

# توحيد

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## Pain killer Dua للالم

اعوذ بعز الل وقدرته وسلطان من شر ما آجد 7 مر

move your right hand on pain spot 7 times

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## ARTICLERESEARCH CHART INFO GRAPHIC OF Prepositions(حروف جر) (USAGE &EXAMPLES)

ARTICLE/RESEARCH: CHART / INFO GRAPHIC OF Prepositions(حروف  
جر) (USAGE &EXAMPLES)

### Prepositions – Time

English	Usage	Example
on	§ days of the week	§ on Monday

English	Usage	Example
· in	§ months / seasons § time of day § year § after a certain period of time ( <i>when?</i> )	§ in August / in winter § in the morning § in 2006 § in an hour
· at	§ for <i>night</i> § for <i>weekend</i> § a certain point of time ( <i>when?</i> )	§ at night § at the weekend § at half past nine
· since	§ from a certain point of time (past till now)	§ since 1980
· for	§ over a certain period of time (past till now)	§ for 2 years
· ago	§ a certain time in the past	§ 2 years ago
· before	§ earlier than a certain point of time	§ before 2004
· to	§ telling the time	§ ten to six (5:50)
· past	§ telling the time	§ ten past six (6:10)
· to / till / until	§ marking the beginning and end of a period of time	§ from Monday to/till Friday
· till / until	§ in the sense of <i>how long something is going to last</i>	§ He is on holiday until Friday.
· by	§ in the sense of <i>at the latest</i> § up to a certain time	§ I will be back by 6 o'clock. § By 11 o'clock, I had read five pages.

## Prepositions – Place (Position and Direction)

English	Usage	Example
· in	<ul style="list-style-type: none"> <li>§ room, building, street, town, country</li> <li>§ book, paper etc.</li> <li>§ car, taxi</li> <li>§ picture, world</li> </ul>	<ul style="list-style-type: none"> <li>§ in the kitchen, in London</li> <li>§ in the book</li> <li>§ in the car, in a taxi</li> <li>§ in the picture, in the world</li> </ul>
· at	<ul style="list-style-type: none"> <li>§ meaning <i>next to, by an object</i></li> <li>§ for <i>table</i></li> <li>§ for events</li> <li>§ place where you are to do something typical (watch a film, study, work)</li> </ul>	<ul style="list-style-type: none"> <li>§ at the door, at the station</li> <li>§ at the table</li> <li>§ at a concert, at the party</li> <li>§ at the cinema, at school, at work</li> </ul>
· on	<ul style="list-style-type: none"> <li>§ attached</li> <li>§ for a place with a river</li> <li>§ being on a surface</li> <li>§ for a certain side (left, right)</li> <li>§ for a floor in a house</li> <li>§ for public transport</li> <li>§ for <i>television, radio</i></li> </ul>	<ul style="list-style-type: none"> <li>§ the picture on the wall</li> <li>§ London lies on the Thames.</li> <li>§ on the table</li> <li>§ on the left</li> <li>§ on the first floor</li> <li>§ on the bus, on a plane</li> <li>§ on TV, on the radio</li> </ul>
· by, next to, beside	<ul style="list-style-type: none"> <li>§ left or right of somebody or something</li> </ul>	<ul style="list-style-type: none"> <li>§ Jane is standing by / next to / beside the car.</li> </ul>
· under	<ul style="list-style-type: none"> <li>§ on the ground, lower than (or covered by) something else</li> </ul>	<ul style="list-style-type: none"> <li>§ the bag is under the table</li> </ul>
· below	<ul style="list-style-type: none"> <li>§ lower than something else but above ground</li> </ul>	<ul style="list-style-type: none"> <li>§ the fish are below the surface</li> </ul>
· over	<ul style="list-style-type: none"> <li>§ covered by something else</li> <li>§ meaning <i>more than</i></li> <li>§ getting to the other side (also <i>across</i>)</li> <li>§ overcoming an obstacle</li> </ul>	<ul style="list-style-type: none"> <li>§ put a jacket over your shirt</li> <li>§ over 16 years of age</li> <li>§ walk over the bridge</li> <li>§ climb over the wall</li> </ul>
· above	<ul style="list-style-type: none"> <li>§ higher than something else, but not directly over it</li> </ul>	<ul style="list-style-type: none"> <li>§ a path above the lake</li> </ul>
· across	<ul style="list-style-type: none"> <li>§ getting to the other side (also <i>over</i>)</li> <li>§ getting to the other side</li> </ul>	<ul style="list-style-type: none"> <li>§ walk across the bridge</li> <li>§ swim across the lake</li> </ul>
· through	<ul style="list-style-type: none"> <li>§ something with limits on top, bottom and the sides</li> </ul>	<ul style="list-style-type: none"> <li>§ drive through the tunnel</li> </ul>

English	Usage	Example
· to	§ movement to person or building § movement to a place or country § for <i>bed</i>	§ go to the cinema § go to London / Ireland § go to bed
· into	§ enter a room / a building	§ go into the kitchen / the house
· towards	§ movement in the direction of something (but not directly to it)	§ go 5 steps towards the house
· onto	§ movement to the top of something	§ jump onto the table
· from	§ in the sense of <i>where from</i>	§ a flower from the garden

## Other important Prepositions

English	Usage	Example
· from	§ who gave it	§ a present from Jane
· of	§ who/what does it belong to § what does it show	§ a page of the book § the picture of a palace
· by	§ who made it	§ a book by Mark Twain
· on	§ walking or riding on horseback § entering a public transport vehicle	§ on foot, on horseback § get on the bus
· in	§ entering a car / Taxi	§ get in the car
· off	§ leaving a public transport vehicle	§ get off the train
· out of	§ leaving a car / Taxi	§ get out of the taxi
· by	§ rise or fall of something § travelling (other than walking or horse riding)	§ prices have risen by 10 percent § by car, by bus

English	Usage	Example
at	§ for age	§ she learned Russian at 45
about	§ for topics, meaning <i>what about</i>	§ we were talking about you

# ARTICLE/ RESEARCH ON SCIENCE: LIST OF MICROORGANISMS USED IN FOOD & BEVERAGE

## LIST OF MICROORGANISMS USED IN FOOD & BEVERAGE

MICROORGANISM	TYPE OF MICROORGANISM	FOOD OR BEVERAGE
1. <a href="#">SACCHAROMYCES CEREVISIAE</a>	<a href="#">fungus</a>	<a href="#">ALE BEER</a>
2. <a href="#">ASPERGILLUS NIGER</a>	<a href="#">fungus</a>	<a href="#">AWAMORI</a>
3. <a href="#">BRACHYBACTERIUM ALIMENTARIUM</a>	<a href="#">bacterium</a>	<a href="#">BEAUFORT CHEESE</a>
4. <a href="#">BRACHYBACTERIUM TYROFERMENTANS</a>	<a href="#">bacterium</a>	<a href="#">BEAUFORT CHEESE</a>
5. <a href="#">ACETOBACTER CEREVISIAE</a>	<a href="#">bacterium</a>	<a href="#">BEER</a>
6. <a href="#">SACCHAROMYCES BAYANUS</a>	<a href="#">fungus</a>	<a href="#">BEER</a>
7. <a href="#">LACTOBACILLUS BUCHERI</a>	<a href="#">bacterium</a>	<a href="#">BREAD</a>
8. <a href="#">LACTOBACILLUS JENSENII</a>	<a href="#">bacterium</a>	<a href="#">BREAD</a>
9. <a href="#">SACCHAROMYCES CEREVISIAE</a>	<a href="#">fungus</a>	<a href="#">BREAD</a>
10. <a href="#">LACTOBACILLUS SPP.</a>	<a href="#">bacterium</a>	<a href="#">BUTTER</a>
11. <a href="#">LACTOCOCCUS SPP.</a>	<a href="#">bacterium</a>	<a href="#">BUTTER</a>
12. <a href="#">LEUCONOSTOC MESENEROIDES SSP. DEXTRANICUM</a>	<a href="#">bacterium</a>	<a href="#">BUTTER</a>
13. <a href="#">LEUCONOSTOC PSEUDOMESENEROIDES</a>	<a href="#">bacterium</a>	<a href="#">BUTTER</a>
14. <a href="#">LEUCONOSTOC SPP.</a>	<a href="#">bacterium</a>	<a href="#">BUTTER</a>
15. <a href="#">LACTOCOCCUS LACTIS</a>	<a href="#">bacterium</a>	<a href="#">BUTTERMILK</a>
16. <a href="#">LEUCONOSTOC PSEUDOMESENEROIDES</a>	<a href="#">bacterium</a>	<a href="#">BUTTERMILK</a>
17. <a href="#">LACTOBACILLUS CURVATUS</a>	<a href="#">bacterium</a>	<a href="#">CACIO DI FOSSA CHEESE</a>

MICROORGANISM	TYPE OF MICROORGANISM	FOOD OR BEVERAGE
18. <a href="#">LACTOBACILLUS PARACASEI SSP. PARACASEI</a>	<a href="#">bacterium</a>	<a href="#">CACIO DI FOSSA CHEESE</a>
19. <a href="#">LACTOBACILLUS PLANTARUM</a>	<a href="#">bacterium</a>	<a href="#">CACIO DI FOSSA CHEESE</a>
20. <a href="#">LACTOBACILLUS BREVIS</a>	<a href="#">bacterium</a>	<a href="#">CANESTRATO PUGLIESE CHEESE</a>
21. <a href="#">LACTOBACILLUS CURVATUS</a>	<a href="#">bacterium</a>	<a href="#">CANESTRATO PUGLIESE CHEESE</a>
22. <a href="#">LACTOBACILLUS PARACASEI SSP. PARACASEI</a>	<a href="#">bacterium</a>	<a href="#">CANESTRATO PUGLIESE CHEESE</a>
23. <a href="#">LACTOBACILLUS PENTOSUS</a>	<a href="#">bacterium</a>	<a href="#">CANESTRATO PUGLIESE CHEESE</a>
24. <a href="#">LACTOBACILLUS PLANTARUM</a>	<a href="#">bacterium</a>	<a href="#">CANESTRATO PUGLIESE CHEESE</a>
25. <a href="#">LACTOBACILLUS MANIHOTIVORANS</a>	<a href="#">bacterium</a>	<a href="#">CASSAVA</a>
26. <a href="#">WEISSELLA BENINENSIS</a>	<a href="#">bacterium</a>	<a href="#">CASSAVA</a>
27. <a href="#">LACTOCOCCUS LACTIS SSP. CREMORIS</a>	<a href="#">bacterium</a>	<a href="#">CHEDDAR CHEESE</a>
28. <a href="#">BREVIBACTERIUM AURANTIAECUM</a>	<a href="#">bacterium</a>	<a href="#">CHEESE</a>
29. <a href="#">CANDIDA COLLICULOSA</a>	<a href="#">fungus</a>	<a href="#">CHEESE</a>
30. <a href="#">CANDIDA UTILIS</a>	<a href="#">fungus</a>	<a href="#">CHEESE</a>
31. <a href="#">CARNOBACTERIUM DIVERGENS</a>	<a href="#">bacterium</a>	<a href="#">CHEESE</a>
32. <a href="#">CORYNEBACTERIUM AMMONIAGENES</a>	<a href="#">bacterium</a>	<a href="#">CHEESE</a>
33. <a href="#">CORYNEBACTERIUM FLAVESCENS</a>	<a href="#">bacterium</a>	<a href="#">CHEESE</a>
34. <a href="#">CORYNEBACTERIUM VARIABILE</a>	<a href="#">bacterium</a>	<a href="#">CHEESE</a>
35. <a href="#">CYSTOFILOBASIDIUM INFIRMOMINIATUM</a>	<a href="#">fungus</a>	<a href="#">CHEESE</a>
36. <a href="#">ENTEROCOCCUS FAECALIS</a>	<a href="#">bacterium</a>	<a href="#">CHEESE</a>
37. <a href="#">FUSARIUM DOMESTICUM</a>	<a href="#">fungus</a>	<a href="#">CHEESE</a>
38. <a href="#">GEOTRICHUM CANDIDUM</a>	<a href="#">fungus</a>	<a href="#">CHEESE</a>
39. <a href="#">HAFNIA ALVEI</a>	<a href="#">bacterium</a>	<a href="#">CHEESE</a>
40. <a href="#">KLUYVEROMYCES LACTIS</a>	<a href="#">fungus</a>	<a href="#">CHEESE</a>
41. <a href="#">KLUYVEROMYCES MARXIANUS</a>	<a href="#">fungus</a>	<a href="#">CHEESE</a>
42. <a href="#">KOCURIA RHIZOPHILA</a>	<a href="#">bacterium</a>	<a href="#">CHEESE</a>
43. <a href="#">LACTOBACILLUS CORYNIFORMIS</a>	<a href="#">bacterium</a>	<a href="#">CHEESE</a>
44. <a href="#">LACTOBACILLUS DELBRUECKII SSP. BULGARICUS</a>	<a href="#">bacterium</a>	<a href="#">CHEESE</a>
45. <a href="#">LACTOBACILLUS HELVETICUS</a>	<a href="#">bacterium</a>	<a href="#">CHEESE</a>
46. <a href="#">LACTOBACILLUS PARABREVIS</a>	<a href="#">bacterium</a>	<a href="#">CHEESE</a>
47. <a href="#">LACTOBACILLUS PARAPLANTARUM</a>	<a href="#">bacterium</a>	<a href="#">CHEESE</a>
48. <a href="#">LACTOBACILLUS PEROLENS</a>	<a href="#">bacterium</a>	<a href="#">CHEESE</a>
49. <a href="#">LACTOCOCCUS LACTIS SSP. LACTIS</a>	<a href="#">bacterium</a>	<a href="#">CHEESE</a>

MICROORGANISM	TYPE OF MICROORGANISM	FOOD OR BEVERAGE
50. <a href="#"><u>LACTOCOCCUS RAFFINOLACTIS</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>CHEESE</u></a>
51. <a href="#"><u>LECANICILLIUM LECANII</u></a>	<a href="#"><u>fungus</u></a>	<a href="#"><u>CHEESE</u></a>
52. <a href="#"><u>LEUCONOSTOC CITREUM</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>CHEESE</u></a>
53. <a href="#"><u>LEUCONOSTOC LACTIS</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>CHEESE</u></a>
54. <a href="#"><u>LEUCONOSTOC MESENTEROIDES SSP. CREMORIS</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>CHEESE</u></a>
55. <a href="#"><u>MACROCOCCUS CASEOLYTICUS</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>CHEESE</u></a>
56. <a href="#"><u>MICROCOCCUS LUTEUS</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>CHEESE</u></a>
57. <a href="#"><u>MUCOR PLUMBEUS</u></a>	<a href="#"><u>fungus</u></a>	<a href="#"><u>CHEESE</u></a>
58. <a href="#"><u>MUCOR RACEMOSUS</u></a>	<a href="#"><u>fungus</u></a>	<a href="#"><u>CHEESE</u></a>
59. <a href="#"><u>PENICILLIUM CAMEMBERTI</u></a>	<a href="#"><u>fungus</u></a>	<a href="#"><u>CHEESE</u></a>
60. <a href="#"><u>PENICILLIUM CASEIFULVUM</u></a>	<a href="#"><u>fungus</u></a>	<a href="#"><u>CHEESE</u></a>
61. <a href="#"><u>PENICILLIUM CHRYSOGENUM</u></a>	<a href="#"><u>fungus</u></a>	<a href="#"><u>CHEESE</u></a>
62. <a href="#"><u>PENICILLIUM NALGIOVENSE</u></a>	<a href="#"><u>fungus</u></a>	<a href="#"><u>CHEESE</u></a>
63. <a href="#"><u>PENICILLIUM ROQUEFORTI</u></a>	<a href="#"><u>fungus</u></a>	<a href="#"><u>CHEESE</u></a>
64. <a href="#"><u>PROPIONIBACTERIUM ACIDIPROPIONICI</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>CHEESE</u></a>
65. <a href="#"><u>PROPIONIBACTERIUM JENSENII</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>CHEESE</u></a>
66. <a href="#"><u>PROPIONIBACTERIUM THOENII</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>CHEESE</u></a>
67. <a href="#"><u>PSYCHROBACTER CELER</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>CHEESE</u></a>
68. <a href="#"><u>RHODOSPORIDIUM INFIRMOMINIATUM</u></a>	<a href="#"><u>fungus</u></a>	<a href="#"><u>CHEESE</u></a>
69. <a href="#"><u>SACCHAROMYCES CEREVISIAE</u></a>	<a href="#"><u>fungus</u></a>	<a href="#"><u>CHEESE</u></a>
70. <a href="#"><u>STAPHYLOCOCCUS CARNOSUS</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>CHEESE</u></a>
71. <a href="#"><u>STAPHYLOCOCCUS EQUORUM SSP. LINENS</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>CHEESE</u></a>
72. <a href="#"><u>STAPHYLOCOCCUS FLEURETTII</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>CHEESE</u></a>
73. <a href="#"><u>STAPHYLOCOCCUS SCIURI SSP. CARNATICUS</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>CHEESE</u></a>
74. <a href="#"><u>STAPHYLOCOCCUS VITULINUS</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>CHEESE</u></a>
75. <a href="#"><u>STAPHYLOCOCCUS XYLOSUS</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>CHEESE</u></a>
76. <a href="#"><u>STREPTOCOCCUS THERMOPHILUS</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>CHEESE</u></a>
77. <a href="#"><u>LACTOBACILLUS DIOLIVORANS</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>CHICHA</u></a>
78. <a href="#"><u>ACETOBACTER ACETI</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>CHOCOLATE</u></a>
79. <a href="#"><u>ACETOBACTER FABARUM</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>CHOCOLATE</u></a>
80. <a href="#"><u>ACETOBACTER PASTEURIANUS</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>CHOCOLATE</u></a>
81. <a href="#"><u>ACETOBACTER SYZYGII</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>CHOCOLATE</u></a>
82. <a href="#"><u>ACETOBACTER TROPICALIS</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>CHOCOLATE</u></a>
83. <a href="#"><u>ASPERGILLUS FUMIGATUS</u></a>	<a href="#"><u>fungus</u></a>	<a href="#"><u>CHOCOLATE</u></a>
84. <a href="#"><u>BACILLUS CEREUS</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>CHOCOLATE</u></a>
85. <a href="#"><u>BACILLUS COAGULANS</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>CHOCOLATE</u></a>

MICROORGANISM	TYPE OF MICROORGANISM	FOOD OR BEVERAGE
86. <a href="#"><u>BACILLUS LICHENIFORMIS</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>CHOCOLATE</u></a>
87. <a href="#"><u>BACILLUS PUMILUS</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>CHOCOLATE</u></a>
88. <a href="#"><u>BACILLUS STEAROTHERMOPHILUS</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>CHOCOLATE</u></a>
89. <a href="#"><u>BACILLUS SUBTILIS</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>CHOCOLATE</u></a>
90. <a href="#"><u>CANDIDA HUMICOLA</u></a>	<a href="#"><u>fungus</u></a>	<a href="#"><u>CHOCOLATE</u></a>
91. <a href="#"><u>CANDIDA PELLICULOSA</u></a>	<a href="#"><u>fungus</u></a>	<a href="#"><u>CHOCOLATE</u></a>
92. <a href="#"><u>CANDIDA RUGOSA</u></a>	<a href="#"><u>fungus</u></a>	<a href="#"><u>CHOCOLATE</u></a>
93. <a href="#"><u>CANDIDA TROPICALIS</u></a>	<a href="#"><u>fungus</u></a>	<a href="#"><u>CHOCOLATE</u></a>
94. <a href="#"><u>GLUCONACETOBACTER AZOTOCAPTANS</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>CHOCOLATE</u></a>
95. <a href="#"><u>GLUCONACETOBACTER DIAZOTROPHICUS</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>CHOCOLATE</u></a>
96. <a href="#"><u>GLUCONACETOBACTER JOHANNAE</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>CHOCOLATE</u></a>
97. <a href="#"><u>GLUCONOBACTER OXYDANS</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>CHOCOLATE</u></a>
98. <a href="#"><u>KLOECKERA AFRICANA</u></a>	<a href="#"><u>fungus</u></a>	<a href="#"><u>CHOCOLATE</u></a>
99. <a href="#"><u>KLOECKERA APIS</u></a>	<a href="#"><u>fungus</u></a>	<a href="#"><u>CHOCOLATE</u></a>
100. <a href="#"><u>KLOECKERA JAVANICA</u></a>	<a href="#"><u>fungus</u></a>	<a href="#"><u>CHOCOLATE</u></a>
101. <a href="#"><u>KLUYVEROMYCES MARXIANUS</u></a>	<a href="#"><u>fungus</u></a>	<a href="#"><u>CHOCOLATE</u></a>
102. <a href="#"><u>LACTOBACILLUS CACAONUM</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>CHOCOLATE</u></a>
103. <a href="#"><u>LACTOBACILLUS CELLOBIOSUS</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>CHOCOLATE</u></a>
104. <a href="#"><u>LACTOBACILLUS FABIFERMENTANS</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>CHOCOLATE</u></a>
105. <a href="#"><u>LACTOBACILLUS FERMENTUM</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>CHOCOLATE</u></a>
106. <a href="#"><u>LACTOBACILLUS GHANENSIS</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>CHOCOLATE</u></a>
107. <a href="#"><u>LACTOBACILLUS HILGARDII</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>CHOCOLATE</u></a>
108. <a href="#"><u>LACTOBACILLUS PLANTARUM</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>CHOCOLATE</u></a>
109. <a href="#"><u>LACTOCOCCUS LACTIS</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>CHOCOLATE</u></a>
110. <a href="#"><u>LEUCONOSTOC MESENTEROIDES</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>CHOCOLATE</u></a>
111. <a href="#"><u>MUCOR RACEMOSUS</u></a>	<a href="#"><u>fungus</u></a>	<a href="#"><u>CHOCOLATE</u></a>
112. <a href="#"><u>RHODOTORULA GLUTINIS</u></a>	<a href="#"><u>fungus</u></a>	<a href="#"><u>CHOCOLATE</u></a>
113. <a href="#"><u>RHODOTORULA RUBRA</u></a>	<a href="#"><u>fungus</u></a>	<a href="#"><u>CHOCOLATE</u></a>
114. <a href="#"><u>SACCHAROMYCES CEREVISIAE</u></a>	<a href="#"><u>fungus</u></a>	<a href="#"><u>CHOCOLATE</u></a>



	<b>MICROORGANISM</b>	<b>TYPE OF MICROORGANISM</b>	<b>FOOD OR BEVERAGE</b>
115.	<a href="#"><u>WEISSELLA FABARIA</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>CHOCOLATE</u></a>
116.	<a href="#"><u>WEISSELLA GHANESIS</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>CHOCOLATE</u></a>
117.	<a href="#"><u>LACTOBACILLUS COLLINOIDES</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>CIDER</u></a>
118.	<a href="#"><u>LACTOBACILLUS MALI</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>CIDER</u></a>
119.	<a href="#"><u>LACTOBACILLUS YAMANASHIENSIS</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>CIDER</u></a>
120.	<a href="#"><u>SACCHAROMYCES BAYANUS</u></a>	<a href="#"><u>fungus</u></a>	<a href="#"><u>CIDER</u></a>
121.	<a href="#"><u>SACCHAROMYCES CEREVISIAE</u></a>	<a href="#"><u>fungus</u></a>	<a href="#"><u>CIDER</u></a>
122.	<a href="#"><u>ACETOBACTER FABARUM</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>COFFEE</u></a>
123.	<a href="#"><u>ACETOBACTER TROPICALIS</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>COFFEE</u></a>
124.	<a href="#"><u>GLUCONACETOBACTER AZOTOCAPTANS</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>COFFEE</u></a>
125.	<a href="#"><u>GLUCONACETOBACTER DIAZOTROPHICUS</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>COFFEE</u></a>
126.	<a href="#"><u>GLUCONACETOBACTER JOHANNAE</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>COFFEE</u></a>
127.	<a href="#"><u>LEUCONOSTOC HOLZAPFELII</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>COFFEE</u></a>
128.	<a href="#"><u>ENTEROCOCCUS FAECALIS</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>CREAM</u></a>
129.	<a href="#"><u>BIFIDOBACTERIUM ANIMALIS</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>DAIRY</u></a>
130.	<a href="#"><u>BIFIDOBACTERIUM BIFIDUM</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>DAIRY</u></a>
131.	<a href="#"><u>BIFIDOBACTERIUM BREVE</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>DAIRY</u></a>
132.	<a href="#"><u>BIFIDOBACTERIUM INFANTIS</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>DAIRY</u></a>
133.	<a href="#"><u>BIFIDOBACTERIUM LACTIS</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>DAIRY</u></a>
134.	<a href="#"><u>BIFIDOBACTERIUM LONGUM</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>DAIRY</u></a>
135.	<a href="#"><u>BIFIDOBACTERIUM PSEUDOLONGUM</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>DAIRY</u></a>
136.	<a href="#"><u>BIFIDOBACTERIUM THERMOPHILUM</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>DAIRY</u></a>
137.	<a href="#"><u>CARNOBACTERIUM MALTAROMATICUM</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>DAIRY</u></a>
138.	<a href="#"><u>KOCURIA VARIANS</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>DAIRY</u></a>

MICROORGANISM	TYPE OF MICROORGANISM	FOOD OR BEVERAGE
139. <u>LACTOBACILLUS ACIDIPISCIS</u>	<u>bacterium</u>	<u>DAIRY</u>
140. <u>LACTOBACILLUS GASSERI</u>	<u>bacterium</u>	<u>DAIRY</u>
141. <u>LACTOBACILLUS JOHNSONII</u>	<u>bacterium</u>	<u>DAIRY</u>
142. <u>LACTOBACILLUS NODENSIS</u>	<u>bacterium</u>	<u>DAIRY</u>
143. <u>LACTOBACILLUS PARACASEI</u>	<u>bacterium</u>	<u>DAIRY</u>
144. <u>LACTOBACILLUS SALIVARIUS</u>	<u>bacterium</u>	<u>DAIRY</u>
145. <u>LACTOBACILLUS TUCSETI</u>	<u>bacterium</u>	<u>DAIRY</u>
146. <u>PICHIA FERMENTANS</u>	<u>fungus</u>	<u>DAIRY</u>
147. <u>PROPIONIBACTERIUM FREUDENREICHII</u> SSP. <u>FREUDENREICHII</u>	<u>bacterium</u>	<u>DAIRY</u>
148. <u>STAPHYLOCOCCUS SUCCINUS</u>	<u>bacterium</u>	<u>DAIRY</u>
149. <u>STREPTOCOCCUS GALLOLYTICUS</u>	<u>bacterium</u>	<u>DAIRY</u>
150. <u>YARROWIA LIPOLYTICA</u>	<u>fungus</u>	<u>DAIRY</u>
151. <u>PROPIONIBACTERIUM FREUDENREICHII</u> SSP. <u>SHERMANII</u>	<u>bacterium</u>	<u>EMMENTAL CHEESE</u>
152. <u>PENICILLIUM ALBUM</u>	<u>fungus</u>	<u>FARMHOUSE CHEESES</u>
153. <u>CARNOBACTERIUM DIVERGENS</u>	<u>bacterium</u>	<u>FISH</u>
154. <u>LACTOBACILLUS ACIDIPISCIS</u>	<u>bacterium</u>	<u>FISH</u>
155. <u>LACTOBACILLUS ALIMENTARIUS</u>	<u>bacterium</u>	<u>FISH</u>
156. <u>LACTOBACILLUS FARCIMINIS</u>	<u>bacterium</u>	<u>FISH</u>
157. <u>LACTOBACILLUS PENTOSUS</u>	<u>bacterium</u>	<u>FISH</u>
158. <u>LEUCONOSTOC CITREUM</u>	<u>bacterium</u>	<u>FISH</u>
159. <u>STAPHYLOCOCCUS PISCIFERMENTANS</u>	<u>bacterium</u>	<u>FISH</u>
160. <u>WEISSELLA THAILANDENSIS</u>	<u>bacterium</u>	<u>FISH</u>
161. <u>LACTOBACILLUS ACETOTOLERANS</u>	<u>bacterium</u>	<u>FRUIT</u>

MICROORGANISM	TYPE OF MICROORGANISM	FOOD OR BEVERAGE
162. <u>LACTOBACILLUS PENTOSUS</u>	<u>bacterium</u>	<u>FRUIT</u>
163. <u>LACTOBACILLUS POBUZIHII</u>	<u>bacterium</u>	<u>FRUIT</u>
164. <u>LACTOBACILLUS SUEBICUS</u>	<u>bacterium</u>	<u>FRUIT</u>
165. <u>LACTOBACILLUS VACCINOSTERCUS</u>	<u>bacterium</u>	<u>FRUIT</u>
166. <u>LACTOBACILLUS CASEI SSP. PSEUDOPLANTARUM</u>	<u>bacterium</u>	<u>GRANA PADANO CHEESE</u>
167. <u>LACTOBACILLUS RHAMNOSUS</u>	<u>bacterium</u>	<u>GRANA PADANO CHEESE</u>
168. <u>BRACHYBACTERIUM ALIMENTARIUM</u>	<u>bacterium</u>	<u>GRUYÈRE CHEESE</u>
169. <u>BRACHYBACTERIUM TYROFERMENTANS</u>	<u>bacterium</u>	<u>GRUYÈRE CHEESE</u>
170. <u>ENTEROCOCCUS FAECALIS</u>	<u>bacterium</u>	<u>HAM</u>
171. <u>ENTEROCOCCUS FAECIUM</u>	<u>bacterium</u>	<u>HAM</u>
172. <u>PENICILLIUM NALGIOVENSE</u>	<u>fungus</u>	<u>HAM</u>
173. <u>STAPHYLOCOCCUS SAPHROPHYTICUS</u>	<u>bacterium</u>	<u>HARZER CHEESE</u>
174. <u>LACTOBACILLUS CASEI</u>	<u>bacterium</u>	<u>IDIAZABAL CHEESE</u>
175. <u>LACTOBACILLUS PLANTARUM</u>	<u>bacterium</u>	<u>IDIAZABAL CHEESE</u>
176. <u>LEUCONOSTOC MESENEROIDES SSP. DEXTRANICUM</u>	<u>bacterium</u>	<u>IDIAZABAL CHEESE</u>
177. <u>LEUCONOSTOC MESENEROIDES SSP. MESENEROIDES</u>	<u>bacterium</u>	<u>IDIAZABAL CHEESE</u>
178. <u>CANDIDA COLLICULOSA</u>	<u>fungus</u>	<u>KEFIR</u>
179. <u>ISSATCHENKIA ORIENTALIS</u>	<u>fungus</u>	<u>KEFIR</u>
180. <u>KAZACHSTANIA EXIGUA</u>	<u>fungus</u>	<u>KEFIR</u>
181. <u>KAZACHSTANIA UNISPORA</u>	<u>fungus</u>	<u>KEFIR</u>
182. <u>LACTOBACILLUS BREVIS SSP. LINENS</u>	<u>bacterium</u>	<u>KEFIR</u>
183. <u>LACTOBACILLUS KEFIRANOFACIENS</u>	<u>bacterium</u>	<u>KEFIR</u>
184. <u>LACTOBACILLUS KEFIRI</u>	<u>bacterium</u>	<u>KEFIR</u>

MICROORGANISM	TYPE OF MICROORGANISM	FOOD OR BEVERAGE
185. <u>LACTOBACILLUS PARABREVIS</u>	<u>bacterium</u>	<u>KEFIR</u>
186. <u>LACTOBACILLUS PARAKEFIRI</u>	<u>bacterium</u>	<u>KEFIR</u>
187. <u>PICHIA FERMENTANS</u>	<u>fungus</u>	<u>KEFIR</u>
188. <u>ZYGOTORULASPORA FLORENTINA</u>	<u>fungus</u>	<u>KEFIR</u>
189. <u>LACTOBACILLUS KIMCHII</u>	<u>bacterium</u>	<u>KIMCHI</u>
190. <u>LEUCONOSTOC INHAE</u>	<u>bacterium</u>	<u>KIMCHI</u>
191. <u>LEUCONOSTOC KIMCHII</u>	<u>bacterium</u>	<u>KIMCHI</u>
192. <u>TETRAGENOCOCCUS KOREENSIS</u>	<u>bacterium</u>	<u>KIMCHI</u>
193. <u>WEISSELLA CIBARIA</u>	<u>bacterium</u>	<u>KIMCHI</u>
194. <u>WEISSELLA KOREENSIS</u>	<u>bacterium</u>	<u>KIMCHI</u>
195. <u>SACCHAROMYCES CARLSBERGENSIS</u>	<u>fungus</u>	<u>LAGER BEER</u>
196. <u>SACCHAROMYCES PASTORIANUS</u>	<u>fungus</u>	<u>LAGER BEER</u>
197. <u>SACCHAROMYCES UVARUM</u>	<u>fungus</u>	<u>LAGER BEER</u>
198. <u>CANDIDA MYCODERMA</u> <sup>[10]</sup>	<u>fungus</u>	<u>LIMBURGER CHEESE</u>
199. <u>DEBARYOMYCES KLOECKERI</u>	<u>fungus</u>	<u>LIMBURGER CHEESE</u>
200. <u>MICROBACTERIUM GUBBEENSENSE</u>	<u>bacterium</u>	<u>LIMBURGER CHEESE</u>
201. <u>ENTEROCOCCUS FAECIUM</u>	<u>bacterium</u>	<u>MANCHEGO CHEESE</u>
202. <u>LACTOBACILLUS CASEI</u>	<u>bacterium</u>	<u>MANCHEGO CHEESE</u>
203. <u>LACTOBACILLUS PLANTARUM</u>	<u>bacterium</u>	<u>MANCHEGO CHEESE</u>
204. <u>CARNOBACTERIUM DIVERGENS</u>	<u>bacterium</u>	<u>MEAT</u>
205. <u>CARNOBACTERIUM PISCICOLA</u>	<u>bacterium</u>	<u>MEAT</u>
206. <u>HALOMONAS ELONGATA</u>	<u>bacterium</u>	<u>MEAT</u>
207. <u>KOCURIA RHIZOPHILA</u>	<u>bacterium</u>	<u>MEAT</u>
208. <u>LACTOBACILLUS ALIMENTARIUS</u>	<u>bacterium</u>	<u>MEAT</u>
209. <u>LACTOBACILLUS DEXTRINICUS</u>	<u>bacterium</u>	<u>MEAT</u>

MICROORGANISM	TYPE OF MICROORGANISM	FOOD OR BEVERAGE
210. <u>LACTOBACILLUS</u> <u>PARACASEI</u>	<u>bacterium</u>	<u>MEAT</u>
211. <u>LACTOBACILLUS</u> <u>RHAMNOSUS</u>	<u>bacterium</u>	<u>MEAT</u>
212. <u>LEUCONOSTOC</u> <u>CARNOSUM</u>	<u>bacterium</u>	<u>MEAT</u>
213. <u>PENICILLIUM</u> <u>SOLITUM</u>	<u>fungus</u>	<u>MEAT</u>
214. <u>STAPHYLOCOCCUS</u> <u>EQUORUM</u>	<u>bacterium</u>	<u>MEAT</u>
215. <u>STAPHYLOCOCCUS</u> <u>SUCCINUS</u>	<u>bacterium</u>	<u>MEAT</u>
216. <u>STAPHYLOCOCCUS</u> <u>VITULINUS</u>	<u>bacterium</u>	<u>MEAT</u>
217. <u>STAPHYLOCOCCUS</u> <u>WARNERI</u>	<u>bacterium</u>	<u>MEAT</u>
218. <u>STREPTOMYCES</u> <u>GRISEUS</u>	<u>bacterium</u>	<u>MEAT</u>
219. <u>STREPTOMYCES</u> <u>MOBARAENSIS</u>	<u>bacterium</u>	<u>MEAT, FISH</u>
220. <u>ASPERGILLUS</u> <u>ORYZAE</u>	<u>fungus</u>	<u>MISO</u>
221. <u>ASPERGILLUS</u> <u>SOJAE</u>	<u>fungus</u>	<u>MISO</u>
222. <u>ENTEROCOCCUS</u> <u>FAECALIS</u>	<u>bacterium</u>	<u>MISO</u>
223. <u>ENTEROCOCCUS</u> <u>FAECIUM</u>	<u>bacterium</u>	<u>MISO</u>
224. <u>SACCHAROMYCES</u> <u>ROUZII</u>	<u>fungus</u>	<u>MISO</u>
225. <u>TETRAGENOCOCCUS</u> <u>HALOPHILUS</u>	<u>bacterium</u>	<u>MISO</u>
226. <u>TORULOPSIS</u> <u>VERSATILIS</u>	<u>fungus</u>	<u>MISO</u>
227. <u>BACILLUS</u> <u>SUBTILIS</u>	<u>bacterium</u>	<u>NATTO</u>
228. <u>LACTOBACILLUS</u> <u>SPP.</u>	<u>bacterium</u>	<u>OLIVE</u>
229. <u>LEUCONOSTOC</u> <u>SPP.</u>	<u>bacterium</u>	<u>OLIVE</u>
230. <u>NEUROSPORA</u> <u>INTERMEDIA</u>	<u>fungus</u>	<u>ONCOM</u>
231. <u>RHIZOPUS</u> <u>MICROSPORUS</u> <u>SSP. OLIGOSPORUS</u>	<u>fungus</u>	<u>ONCOM</u>
232. <u>LEUCONOSTOC</u> <u>PALMAE</u>	<u>bacterium</u>	<u>PALM WINE</u>
233. <u>ZYMOMONAS</u> <u>MOBILIS</u>	<u>bacterium</u>	<u>PALM WINE</u>
234. <u>LACTOBACILLUS</u> <u>CASEI</u> <u>SSP. PSEUDOPANTARUM</u>	<u>bacterium</u>	<u>PARMIGIANO-REGGIANO</u> <u>CHEESE</u>
235. <u>LACTOBACILLUS</u> <u>RHAMNOSUS</u>	<u>bacterium</u>	<u>PARMIGIANO-REGGIANO</u> <u>CHEESE</u>
236. <u>LACTOBACILLUS</u> <u>CURVATUS</u>	<u>bacterium</u>	<u>PECORINO ROMANO CHEESE</u>

MICROORGANISM	TYPE OF MICROORGANISM	FOOD OR BEVERAGE
237. <i>LACTOBACILLUS DELBRUECKII</i> SSP. <i>LACTIS</i>	<a href="#">bacterium</a>	<a href="#">PECORINO ROMANO CHEESE</a>
238. <i>LACTOBACILLUS FERMENTUM</i>	<a href="#">bacterium</a>	<a href="#">PECORINO ROMANO CHEESE</a>
239. <i>LACTOBACILLUS PLANTARUM</i>	<a href="#">bacterium</a>	<a href="#">PECORINO ROMANO CHEESE</a>
240. <i>LACTOBACILLUS CURVATUS</i>	<a href="#">bacterium</a>	<a href="#">PECORINO SARDO CHEESE</a>
241. <i>LACTOBACILLUS PARACASEI</i> SSP. <i>PARACASEI</i>	<a href="#">bacterium</a>	<a href="#">PECORINO SARDO CHEESE</a>
242. <i>ENTEROCOCCUS FAECALIS</i>	<a href="#">bacterium</a>	<a href="#">PICKLE</a>
243. <i>ENTEROCOCCUS FAECIUM</i>	<a href="#">bacterium</a>	<a href="#">PICKLE</a>
244. <i>LACTOBACILLUS KISONENSIS</i>	<a href="#">bacterium</a>	<a href="#">PICKLE</a>
245. <i>LACTOBACILLUS OTAKIENSIS</i>	<a href="#">bacterium</a>	<a href="#">PICKLE</a>
246. <i>LACTOBACILLUS RAPI</i>	<a href="#">bacterium</a>	<a href="#">PICKLE</a>
247. <i>LACTOBACILLUS SUNKII</i>	<a href="#">bacterium</a>	<a href="#">PICKLE</a>
248. <i>LEUCONOSTOC MESENEROIDES</i> SSP. <i>DEXTRANICUM</i>	<a href="#">bacterium</a>	<a href="#">PICKLE</a>
249. <i>LACTOBACILLUS SENMAIZUKEI</i>	<a href="#">bacterium</a>	<a href="#">PICKLES</a>
250. <i>ZYMOMONAS MOBILIS</i>	<a href="#">bacterium</a>	<a href="#">PULQUE</a>
251. <i>YARROWIA LIPOLYTICA</i>	<a href="#">fungus</a>	<a href="#">RACLETTE CHEESE</a>
252. <i>CANDIDA ZEYLANOIDES</i>	<a href="#">fungus</a>	<a href="#">REBLOCHON CHEESE</a>
253. <i>DEBARYOMYCES HANSENI</i>	<a href="#">fungus</a>	<a href="#">REBLOCHON CHEESE</a>
254. <i>CANDIDA VINI</i> <sup>[10]</sup>	<a href="#">fungus</a>	<a href="#">REBLOCHON CHEESE, WINE</a>
255. <i>LACTOBACILLUS CASEI</i>	<a href="#">bacterium</a>	<a href="#">RONCAL CHEESE</a>
256. <i>LACTOBACILLUS PLANTARUM</i>	<a href="#">bacterium</a>	<a href="#">RONCAL CHEESE</a>
257. <i>LEUCONOSTOC MESENEROIDES</i> SSP. <i>DEXTRANICUM</i>	<a href="#">bacterium</a>	<a href="#">RONCAL CHEESE</a>
258. <i>LEUCONOSTOC MESENEROIDES</i> SSP. <i>MESENEROIDES</i>	<a href="#">bacterium</a>	<a href="#">RONCAL CHEESE</a>
259. <i>LACTOBACILLUS MALI</i>	<a href="#">bacterium</a>	<a href="#">RUM</a>
260. <i>LACTOBACILLUS SIMILIS</i>	<a href="#">bacterium</a>	<a href="#">RUM</a>
261. <i>ASPERGILLUS ORYZAE</i>	<a href="#">fungus</a>	<a href="#">SAKE</a>
262. <i>LACTOBACILLUS HOMOHIUCHII</i>	<a href="#">bacterium</a>	<a href="#">SAKE</a>

MICROORGANISM	TYPE OF MICROORGANISM	FOOD OR BEVERAGE
263. <a href="#"><u>LACTOBACILLUS SAKEI</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>SAKE</u></a>
264. <a href="#"><u>LEUCONOSTOC FALLAX</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>SAUERKRAUT</u></a>
265. <a href="#"><u>ENTEROCOCCUS FAECALIS</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>SAUSAGE</u></a>
266. <a href="#"><u>KOCURIA VARIANS</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>SAUSAGE</u></a>
267. <a href="#"><u>LACTOBACILLUS CURVATUS</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>SAUSAGE</u></a>
268. <a href="#"><u>LACTOBACILLUS PLANTARUM</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>SAUSAGE</u></a>
269. <a href="#"><u>LACTOBACILLUS SAKEI</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>SAUSAGE</u></a>
270. <a href="#"><u>LACTOBACILLUS TUCSETI</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>SAUSAGE</u></a>
271. <a href="#"><u>LACTOBACILLUS VERSMOLDESIS</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>SAUSAGE</u></a>
272. <a href="#"><u>MACROCOCCUS CASEOLYTICUS</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>SAUSAGE</u></a>
273. <a href="#"><u>MICROCOCCUS LYLAE</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>SAUSAGE</u></a>
274. <a href="#"><u>PEDIOCOCCUS ACIDILACTICI</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>SAUSAGE</u></a>
275. <a href="#"><u>PEDIOCOCCUS PENTOSACEUS</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>SAUSAGE</u></a>
276. <a href="#"><u>PENICILLIUM CHRYSOGENUM</u></a>	<a href="#"><u>fungus</u></a>	<a href="#"><u>SAUSAGE</u></a>
277. <a href="#"><u>PENICILLIUM NALGIOVENSE</u></a>	<a href="#"><u>fungus</u></a>	<a href="#"><u>SAUSAGE</u></a>
278. <a href="#"><u>STAPHYLOCOCCUS CARNOSUS SSP. CARNOSUS</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>SAUSAGE</u></a>
279. <a href="#"><u>STAPHYLOCOCCUS SIMULANS</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>SAUSAGE</u></a>
280. <a href="#"><u>STAPHYLOCOCCUS XYLOSUS</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>SAUSAGE</u></a>
281. <a href="#"><u>WEISSELLA PARAMESENEROIDES</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>SAUSAGE</u></a>
282. <a href="#"><u>LACTOBACILLUS COMPOSTI</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>SHŌCHŪ</u></a>
283. <a href="#"><u>LACTOBACILLUS SATSUMENSIS</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>SHŌCHŪ</u></a>
284. <a href="#"><u>ARTHROBACTER ARILAITENSIS</u></a>	<a href="#"><u>bacterium</u></a>	SMEAR-RIPENED <a href="#"><u>CHEESE</u></a>
285. <a href="#"><u>ARTHROBACTER BERGEREI</u></a>	<a href="#"><u>bacterium</u></a>	SMEAR-RIPENED <a href="#"><u>CHEESE</u></a>
286. <a href="#"><u>ARTHROBACTER GLOBIFORMIS</u></a>	<a href="#"><u>bacterium</u></a>	SMEAR-RIPENED <a href="#"><u>CHEESE</u></a>

MICROORGANISM	TYPE OF MICROORGANISM	FOOD OR BEVERAGE
287. <a href="#"><u>ARTHROBACTER VARIABILIS</u></a>	<a href="#"><u>bacterium</u></a>	SMEAR-RIPENED <a href="#"><u>CHEESE</u></a>
288. <a href="#"><u>BREVIBACTERIUM CASEI</u></a>	<a href="#"><u>bacterium</u></a>	SMEAR-RIPENED <a href="#"><u>CHEESE</u></a>
289. <a href="#"><u>BREVIBACTERIUM LINENS</u></a>	<a href="#"><u>bacterium</u></a>	SMEAR-RIPENED <a href="#"><u>CHEESE</u></a>
290. <a href="#"><u>CORYNEBACTERIUM CASEI</u></a>	<a href="#"><u>bacterium</u></a>	SMEAR-RIPENED <a href="#"><u>CHEESE</u></a>
291. <a href="#"><u>CORYNEBACTERIUM MOOREPARKENSE</u></a>	<a href="#"><u>bacterium</u></a>	SMEAR-RIPENED <a href="#"><u>CHEESE</u></a>
292. <a href="#"><u>DEBARYOMYCES HANSENII</u></a>	<a href="#"><u>fungus</u></a>	SMEAR-RIPENED <a href="#"><u>CHEESE</u></a>
293. <a href="#"><u>MICROBACTERIUM GUBBEENSE</u></a>	<a href="#"><u>bacterium</u></a>	SMEAR-RIPENED <a href="#"><u>CHEESE</u></a>
294. <a href="#"><u>RHODOTORULA MINUTA</u></a>	<a href="#"><u>fungus</u></a>	SMEAR-RIPENED <a href="#"><u>CHEESE</u></a>
295. <a href="#"><u>TORULASPORA DELBRUECKII</u></a>	<a href="#"><u>fungus</u></a>	SMEAR-RIPENED <a href="#"><u>CHEESE</u></a>
296. <a href="#"><u>THRICHOSPORON BEIGELII</u></a>	<a href="#"><u>fungus</u></a>	SMEAR-RIPENED <a href="#"><u>CHEESE</u></a>
297. <a href="#"><u>YARROWIA LIPOLYTICA</u></a>	<a href="#"><u>fungus</u></a>	SMEAR-RIPENED <a href="#"><u>CHEESE</u></a>
298. <a href="#"><u>LEUCONOSTOC PSEUDOMESENTEROIDES</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>SOUR CREAM</u></a>
299. <a href="#"><u>CANDIDA VALIDA</u></a> <sup>[10]</sup>	<a href="#"><u>fungus</u></a>	<a href="#"><u>SOURDOUGH</u></a>
300. <a href="#"><u>CANDIDA EXIGUUS</u></a>	<a href="#"><u>fungus</u></a>	<a href="#"><u>SOURDOUGH BREAD</u></a>
301. <a href="#"><u>CANDIDA MILLERI</u></a>	<a href="#"><u>fungus</u></a>	<a href="#"><u>SOURDOUGH BREAD</u></a>
302. <a href="#"><u>LACTOBACILLUS ACETOTOLERANS</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>SOURDOUGH BREAD</u></a>
303. <a href="#"><u>LACTOBACILLUS ACIDIFARINAE</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>SOURDOUGH BREAD</u></a>
304. <a href="#"><u>LACTOBACILLUS CRISPATUS</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>SOURDOUGH BREAD</u></a>
305. <a href="#"><u>LACTOBACILLUS FERMENTUM</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>SOURDOUGH BREAD</u></a>
306. <a href="#"><u>LACTOBACILLUS GASSERI</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>SOURDOUGH BREAD</u></a>
307. <a href="#"><u>LACTOBACILLUS HAMMESII</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>SOURDOUGH BREAD</u></a>
308. <a href="#"><u>LACTOBACILLUS HOMOHIIOCHII</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>SOURDOUGH BREAD</u></a>
309. <a href="#"><u>LACTOBACILLUS JOHNSONII</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>SOURDOUGH BREAD</u></a>
310. <a href="#"><u>LACTOBACILLUS MINDENSIS</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>SOURDOUGH BREAD</u></a>
311. <a href="#"><u>LACTOBACILLUS MUCOSAE</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>SOURDOUGH BREAD</u></a>



MICROORGANISM	TYPE OF MICROORGANISM	FOOD OR BEVERAGE
312. <i>LACTOBACILLUS NAMURENSIS</i>	<a href="#">bacterium</a>	<a href="#">SOURDOUGH BREAD</a>
313. <i>LACTOBACILLUS NANTESIS</i>	<a href="#">bacterium</a>	<a href="#">SOURDOUGH BREAD</a>
314. <i>LACTOBACILLUS PANIS</i>	<a href="#">bacterium</a>	<a href="#">SOURDOUGH BREAD</a>
315. <i>LACTOBACILLUS PARABUCHNERI</i>	<a href="#">bacterium</a>	<a href="#">SOURDOUGH BREAD</a>
316. <i>LACTOBACILLUS PARALIMENTARIUS</i>	<a href="#">bacterium</a>	<a href="#">SOURDOUGH BREAD</a>
317. <i>LACTOBACILLUS PONTIS</i>	<a href="#">bacterium</a>	<a href="#">SOURDOUGH BREAD</a>
318. <i>LACTOBACILLUS REUTERI</i>	<a href="#">bacterium</a>	<a href="#">SOURDOUGH BREAD</a>
319. <i>LACTOBACILLUS ROSSIAE</i>	<a href="#">bacterium</a>	<a href="#">SOURDOUGH BREAD</a>
320. <i>LACTOBACILLUS SANFRANCISCENSIS</i>	<a href="#">bacterium</a>	<a href="#">SOURDOUGH BREAD</a>
321. <i>LACTOBACILLUS SECALIPHILUS</i>	<a href="#">bacterium</a>	<a href="#">SOURDOUGH BREAD</a>
322. <i>LACTOBACILLUS SILIGINIS</i>	<a href="#">bacterium</a>	<a href="#">SOURDOUGH BREAD</a>
323. <i>LACTOBACILLUS SPICHERI</i>	<a href="#">bacterium</a>	<a href="#">SOURDOUGH BREAD</a>
324. <i>BIFIDOBACTERIUM BREVE</i>	<a href="#">bacterium</a>	<a href="#">SOY</a>
325. <i>LACTOBACILLUS FARCIMINIS</i>	<a href="#">bacterium</a>	<a href="#">SOY</a>
326. <i>STAPHYLOCOCCUS CONDIMENTI</i>	<a href="#">bacterium</a>	<a href="#">SOY</a>
327. <i>MUCOR HIEMALIS</i>	<a href="#">fungus</a>	<a href="#">SOY BEAN CURD</a>
328. <i>ASPERGILLUS ORYZAE</i>	<a href="#">fungus</a>	<a href="#">SOY SAUCE</a>
329. <i>ASPERGILLUS SOJAE</i>	<a href="#">fungus</a>	<a href="#">SOY SAUCE</a>
330. <i>ENTEROCOCCUS FAECALIS</i>	<a href="#">bacterium</a>	<a href="#">SOY SAUCE</a>
331. <i>ENTEROCOCCUS FAECIUM</i>	<a href="#">bacterium</a>	<a href="#">SOY SAUCE</a>
332. <i>TETRAGENOCOCCUS HALOPHILUS</i>	<a href="#">bacterium</a>	<a href="#">SOY SAUCE</a>
333. <i>BACILLUS SPHAERICUS</i>	<a href="#">bacterium</a>	<a href="#">STINKY TOFU</a>
334. <i>ARTHROBACTER NICOTIANAE</i>	<a href="#">bacterium</a>	<a href="#">SURFACE-RIPENED CHEESE</a>
335. <i>CANDIDA KEFYR</i>	<a href="#">fungus</a>	<a href="#">SURFACE-RIPENED CHEESE</a>
336. <i>CANDIDA KRUSEI</i>	<a href="#">fungus</a>	<a href="#">SURFACE-RIPENED CHEESE</a>
337. <i>MICROBACTERIUM FOLIORUM</i>	<a href="#">bacterium</a>	<a href="#">SURFACE-RIPENED CHEESE</a>

MICROORGANISM	TYPE OF MICROORGANISM	FOOD OR BEVERAGE
338. <u><i>PENICILLIUM COMMUNE</i></u>	<u>fungus</u>	SURFACE-RIPENED <u>CHEESE</u>
339. <u><i>PROTEUS VULGARIS</i></u>	<u>bacterium</u>	SURFACE-RIPENED <u>CHEESE</u>
340. <u><i>ASPERGILLUS ACIDUS</i></u>	<u>fungus</u>	<u>TEA</u>
341. <u><i>RHIZOPUS MICROSPORUS SSP. OLIGOSPORUS</i></u>	<u>fungus</u>	<u>TEMPEH</u>
342. <u><i>ARTHROBACTER NICOTIANAE</i></u>	<u>bacterium</u>	<u>TILSIT CHEESE</u>
343. <u><i>MICROBACTERIUM GUBBEENSENSE</i></u>	<u>bacterium</u>	<u>TILSIT CHEESE</u>
344. <u><i>VERTICILLIUM LECANII</i></u>	<u>fungus</u>	<u>TOMME CHEESE</u>
345. <u><i>ACETOBACTER LOVANIENSIS</i></u>	<u>bacterium</u>	<u>VEGETABLES</u>
346. <u><i>ACETOBACTER ORIENTALIS</i></u>	<u>bacterium</u>	<u>VEGETABLES</u>
347. <u><i>LACTOBACILLUS ACETOTOLERANS</i></u>	<u>bacterium</u>	<u>VEGETABLES</u>
348. <u><i>LACTOBACILLUS ACIDOPHILUS</i></u>	<u>bacterium</u>	<u>VEGETABLES</u>
349. <u><i>LACTOBACILLUS BREVIS</i></u>	<u>bacterium</u>	<u>VEGETABLES</u>
350. <u><i>LACTOBACILLUS DELBRUECKII</i></u>	<u>bacterium</u>	<u>VEGETABLES</u>
351. <u><i>LACTOBACILLUS HARBINENSIS</i></u>	<u>bacterium</u>	<u>VEGETABLES</u>
352. <u><i>LACTOBACILLUS HELVETICUS</i></u>	<u>bacterium</u>	<u>VEGETABLES</u>
353. <u><i>LACTOBACILLUS PARABREVIS</i></u>	<u>bacterium</u>	<u>VEGETABLES</u>
354. <u><i>LACTOBACILLUS PARAPLANTARUM</i></u>	<u>bacterium</u>	<u>VEGETABLES</u>
355. <u><i>LACTOBACILLUS PEROLENS</i></u>	<u>bacterium</u>	<u>VEGETABLES</u>
356. <u><i>LACTOBACILLUS PLANTARUM</i></u>	<u>bacterium</u>	<u>VEGETABLES</u>
357. <u><i>LACTOBACILLUS RAPI</i></u>	<u>bacterium</u>	<u>VEGETABLES</u>
358. <u><i>LACTOBACILLUS RHAMNOSUS</i></u>	<u>bacterium</u>	<u>VEGETABLES</u>
359. <u><i>LACTOBACILLUS VACCINOSTERCUS</i></u>	<u>bacterium</u>	<u>VEGETABLES</u>
360. <u><i>LEUCONOSTOC MESENTEROIDES</i></u>	<u>bacterium</u>	<u>VEGETABLES</u>

MICROORGANISM	TYPE OF MICROORGANISM	FOOD OR BEVERAGE
361. <a href="#"><u>LEUCONOSTOC MESENTEROIDES SSP. CREMORIS</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>VEGETABLES</u></a>
362. <a href="#"><u>PEDIOCOCCUS ACIDILACTICI</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>VEGETABLES</u></a>
363. <a href="#"><u>ACETOBACTER ACETI</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>VINEGAR</u></a>
364. <a href="#"><u>ACETOBACTER MALORUM</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>VINEGAR</u></a>
365. <a href="#"><u>ACETOBACTER PASTEURIANUS</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>VINEGAR</u></a>
366. <a href="#"><u>ACETOBACTER POMORUM</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>VINEGAR</u></a>
367. <a href="#"><u>ACETOBACTER SYZYGII</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>VINEGAR</u></a>
368. <a href="#"><u>GLUCONACETOBACTER ENTANII</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>VINEGAR</u></a>
369. <a href="#"><u>GLUCONACETOBACTER EUROPAEUS</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>VINEGAR</u></a>
370. <a href="#"><u>GLUCONACETOBACTER HANSENI</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>VINEGAR</u></a>
371. <a href="#"><u>GLUCONACETOBACTER OBOEDIENS</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>VINEGAR</u></a>
372. <a href="#"><u>GLUCONACETOBACTER XYLINUS</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>VINEGAR</u></a>
373. <a href="#"><u>CYBERLINDNERA MRAKII</u></a>	<a href="#"><u>fungus</u></a>	<a href="#"><u>WINE</u></a>
374. <a href="#"><u>LACTOBACILLUS BUCHERI</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>WINE</u></a>
375. <a href="#"><u>LACTOBACILLUS HILGARDII</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>WINE</u></a>
376. <a href="#"><u>LACTOBACILLUS KUNKEEI</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>WINE</u></a>
377. <a href="#"><u>LACTOBACILLUS MALI</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>WINE</u></a>
378. <a href="#"><u>LACTOBACILLUS NAGELII</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>WINE</u></a>
379. <a href="#"><u>LACTOBACILLUS OENI</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>WINE</u></a>
380. <a href="#"><u>LACTOBACILLUS PENTOSUS</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>WINE</u></a>
381. <a href="#"><u>LACTOBACILLUS YAMANASHIENSIS</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>WINE</u></a>
382. <a href="#"><u>LEUCONOSTOC SPP.</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>WINE</u></a>
383. <a href="#"><u>OENOCOCCUS OENI</u></a>	<a href="#"><u>bacterium</u></a>	<a href="#"><u>WINE</u></a>
384. <a href="#"><u>PICHIA FERMENTANS</u></a>	<a href="#"><u>fungus</u></a>	<a href="#"><u>WINE</u></a>
385. <a href="#"><u>SACCHAROMYCES BAYANUS</u></a>	<a href="#"><u>fungus</u></a>	<a href="#"><u>WINE</u></a>
386. <a href="#"><u>SACCHAROMYCES CEREVISIAE</u></a>	<a href="#"><u>fungus</u></a>	<a href="#"><u>WINE</u></a>

	MICROORGANISM	TYPE OF MICROORGANISM	FOOD OR BEVERAGE
387.	<i>BIFIDOBACTERIUM ADOLESCENTIS</i>	bacterium	YOGURT
388.	<i>LACTOBACILLUS ACIDOPHILUS</i>	bacterium	YOGURT
389.	<i>LACTOBACILLUS CASEI</i>	bacterium	YOGURT
390.	<i>LACTOBACILLUS DELBRUECKII SSP. BULGARICUS</i>	bacterium	YOGURT
391.	<i>PSEUDOMONAS FLUORESCENS</i>	bacterium	YOGURT
392.	<i>STREPTOCOCCUS SALIVARIUS</i>	bacterium	YOGURT
393.	<i>STREPTOCOCCUS THERMOPHILUS</i>	bacterium	YOGURT

# Evaluation of Hand Hygiene Perceptions & practice amongst health care workers in Saudi Arabian hospitals

*Evaluation of Hand Hygiene Perceptions & practice amongst health care workers in Saudi Arabian hospitals*

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## **ABSTRACT**

HAND HYGIENE is associated with increase morbidity, mortality,

prolonged hospital stay, increased health care costs, and antibiotic resistance in both acute and long term care facilities. Hand hygiene, such as hand washing and hand rub, has been the cornerstone of infection prevention and control measures in reducing HAND HYGIENE. The aim of the study is to assess the perception towards hand hygiene amongst healthcare professionals such as doctors and nurses in the Ministry of Interior Security hospital, Saudi Arabia.

A descriptive survey using a modified World Health Organization (revised 2009) questionnaire was used to gather data. A total of 87 respondents participated in the study. Results showed that respondents (27.6%) are aware that HAND HYGIENE has an impact on patient outcome ( $X^2= 46.5$ ;  $p < 0.05$ ), hospitalized patient will likely develop HAND HYGIENE ( $X^2= 50.4$ ;  $p < 0.05$ ), and hand hygiene remains to be the single and most effective method against HAND HYGIENE ( $X^2= 52.2$ ;  $p < 0.05$ ). Respondents reported a high self-efficacy ( $X^2= 127.3$ ;  $p < 0.05$ ) in performing hand hygiene.

Organizational factors such as staff engagement, commitment of the department heads and leadership are perceived to be significant in promoting hand hygiene practices. Strategies such as provision of access to hand hygiene facilities, guidelines, education and training, positive role modeling are effective. In conclusion, the findings suggest that health care workers have a high level of awareness about HAND HYGIENES and the importance of hand hygiene.

Furthermore, assessment of knowledge thru self-report is not enough to determine compliance of hand hygiene practices. Observational studies are recommended.

**KEYWORDS:**

HAND HYGIENE, Hand Hygiene, Nurses, Survey, Questionnaire.

## **INTRODUCTION**

World Health Organization (2009) defines "HAND HYGIENE Associated Infections (HAND HYGIENE), also referred to as "nosocomial" or "hospital" infection, as an infection occurring in a patient during the process of care in a hospital or other healthcare facility which was not present or incubating at the time of admission." HAND HYGIENE is associated with increase morbidity, mortality, prolonged hospital stay, increased health care costs, and antibiotic resistance in both acute and long term care facilities (Shah, and Singhal, 2013).

Hand hygiene, such as hand washing and hand rub, has been the cornerstone of infection prevention and control measures in reducing HAND HYGIENE (Center for Disease Control, 2010). Despite the numerous guidelines published, compliance remain to be a challenge to achieve and sustain. Studies of Halwani, Tashkani, and Basuny (2010) in ten Intensive Care Units in Saudi Arabia about the incidence of HCAI's detected 851 HAND HYGIENE among 5,523 patients admitted and stayed for 53,025 days with a mean length of stay of 9 days.

The incidence rate for HCAI was 16 per 1000 patients' days. Al-Tawfiq, Abed, Al-Yami, and Birrer (2012) conducted a descriptive time series study using multimodal International Journal of Caring Sciences January-April 2015 Volume 8 Issue 1 Page 109 [www.internationaljournalofcaringsciences.org](http://www.internationaljournalofcaringsciences.org) interventions from October 2006 to December 2011 set in a 350-bed community hospital in Saudi Arabia. The rate of health care-associated methicillin-resistant Staphylococcus aureus per 1,000 patient-days decreased from 0.42 in 2006 to 0.08 in 2011.

Ventilator-associated infection rates decreased from 6.12 to 0.78, central line-associated bloodstream infections rates decreased from 8.23 to 4.8, and catheter-associated urinary tract infection rates decreased from 7.08 to 3.5. Allegranzi

et al. (2013) conducted a global implementation of WHO's multimodal strategy for improvement of hand hygiene using a quasi experimental study in five countries including Saudi Arabia. These prior studies show that implementation of WHO's hand-hygiene strategy is feasible and sustainable across a range of settings in different countries and leads to significant compliance and knowledge improvement in healthcare workers, supporting recommendation for use worldwide.

Whereas these WHO multi-modal strategy and previous studies indicate that this is effective in reducing HAIs and increasing hand hygiene compliance. The researchers as part of the Infection Control and Prevention Committee in the hospital would like to support the WHO hand hygiene campaign by conducting the study using the WHO approved tool kit.

The WHO tool kit offer a series of assessment and intervention framework to identify problems and strategies to improve hand hygiene practices in the hospital. Our study is in the initial phase of establishing the baseline data for the knowledge of healthcare workers about hand hygiene.

### **SIGNIFICANCE OF STUDY**

Hand hygiene is described by many health care workers as the single most important tool in preventing the spread of health care-associated infections between patients.

According to WHO, there are few definitive data on the patient-care activities that are most likely to transmit bacteria to worker hands, but there have been several studies that identified many possibilities. Although bacteria have been found on HEALTH CARE WORKER hands after activities such as wound care, intravascular catheter care, respiratory tract care and handling patient secretions as expected, bacteria also have been found on HEALTH CARE WORKER hands after so-called "clean" contact, such as taking a patient's pulse, temperature or blood pressure.

Organisms found on HEALTH CARE WORKER hands after such patient contact range from *Klebsiella* spp., *Staphylococcus aureus*, *Clostridium difficile*, MRSA and gram-negative bacteria. However, direct patient contact is not the only way HEALTH CARE WORKER hands can be contaminated. HEALTH CARE WORKERS can acquire bacteria on their hands by touching contaminated surfaces in the patient environment and simply by touching a contaminated chart at the nurses' station, according to the literature.

Washing hands before and after patient contact seems like a simple solution to prevent the spread of bacteria between patients. Most hospitals have hand hygiene policies in place that guide their employees to do just that. But it is not as simple as it seems.

"When we look at all of the things that we can do to prevent infections in the hospital, one of the most important things about hand hygiene is that it works for so many different types of organisms, and you get a lot of bang for the buck," **Michael Edmond, MD, MPH**, the Richard P. Wenzel professor of internal medicine in the division of infectious diseases at Virginia Commonwealth University, told *Infectious Disease News*. "The issue is that you have to practice it at a high level of compliance for it to work. There are so many opportunities for hand hygiene, and it is difficult to get to a level of compliance where we're able to make changes to infection rates."

### **THE AIM OF THE STUDY**

The purpose of this study is to support the WHO hand hygiene campaign against HAND HYGIENE. It aims to assess the perception towards hand hygiene amongst healthcare professionals in the hospital. Specifically, it seeks to identify perceptions on health care-associated infections and hand hygiene.



## **RESEARCH HYPOTHESIS SETTING**

A descriptive study using a standardized survey questionnaire of the World Health Organization (WHO) was performed. Descriptive survey design aims to observe, describe, analyze and document aspects of situation as it naturally occurs (Polit & Beck, 2004).

In this situation, the perceptions about healthcare associated infection and hand hygiene were the focus of the study. The study was conducted at the Ministry of Interior Security Hospitals, Jeddah Kingdom of Saudi Arabia and was completed last July 2013.

## **PARTICIPANTS AND SAMPLING**

A purposive sampling was done to meet the inclusion and exclusion criteria. The participants consisted of various healthcare professional working in the hospital.

The participants included in the study were healthcare professional i.e. medical doctors, nurses and others who have a direct contact to patients at least on a daily basis, understands English and willing to participate in the survey.

Participants who did not meet the inclusion criteria were excluded. There were a total of 102 healthcare professionals eligible and was invited to participate in the study. However, there were only 87 participants who completed and returned the survey questionnaire.

## **TOOLS FOR DATA COLLECTION AND ANALYSIS**

The study utilized the "Perception Survey for Health-Care Workers" questionnaire which was formulated and recommended by the World Health Organization (WHO) in their campaign for patient safety. It is a self-administered 21-item questionnaire used to measure perception with regards to healthcare associated infection and hand hygiene. This

questionnaire has been reliable and validated by World Health Organization (WHO). It is easy to administer and takes about 10 minutes to fill-out.

The questionnaire was slightly modified by the researchers to remove irrelevant items and to ensure that items reflect the context where the research is conducted. Moreover, some terms were simplified to make it clear.

### RESEARCH QUESTIONS

The first eight question asked about demographic characteristics. There were three items that pertains to perceptions about healthcare associated infection and ten items related to perceptions about hand hygiene practices. Possible answers to question were varied ranging from a yes or no response, one to seven rating and using a four point Likert scale. Information package, consent and the 21-item of questionnaire were altogether distributed to the identified eligible participants. SPSS statistical software version 17 was used for statistical analysis of the collected data.

### STATISTICAL DESIGN

Descriptive statistics and inferential non-parametric Chi-squared ( $\chi^2$ ) test was used. For statistical tests, P-values less than 0.05 were considered to be statistically significant.

### ETHICAL CONSIDERATIONS

Ethical considerations were addressed by seeking the ethical approval from the Infection Control and Prevention Committee of the hospital. Research permit was sought from the hospital director. Participation in the study is completely voluntary. Information package and informed consent was provided.

Results There were a total of 87 healthcare professionals who participated. Nurses (64.4%) accounts for the majority of the

participants, followed by physician (20.7%) and other healthcare professional (14.9%) such as psychologist, technicians, therapists and dietician. Males (94.3%) were the predominant respondent in the study as compared with the female (5.7%) participants. The mean age was 32.3 + 8.3 years.

### **PILOT STUDY**

Infection Participants were asked to identify the percentage of the hospitalized patients who will develop HAND HYGIENE. The responses obtained were varied and widely distributed from 0-100%. However, 27.6% of the respondents believed that there is about 0 – 10% chances that hospitalized patients will develop HAND HYGIENE.

On the other hand, there were 19.5% respondents who claimed that they don't have the knowledge of the occurrence of healthcare associated infection in the hospital. The difference among the respondent's perceptions about the percentage of hospitalized patients developing HAND HYGIENE was significant ( $X^2= 50.4$ ;  $p < 0.05$ ).

On the other hand, there was a significant difference in the perception of impact of health care-associated infection on a patient's clinical outcome ( $X^2= 46.5$ ;  $p < 0.05$ ). Most of the participants believed that there is a high (54%) and very high (21.8%) impact of HAND HYGIENE in patient's clinical outcome.

Lastly, Table 1 shows that there was a significant difference ( $X^2= 52.2$ ;  $p < 0.05$ ) in the respondents perceptions about the effectiveness of hand hygiene as measures to prevent HAND HYGIENE. Majority (99%) of the respondents knew and agreed that hand hygiene is the single and most effective against HAND HYGIENE. Perceptions about Hand Hygiene Three quarters of the participants had undertaken a formal training in hand hygiene in the last two years. When asked about the routine use of alcohol based hand rub when performing hand hygiene,

97.7% of the respondents agreed to prefer the hand rub method.

Among all patient safety issues, there was a significant difference ( $X^2= 42.3$ ;  $p < 0.05$ ) about the respondents perception as to the importance of hand hygiene at the institution. Respondents believed that hand hygiene has a high (43.7%) and very high (55.2%) priority in their affiliated hospital. When asked about the percentage of situations requiring hand hygiene and the actual performance of hand hygiene either by hand rubbing or hand washing among healthcare workers in the hospital, the response varied between 0 to 100%.

Around 67.7 % of the respondents believed that the actual performance of hand hygiene is between 70-100% which was significant ( $X^2= 78.2$ ;  $p < 0.05$ ).

Managers' support and promotion of hand hygiene (34.5%), alcohol based hand rub availability at each point of care (60.9%), displays of hand hygiene posters (57.5%), education on hand hygiene (40.2%), visible clear and simple instructions for hand hygiene (52.9%), positive role modeling (51.8%) and patient reminding healthcare workers to perform hand hygiene (26.4%) were found significant interventions to promote and improve hand hygiene practices in the hospital as shown in Table 2.

**TABLE 1. IMPACT OF HAND HYGIENE ON PATIENT'S CLINICAL OUTCOME AND EFFECTIVENESS OF HAND HYGIENE AS PREVENTIVE MEASURES.**

RESPONDENT'S OPINION	VERY LOW	LOW	HIGH	VERY HIGH	$X^2$ (p-value)
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Impact of HCAI on patient's clinical outcome	3 2.4%	18 20.7%	47 54%	19 21.7%	46 (0.000)
Effectiveness of Hand Hygiene in preventing HAND HYGIENE	1 (1.1%)	0 (0%)	30 (34.5%)	56 (64.7)	53.2 (0.000)

<<\*>>HH means HAND HYGIENE

**TABLE 2. EFFECTIVENESS OF VARIOUS STRATEGIES TO IMPROVE HAND HYGIENE PRACTICES.**

ACTIONS	1 Not Effective	2	3	4	5	6	7 Very Effective	$\chi^2$ (p-value)
Managers support and promote HH	0 (0.0%)	0 (0.0%)	3 (3.4%)	14 (16.1%)	17 (19.5%)	23 (26.2%)	30 (33.0%)	23.5 (0.000%)
Handrub always available	0 (0.0%)	0 (0.0%)	1 (1.1%)	2 (2.4%)	9 (10.3%)	22 (25.3%)	53 (60.9%)	107.1 (0.000)
Posters displayed	0 (1.1%)	0 (2.3%)	1 (1.1%)	3 (6.9%)	8 (9.6%)	25 (25%)	50 (57%)	96.8 (%)
Receive education on hand hygiene	1 (1.1%)	2 (2.3%)	1 (1.1%)	6 (6.9%)	11 (12.6%)	31 (35.6%)	35 (40.20%)	102.0 (0.000%)

Clear and simple instructions visible	0 (%)	0 (%)	1 (%)	2 (%)	11 (%)	27 (%)	46 (%)	83.4 (%)
Feedback regularly provided	0 (0.0%)	0 (4.6%)	4 (3.4%)	4 (14.6%)	12 (14.2%)	27 (31.2%)	23 (26.4%)	33.2 (0.00%)
Good example for role modeling	0 (0.0%)	0 (4.6%)	5 (3.6%)	3 (14.0%)	11 (14.4%)	27 (31.2%)	22 (26.5%)	33.99 (0.00%)
Patient remind staff	0 (0.0%)	1 (4.5%)	3 (3.4%)	4 (14.7%)	13 (14.3%)	26 (31.1%)	22 (26.3%)	34.2 (0.00%)

Interestingly, there was a significant difference in the respondent's (31%) perception that regular feedback on hand hygiene performance was not as effective as compared with the above mentioned strategies.

Moreover, the respondents perceived that the head of the department ( $X^2 = 58.6$ ;  $p < 0.05$ ), colleagues ( $X^2 = 63$ ;  $p < 0.05$ ) and patients ( $X^2 = 64.5$ ;  $p < 0.05$ ) placed a very high importance in adhering to optimal hand hygiene performance during the care process. These perceptions were found to be significant.

At a personal level, respondents were asked to reflect about their effort to perform good hand hygiene when caring for patients. Almost half of the respondents considered that it was a big effort on their part to perform hand hygiene in caring for patients.

Furthermore, when asked about their own performance of hand hygiene requiring situation, around 80% of the respondents answered that between 80 -100% of the required situation they perform optimal hand hygiene and the result was significant ( $X^2 = 127.3$ ;  $p < 0.05$ ).

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## **DISCUSSION**

The study investigated the perception towards hand hygiene

among healthcare professionals in the hospital. The results showed that health care professionals have a very high level of knowledge about health care-associated infections and the role of hand hygiene.

**First**, the study showed that respondents have a very high perception that HAND HYGIENES have a significant impact in patient outcome.

The result showed that majority of the respondents believed that there is a 0-10% chances that hospitalized patients will develop HAND HYGIENE. The result was congruent to the WHO Report in 2011 on the burden of endemic HAND HYGIENE worldwide.

According to the report seven out of 100 hospitalized patients in developed countries and ten out of 100 hospitalized patients in developing countries will develop at least one healthcare-associated infection.

In a similar study conducted by Burnett (2009), clinical ward nurses demonstrates good perceptions about HAND HYGIENES and positive attitudes toward hand hygiene.

However, a secondary finding in the study showed that these high level of awareness was not found to be independently associated with positive behavior. This mean that being knowledgeable does not necessarily translates to high level of compliance. On the other hand, Most of the participants believed that there was a high (54%) and very high (21.8%) impact of HAND HYGIENE in patient's clinical outcome and hand hygiene (99%) remains the single and most effective against HAND HYGIENE.

Previous studies of Tai et al. (2009) showed that 70% of the nurses and 49% of the physicians perceived that over 15% of patients would suffer from healthcare-associated infections. A total of 79% of the nurses and 68% of the physicians believed that more than 5% of patients would die as a result of

healthcare-associated infection. A total of 60% of the nurses and 46% of the physicians acknowledged that over 75% of healthcare-associated infections could be prevented by optimal hand hygiene practices.

Second, the results of our study not only confirm with the previous but also showed that majority of the health care professional (99%) had a very high degree of awareness about the effectiveness of hand hygiene against HAND HYGIENE. This awareness can be attributed to formal training attended previously by the respondents.

Nteli et al. (2012) reported that educational activities were important factor to improve health-care workers hand hygiene practices. In contrast, De Wandel et al. (2010) argued that neither having good theoretical knowledge of hand hygiene guidelines nor social influence or moral perceptions does not influence hand hygiene practices. Self-efficacy is a determinant factor for compliance with hand hygiene.

When asked about self-efficacy, half of the respondents considered that it was a big effort on their part to perform hand hygiene in caring for patients and around 80% of the respondents answered that between 80 -100% of the required situation they perform optimal hand hygiene. Previous study reported that nurses reporting a poor self-efficacy or a poor attitude toward time related barriers appear to be less compliant (De Wandel et al. 2010).

Speaking about factors and determinants, Tai et al. (2009) found that perceived behavioral control and subjective norms were the most important factors associated with the nurses and physicians' self-reported hand hygiene performance. Apart from knowledge and self-efficacy, Sinkowitz-Cochran et al. (2012) added that staff engagement, overwhelmed/stress-chaos, and hospital leadership (Min, 2013) were three organizational factors found to be significantly associated with individual health care personnel knowledge, attitudes, and self-reported



hand hygiene practices.

The result confirmed with the previous study, managers' support and promotion of hand hygiene, alcohol-based hand rub availability at each point of care, displays of hand hygiene posters, education on hand hygiene, visible clear and simple instructions for hand hygiene, positive role modeling, and patient reminding healthcare workers to perform hand hygiene were found significant interventions to promote and improve hand hygiene practices in the hospital.

Furthermore, respondent believed that hand hygiene is a very high priority among the head department, colleague and patient in the institution. Interestingly, the study results reported that regular feedback was not an effective measures to encouraged respondents to comply with hand hygiene practices.

The result was unexpected since literatures have well documented the effectiveness of regular feedback in increasing the hand hygiene compliance such as the study of Pessoa-Silva et al. (2007) and Min (2013) who reported that performance feedback is effective in sustaining compliance improvement and is independently associated with infection risk reduction. The researcher speculated that the low perception about feedback can be attributed to the different cultural perception about feedback, since the hospital employs employee from a multicultural background and another factor could be the manner of delivering the feedback may play an important role.

Min (2013) suggested that education and role modeling at both the individual and organizational levels might be beneficial in improving hand hygiene compliance.

Al-Tawfiq, Abed, Al-Yami, and Birrer (2012) suggested that a multimodal approach using different strategies and intervention such as the WHO hand hygiene campaign (Allegranzi et al., 2013) promotes an institution-wide increase and sustained improvement in the rates of compliance.

**Lastly**, most respondent preferred alcohol based hand rub as the method of hand hygiene primarily because of the same reasons reported by the literatures such as: it requires less time , acts faster, more accessible than sinks, effective in reducing the number of microorganism, and skin issues were less common (Center for Disease Control, 2010).

In general, the study contributes to support the WHO hand hygiene campaign against HAND HYGIENE. The findings suggest that health care workers have a high level of awareness about HAND HYGIENEs and the importance of hand hygiene.

Furthermore, assessment of knowledge thru self-report is not enough to determine compliance of hand hygiene practices.

Observational studies are recommended. This is a small-scale project whose findings are difficult to be generalized because the researcher's respondents came from a single location, the use of a relatively small sample is a limitation of this research.

## **CONCLUSION**

In conclusion, the respondents have a high level of knowledge about HAND HYGIENEs . Respondents were aware that HAND HYGIENE has an impact on patient outcome, hospitalized patient will likely develop HAND HYGIENE, and hand hygiene remains to be the single and most effective method against HAND HYGIENE. Respondents reported a high self-efficacy in performing hand hygiene. Organizational factors such as staff engagement, commitment of the department heads, and leadership were perceived to be significant in promoting hand hygiene practices. Strategies such as provision of access to hand hygiene facilities, guidelines, education and training, positive role modeling were effective. There was a low perception about the effectiveness of regular feedback.

Furthermore, observational studies are recommended to objectively measure hand hygiene compliance.

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