INFECTION PREVENTION SILVER
ANTI-MICROBIAL TEXTILES

- Antimicrobial
- Eliminates Static
- Shields from RF-EMR
- Eliminates Odour
- Regulates Temperature
Agenda

• SILVERGUARD background
• Infection management challenges and the SILVER antimicrobial technology solution
• Case studies and clinical data
• SILVERGUARD unique products
Who is SILVERGUARD TEXTILES and what do we do?

- SILVERGUARD is a proudly SA company with the strategic intent to promote antimicrobial technology to the healthcare and other markets whilst developing local production and value chain capability.

- SILVERGUARD, powered by X-STATIC is a licensee of NOBLE BIOMATERIALS Inc. - a global leader in bacterial management solutions originating from the USA and who develops, manufacturers, sells and markets advanced antimicrobial technologies designed to manage all forms of bacterial contamination.

- SILVERGUARD uses the licensed technology and the licensed trademarks to manufacture and produce in SA, and sell a variety of textile products and garments throughout AFRICA.
THE GLOBAL LEADER IN SILVER ANTIMICROBIAL SOLUTIONS

Healthcare

Government

Consumer

Industrial

More than 250 licensees validate the performance and integrity of Noble’s technologies in the world’s most critical applications.
What do we mean by ANTIMICROBIAL TECHNOLOGY

• According to Prof. AB Lansdown (Imperial College Faculty of Medicine London) “silver has a long and intriguing history as an antibiotic in human care”

• The antimicrobial technology combines 100% pure ionisable silver with a textile fibre which is woven into a polyester or a cotton/polyester fabric

• These fabrics are used in the clinical, domestic and industrial environments to reduce the risk of infections

• In particular, infections caught in a hospital and are potentially caused by organisms that are resistant to antibiotic
THE SOLUTION

- 99.9% Pure Silver
- 100% Surface Area
- Flexible
- Permanent
- Safe & Natural

X-STATIC® Mechanism of Action - from YouTube.mp4
THE IDEAL SILVER HOSPITAL ROOM
(AS PRESCRIBED BY THE DOCTOR)

BED SHEETS
MATTRESS COVERS
CURTAINS
PATIENT GOWNS
LAB COATS
CLOTHING

PURE SILVER…
PURE PROTECTION
THE HEALTH ISSUE in the USA

• Healthcare Acquired Infection (HAI) rate and incidence rising rapidly
  • 2 million patients per year in the US*
  • 90,000 deaths per year*
  • Hospital stays increase 7-10 days*
  • $6.5BN ($30k/patient) annual cost*
  • >70% of causal bacteria are drug-resistant

• No reimbursement for HAI’s
  • CMMS and many insurance companies will no longer reimburse hospitals for HAI’s deemed preventable.

*CDC Statistics
and it was found that the main culprits of HAI’s were….

- *Klebsiella Pneumoniae*, a bacterial infection that can cause different types of infections, such as
  - Pneumonia
  - Bloodstream infections
  - Wound or surgical site infections, and
  - Meningitis
- Similarly, the other dominant bacteria found was *Acinetobacter Baumannii*, typically found in ICU’s and heath settings housing very ill patients
- and other *MRSA infections* some of which were considered to be life-threatening

*and according to the US Centers for Disease Control, all of the above bacterium have increasingly become resistant to commonly used antibiotics*
THE HEALTH ISSUE

• Infection Control Protocols today
  • Focus today is **hygiene** (hand washing) and **hard surface** disinfection (counters, instruments, etc).
  • Studies have shown only 50% of high risk objects are cleaned during terminal cleanings.
  • Policy driven by facilities and compliance driven by enforcement and behavior.
  • **Textile surfaces are ignored** when it comes to infection prevention

• Problem Areas
  • Textile surfaces have been shown to harbor a wide variety of bacteria in several studies. Laundering/sterilization is the only disinfection protocol.
  • **Privacy Curtains** are rarely washed but are touched frequently.
  • **Lab coats** are not regularly laundered but are exposed to contaminants.
  • Exposed **scrubs/uniforms** are often worn outside departments/facilities increasing chances of cross contamination.
THE OPPORTUNITY

• Soft Surfaces – A missing piece of the puzzle
  • Soft surfaces cover 90% of patient contact environment and a significant percentage of the hospital room interior surface area.
  • Soft surface management can create a comprehensive approach to reducing environmental contamination.
  • The right soft surface solution will not require a change in behavior or additional training to be effective.
WHY SILVERGUARD with X-STATIC?

• **Broad spectrum antimicrobial**
  – Proven to reduce bacterial growth on textile surfaces by >99.9%, including multi drug-resistant strains.*

• **Fast acting**
  – 3-LOG reduction in less than 4 hours

• **Long-lasting**
  – Continuous reduction for the life of the product. Does not wear out or wash out.

• **Safe**
  – Non-toxic, no harsh chemicals.
  – Bacteria will not become resistant.

*In Vitro data available for review
And the evidence?

- In-Vitro Efficacy, or the reduction in the number of suspended or adherent bacteria found in fabrics containing X-STATIC after extensive antimicrobial laboratory testing done in the USA, Europe, South Africa & Japan found the following:

<table>
<thead>
<tr>
<th>Laboratory</th>
<th>Test Method</th>
<th>1 Hour reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>NAMSA</td>
<td>ASTM 2149AATCC100</td>
<td>&gt;99.9%</td>
</tr>
<tr>
<td>BIOSAN</td>
<td>ASTM 2149ISO 20743</td>
<td>&gt;99.9%</td>
</tr>
<tr>
<td>CENTEXBEL</td>
<td>ISO 20743</td>
<td>&gt;99.9%</td>
</tr>
<tr>
<td>JAPAN STHF</td>
<td>JIS 1902</td>
<td>&gt;99.9%</td>
</tr>
<tr>
<td>Swift Lab – Midrand</td>
<td>SWJM35</td>
<td>&gt; 99,9%</td>
</tr>
<tr>
<td>NHLS – Baragwanath</td>
<td>Sterility</td>
<td>&gt; 99,8%</td>
</tr>
</tbody>
</table>

Lead physician Bara Burns Unit: *Besides the compelling lab results, we noted a significant improvement in patient stability*
# Environmental sterility swabs (TMA)

Initial swab prior to Silverguard

## MICRO FINAL REPORT

<table>
<thead>
<tr>
<th>Lab Sample Ref #</th>
<th>Test Date: 20/10/2015</th>
<th>Date Analysis Started: 20/10/2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>GT 15-017178</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Lab Sample Ref #:** GT 15-017178-001  
**Product Description:** Swab: Before 0:00am ICU 113024f  
**Sample Condition:** SEALED  

<table>
<thead>
<tr>
<th>Test Type</th>
<th>Method No.</th>
<th>Result</th>
<th>Limits</th>
</tr>
</thead>
<tbody>
<tr>
<td>TMA</td>
<td>SWJM 35</td>
<td>20 cfu/area</td>
<td>N/A</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Lab Sample Ref #:</th>
<th>Test Date: 20/10/2015</th>
<th>Date Analysis Started: 20/10/2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>GT 15-017178</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Lab Sample Ref #:** GT 15-017178-002  
**Product Description:** Swab: 9:00am Dry 949103  
**Sample Condition:** SEALED  

<table>
<thead>
<tr>
<th>Test Type</th>
<th>Method No.</th>
<th>Result</th>
<th>Limits</th>
</tr>
</thead>
<tbody>
<tr>
<td>TMA</td>
<td>SWJM 35</td>
<td>10 cfu/area</td>
<td>N/A</td>
</tr>
</tbody>
</table>

**Comment:**

[Signature]

Technical Signatory: Samukelisiwe Precious Nyawo

Date: 22/10/2015
Environmental sterility swabs (TMA)

Week one with Silverguard and control bed

---

**MICRO FINAL REPORT**

<table>
<thead>
<tr>
<th>Silveware Textiles (Pty) Ltd</th>
<th>REQ. NO.: GT 15-017652</th>
</tr>
</thead>
<tbody>
<tr>
<td>P.O Box 653662</td>
<td>Date Received: 27/10/2015</td>
</tr>
<tr>
<td>Benmore</td>
<td>Report Date: 02/11/2015</td>
</tr>
<tr>
<td>2010</td>
<td>Order Number: GT 15-017652</td>
</tr>
</tbody>
</table>

Contact Name: Yvonne Ralph
Your email: yvonne@silverguard.co.za
Report Number: 14G035-0

---

**Test Details:**

<table>
<thead>
<tr>
<th>Lab Sample Ref #: GT 15-017662-001</th>
<th>Test Date: 27/10/2015</th>
<th>Date Analysis Started: 27/10/2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product Description: Swab: Trial Bed 11:15 am SEALED</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sample Condition: SEALED</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Test Results:**

<table>
<thead>
<tr>
<th>Test Type</th>
<th>Method No.</th>
<th>Result</th>
<th>Limits</th>
</tr>
</thead>
<tbody>
<tr>
<td>TMA</td>
<td>SWJM 35</td>
<td>No Growth cfu/area</td>
<td>N/A</td>
</tr>
</tbody>
</table>

---

**Test Details:**

<table>
<thead>
<tr>
<th>Lab Sample Ref #: GT 15-017662-002</th>
<th>Test Date: 27/10/2015</th>
<th>Date Analysis Started: 27/10/2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product Description: Swab: Control Bed 11:15 am SEALED</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sample Condition: SEALED</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Test Results:**

<table>
<thead>
<tr>
<th>Test Type</th>
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</tr>
</thead>
<tbody>
<tr>
<td>TMA</td>
<td>SWJM 35</td>
<td>20 cfu/area</td>
<td>N/A</td>
</tr>
</tbody>
</table>

---

Comment:

[Signature]

Technical Signatory: Samukelisiwe Precious Nyawo
TMA: Total Mortal Activity / Total Viable Plate Count

Date: 02/11/2015
Environmental sterility swabs (TMA)

Week two with Silverguard and control bed

<table>
<thead>
<tr>
<th>Lab Sample Ref #: GT 15-018218-001</th>
<th>Test Date: 04/11/2015</th>
<th>Date Analysis Started: 04/11/2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product Description: Control Bed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sample Condition: SEALED</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Remark: 9:45 AM</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Test Type</th>
<th>Method No.</th>
<th>Result</th>
<th>Limits</th>
</tr>
</thead>
<tbody>
<tr>
<td>TMA</td>
<td>SWJM 35</td>
<td>000 cfu/area</td>
<td>N/A</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Lab Sample Ref #: GT 15-018218-002</th>
<th>Test Date: 04/11/2015</th>
<th>Date Analysis Started: 04/11/2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product Description: Trial Bed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sample Condition: SEALED</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Remark: 9:45 AM</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Test Type</th>
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<th>Result</th>
<th>Limits</th>
</tr>
</thead>
<tbody>
<tr>
<td>TMA</td>
<td>SWJM 35</td>
<td>10 cfu/area</td>
<td>N/A</td>
</tr>
</tbody>
</table>
Environmental sterility swabs

Laboratory NHLS conducted in a labour ward

14th March 2016

Control Beds
Bed 2  AATV5789NOF  Bacterial growth detected
       Acinetobacter baumannii [ACIBA]
Bed 6  AATV5790NOF  Bacterial growth detected
       Coagulase Negative Staphylococcus [CNS]
       Corynebacterium species [CORSPEC]
Bed 16 AATV5791NOF  No growth detected
Bed 20 AATV5792NOF  Bacterial growth detected
       Coagulase Negative Staphylococcus [CNS]

Silverguard Beds
Bed 1  AATV5785NOF  No bacterial growth
Bed 5  AATV5786NOF  No bacterial growth
Bed 8  AATV5787NOF  No growth
Bed 9  AATV5788NOF  No growth
Silverguard X-Static product evaluation Prominent Burns Unit 31 Aug 2016

Detection

- Bacillus + Scanty Enterobacteriaceae
- Scanty Staphylococcus
- Scanty Staphylococcus
- Scanty Staphylococcus
- Scanty CNS
- Scanty CNS

No Growth

- Hour 1
- Hour 2
- Hour 3
- Hour 4

Bar chart showing the detection of various bacteria and fungi over time, with colors representing different materials: Curtain, Mattress, Sheet, and Scrubs.
BROAD SPECTRUM
in vitro testing

Bacterial Aerobes

**Gram +ve Rods**
- Bacillus sp. (4)
- Corynebacterium sp. (5)
- Propionibacterium sp. (2)

**Gram –ve Rods**
- Acinetobacter sp. (5)
- Aeromonas sp. (3)
- Burkholderia sp. (2)
- Citrobacter sp. (5)
- Comomonas sp. (1)
- Enterobacter sp. (7)
- Escherichia sp. (6)
- Klebsiella sp. (2)
- Pseudomonas sp. (10)
- Salmonella sp. (6)
- Serratia sp. (3)
- Stenotrophomonas sp. (2)
- Morganella sp. (1)
- Proteus sp. (4)
- Providencia sp. (5)
- Branhamella sp. (2)

**Gram –ve Cocci**
- Micrococcus sp. (3)
- Staphylococcus sp. (22)
- (10 MRSA)
- Streptococcus sp. (16)
- Enterococcus sp. (15)
- Enterococcus all VRE

**Bacterial Anaerobes**

**Gram +ve Rods**
- Clostridium sp. (2)
- Eubacterium sp. (1)

**Gram –ve Rods**
- Bacteroides sp. (2)
- Fusobacterium sp. (1)
- Porphymonas sp. (1)
- Prevotella sp. (2)

**Gram –ve Cocci**
- Veillonella sp. (2)

**Gram +ve Cocci**

**Fungi**

**Moulds**
- Aspergillus sp. (2)

**Yeastas**
- Candida sp. (3)
STUDY TO DETERMINE THE CONTAMINATION RATE OF UNTREATED PRIVACY CURTAINS

“In a culture survey, we found that 42% of hospital privacy curtains were contaminated with vancomycin-resistant enterococci, 22% with methicillin-resistant Staphylococcus aureus, and 4% with Clostridium difficile. Hand imprint cultures demonstrated that these pathogens were easily acquired on hands. Hospital curtains are a potential source for dissemination of healthcare-associated pathogens.”

Source:
Infection Control Hospital Epidemiology 2008; 29:1074-1076
MDRO’s X-STATIC in-vitro testing

Cubicle Curtain Bacteria Reduction Test
Duration: 8 Hours

<table>
<thead>
<tr>
<th>Reduction</th>
<th>ArgentKnit® with X-Static®</th>
<th>NAMSA Control</th>
<th>ArgentKnit® with X-Static®</th>
<th>NAMSA Control</th>
<th>ArgentKnit® with X-Static®</th>
<th>NAMSA Control</th>
<th>ArgentKnit® with X-Static®</th>
<th>NAMSA Control</th>
<th>ArgentKnit® with X-Static®</th>
<th>NAMSA Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>% Reduction</td>
<td>99.99%</td>
<td>0.00%</td>
<td>99.99%</td>
<td>0.00%</td>
<td>99.99%</td>
<td>0.00%</td>
<td>99.99%</td>
<td>0.00%</td>
<td>99.99%</td>
<td>0.00%</td>
</tr>
</tbody>
</table>

MRSA: Methicillin Resistant Staph Aureus
KP: Klebsiella Pneumonia
EC: E.Coli
PA: Pseudomonas Aeruginosa
VRE: Vancomycin Resistant Enterococcus
# PRIVACY CURTAINS COST COMPARISON SA ZAR

## PRIVACY CURTAINS COST COMPARISON ICU, HC AND CASUALTY WARDS

<table>
<thead>
<tr>
<th></th>
<th>X-STATIC TRANQUIL Polyester</th>
<th>DISPOSABLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment</td>
<td>( Antimicrobial )</td>
<td>( Antimicrobial &amp; Sporcidal )</td>
</tr>
<tr>
<td>Fabric Finish</td>
<td>woven</td>
<td>treated</td>
</tr>
<tr>
<td>Permanent &amp; life span</td>
<td>yes - min 5 years</td>
<td>no - 6 months</td>
</tr>
<tr>
<td>Rotation over 5 years</td>
<td>1</td>
<td>10</td>
</tr>
<tr>
<td>Launder &amp; no of washes</td>
<td>yes 80-100</td>
<td>no</td>
</tr>
<tr>
<td>Frequency of washes - months</td>
<td>3 months</td>
<td>n/a</td>
</tr>
<tr>
<td>Standard drop ( length )</td>
<td>250cm</td>
<td>250cm</td>
</tr>
<tr>
<td>Total cover width</td>
<td>750cm</td>
<td>750cm</td>
</tr>
<tr>
<td>Curtain weight: each</td>
<td>2.5</td>
<td>2</td>
</tr>
<tr>
<td>Curtain weight: 14 beds</td>
<td>35</td>
<td></td>
</tr>
<tr>
<td>Laundry cost per kg: year1</td>
<td>R20</td>
<td></td>
</tr>
<tr>
<td>no of privacy curtains- single par</td>
<td>14</td>
<td>14</td>
</tr>
<tr>
<td>cost per curtain: year 1</td>
<td>R2,226</td>
<td>R1,033</td>
</tr>
<tr>
<td>Total cost over 5 years</td>
<td>R31,164</td>
<td>R166,334</td>
</tr>
<tr>
<td>Total laundry cost: 5 yrs</td>
<td>R16,102.07</td>
<td>n/a</td>
</tr>
<tr>
<td>Total cost excluding disposable cost</td>
<td>R47,266.07</td>
<td>R166,334.38</td>
</tr>
<tr>
<td>Total saving over 5 years / %</td>
<td>R119,068.31</td>
<td>72%</td>
</tr>
<tr>
<td>Saving per bed / %</td>
<td>R8,504.88</td>
<td>72%</td>
</tr>
<tr>
<td>Estimated saving for 14 HD beds only</td>
<td>R442,253.71</td>
<td></td>
</tr>
</tbody>
</table>

**NOTES:**

*Actual case study of prominent private trauma facility*

*Excludes the cost of rotating / disposing of the curtain after contamination*

*Inflation factor 7% pa*
GERMAN CLINICAL STUDY
NURSE’S UNIFORMS

Clinically proven to reduce infection pathogens on soft surfaces by 93%

<table>
<thead>
<tr>
<th>1 HOUR REDUCTION RATES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td>X-STATIC</td>
</tr>
<tr>
<td>CONTROL</td>
</tr>
</tbody>
</table>
## CERTIFICATIONS & APPROVALS

<table>
<thead>
<tr>
<th>AGENCY</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISO</td>
<td>9001-2008 Registration</td>
</tr>
<tr>
<td>FDA</td>
<td>510k Medical Device - Class 1 and 2 Approvals</td>
</tr>
<tr>
<td>CE</td>
<td>Medical Device – Class 1, 2 and 3 Approvals</td>
</tr>
<tr>
<td>EPA</td>
<td>Antimicrobial Registration (FIFRA)</td>
</tr>
<tr>
<td>OEKO-TEX</td>
<td>Standard 100 Approval (Class 1)</td>
</tr>
<tr>
<td>ANVISA</td>
<td>Brazil healthcare registration</td>
</tr>
<tr>
<td>EU Reach</td>
<td>Antimicrobial pre-registration</td>
</tr>
</tbody>
</table>
IN CONCLUSION

• Infection prevention and HAI’S continue to be a problem and our common challenge
• Current IC protocols alone are not adequate to eliminate the problem
• Antimicrobial textiles are proven internationally and in SA to combat infection and defeat HAI’s
• SILVERGUARD POWERED by X-Static’s® performance and durability make it the superior product choice for this important role
Thank You