJF-Q180V (right). The distal end of the TJF-160VR has a removable cap and conventional elevator wire channel port that requires flushing. The distal end of the TJF-Q180V has a fixed cap and sealed (invisible) elevator wire channel port.

Verfaillie et al Endoscopy (2015) 47 493-502

Sterilizasyon mu dezenfeksiyon mu?….

Impact of ethylene oxide gas sterilization of duodenoscopes after a carbapenem-resistant Enterobacteriaceae outbreak

Igor Naryzhny, DO,[1] Dean Silas, MD,[1] Kenneth Chi, MD[1]

Park Ridge, Illinois, USA

Background and Aims: Carbapenem-resistant Enterobacteriaceae (CRE) outbreaks have been implicated at several medical institutions involving gastroenterology laboratories and, specifically, duodenoscopes. Currently, there are no specific guidelines to eradicate or prevent the outbreak of this bacteria. We describe ethylene oxide (ETO) gas sterilizations of duodenoscopes to address this issue.

Methods: A complete investigation of the gastroenterology laboratory and an evaluation by the Centers for Disease Control and Prevention concluded that no lapses were found in the reprocessing of the equipment. With no deficiencies to address, we began a novel cleaning process using surgical ETO gas sterilizers in addition to standard endoscope reprocessing recommendations and guidelines, all while trying to eradicate the CRE contamination and prevent future recurrences. We also instituted a surveillance system for recurrence of CRE contamination via monthly cultures of the duodenoscopes.

Results: Between October 2013 and April 2014, 589 ERCPs were performed with 645 ETO gas sterilizations of 6 duodenoscopes. Given the extra 16 hours needed to sterilize the duodenoscopes, our institution incurred costs resulting from purchasing additional equipment and surveillance cultures. Four duodenoscopes sustained damage during this period; however, this could not be directly attributed to the sterilization process.

Conclusions: Proper use of high-level disinfection alone may not eliminate multidrug-resistant organisms from duodenoscopes. In this single-center study, the addition of ETO sterilization and frequent monitoring with cultures reduced duodenoscope contamination and eliminated clinical infections. As such, ETO gas sterilization may provide benefit in further decontamination of duodenoscopes, but further investigation is necessary. (Gastrointest Endosc 2016;■:1-4.)

Yüksek risk

Düşük risk

Steril vücut boşluklarına giren endoskoplar:

Manuel ön yıkama → otomatik yıkayıcı dez.de yıkama → filtre su ile durulama → sterilizasyon

Steril vücut boşluklarına kontamine vücut boşluklarından giren endoskoplar:

Manuel ön yıkama → otomatik yıkayıcı dez.de yıkama → steril su ile durulama

Kontamine vücut boşluklarına giren endoskoplar:

Manuel ön yıkama → otomatik yıkayıcı dez.de yıkama → filtre su ile durulama

Lümensiz endoskoplar:

Manuel ön yıkama → Manuel dezenfeksiyon VEYA

Manuel ön yıkama → Otomatik yıkayıcı dez.de yıkama

CFPP 01-06 Decontamination of flexible endoscopes (2012)

Endoskop dekontaminasyon ünitelerinin merkezileştirilmesi

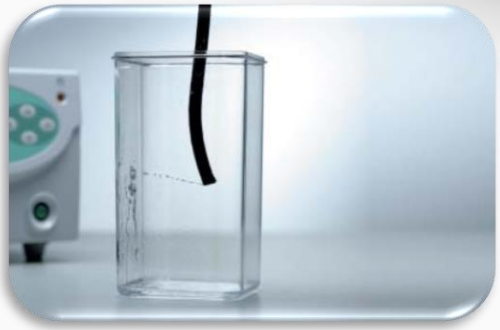
Merkezi olmadığında

- Farklı birimlerde endoskop dekontaminasyonu için dizayn edilmemiş alanlarda çok sayıda endoskop yıkayıcı dezenfektör
- Çok sayıda personel
  - Eğitim problemi
- Uygulamada standardizasyon yok
- Kalite kontrol yok

Merkezi ünitelerde

- Tek merkez ve standardize lojistik
- Kesin sorumluluk
- Kalite güvencesi
- Etkin
- Bilinçli süreç ve takip
- Eğitimli personel

Endoskopi odası



Merkezi Endoskop Dekontaminasyon Ünitesi

“Süper MSÜ”

New CSSD « STERINORD » opened since november 2013

Key data:

- 2600 m2
- 1200 operating trays / day
- 80 operators
- Full automatisation
- Full traceability
- Quality management
- Risk management

C. Denis

D. Goulliet

Yeni lojistik uygulamalar

Kanban sistem

J M Legentil

9 am

nurse

2 pm

Logistics

Stock rotation

2 pm

Re-stocking of secondary bin

9 am

Kanban board: Supply board

Yeni lojistik uygulamalar

Yeni lojistik uygulamalar

Yeni lojistik uygulamalar

I never think of the future, it comes soon enough

Albert Einstein


DAS
DEZENFEKSİYON
ANTİSEPSİ
STERİLİZASYON
DERNEĞİ
10.
Uluslararası
Sterilizasyon Dezenfeksiyon
Kongresi
29 Kasım - 3 Aralık 2017
Sueno Hotel, Belek, Antalya