BRIEF COMMUNICATION

Fatal MDR *Klebsiella* in ICU — How was it Dealt with?

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Introduction

Multidrug resistant (MDR) infections in any ICU are troublesome and undesirable. Moreover the management of such infections in any critical care setting is a challenge for the physician as well as the infection control team. *Klebsiella pneumoniae*, resistant to carbapenam infection is one of the most threatening GNB,[1] and spreading rapidly all over.[2] The risk of nosocomial infection in ICU is 5–10 times greater than those acquired in general medicine and surgical wards.[3] We present here a report of an outbreak of MDR *Klebsiella* infection in our ICU and how it was dealt with.

Materials and Methods

During the months of September and October 2018, we observed a significant surge of MDR *Klebsiella pneumonia* in our ICU. Multiple patients had this organism grown in their endotreacheal cultures. These were nosocomial infections including hospital acquired pneumonia (HAP) and ventilatory acquired pneumonia (VAP). More than five patients in less than four weeks had a similar culture sensitivity report. (Fig. 1). Further it was sensitive to only a few drugs like colistin, polymyxin B and tigecycline. Majority of them were resistant to carbapenams.

The mortality ratio of ICU increased due to this MDR bug. Also the cost of treatment escalated due to use of drugs like colistin. The duration of stay of such patient who had acquired nosocomial infections in the ICU prolonged.

To our surprise, when we did an environmental sampling of our ICU, the same MDR *Klebsiella* was grown on culture, taken from bed rails, switches, etc. (Fig. 2)

It was not difficult to understand that we were facing an outbreak of MDR *Klebsiella* in our hospital, which was increasing the morbidity and mortality rate of ICU. The actual fear was that this infection if not curtailed would spread to the entire hospital and would be detrimental to the health of even those patients who were admitted outside the critical care areas.

Immediately an outbreak control team was formulated. It consisted of members from the hospital management, infection control team, housekeeping staff, intensive care team, laboratory staff and the nursing staff.

First and foremost, this team reviewed the video recording of critical care areas. To their surprise, it was observed that there was a sharp decline in hand-hygiene practices which were observed under video surveillance. Direct observation and video surveillance was done for last two months for critical care areas to monitor hand-hygiene practices which were being followed (Fig. 3).

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Following this, efforts were started to train the entire staff and doctors for 5 key moments of hand hygiene.

WHO 5 key moments of hand hygiene (Fig. 4):

1. Before touching the patient
2 After touching the patient
3. Before aseptic technique
4. After aseptic technique
5. Patient surrounding (bed side looker, medicine trolley, monitors, IV stand, bed, bed railing)

Apart from repeated training and observation, hand swabs were taken for culture and sensitivity. Staff and doctors were shown their video recording and informed about the moments when they missed out on hand hygiene practices. Positive reinforcement was done, in the form of rewarding the staff and also the areas which were showing best practices of hand hygiene. Similarly chronic defaulters were punished.

Apart from this, deep cleaning of beds and surrounding was started in the ICU with bacilli.

Further patients, who had their culture positive, were isolated and kept away from other patients. Care was taken to prevent cross infections. For these patients, entry of staff and relatives was restricted in the isolation areas

Observations

To, our surprise, after 15 days, environmental sampling was done again which showed that the deadly multidrug resistant *Klebsiella* was eradicated from most sources (Fig. 5).

On the same lines, we also found that klebsiella infection among patient had declined after following strict infection control practices.

MICROBIOLOGY
CULTURE AND SENSITIVITY REPORT (SAMPLE REPORT)

Sample: Endotracheal Secretion
Organism isolated: *Klebsiella pneumoniae* grown on culture
Colony count: 10^5 cfu/mL

Group (a)		*Group (c)*	
Ampicillin	R	Tigecycline	S
Gentamicin	R		
Tobramycin	R	*Group (o)*	
		Cefixime	R
Group (b)		Netillin	R
Amikacin	R	Ofloxacin	R
Amoxocillin/clavulanate	R	Colistin	S
Ampicillin/sulbactum	R	Polymixin-B	S
Ticarcillin/clavulanic acid	R		
Piperacillin/tazobactam	R		
Cefuroxime	R		
Cefepime	R		
Ceftriaxone	R		
Cefotaxime	R		
Cefoxitin	R		
Ciprofloxacin	R		
Levofloxacin	R		
Cefoperazone/sulbactum	R		
Imipenem	R		
Meropenem	R		
Cotrimoxazole	R		

Fig. 1: Culture and sensitivity report

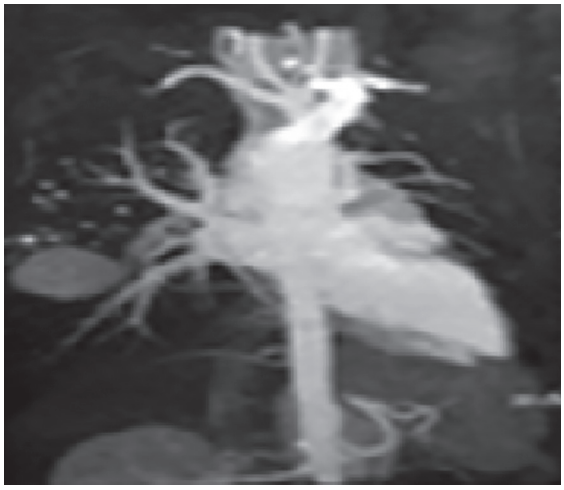

Fig. 2A: *Klebsiella*

Center: Malviya Nagar Date of Procedure: 26/09/2018

Sr. No.		*Remarks*
	High-dependency (HDU)	
1	Air bioload	>25 cfu
2	Wall (swab)	*Klebsiella* spp. grown on culture.
3.	Bed (swab) No. 2	*Klebsiella* spp. grown on culture.
4.	Bed rail (swab) No. 3	*Escherichia* coli grown on culture.
5.	Switches (swab)	*Escherichia* coli grown on culture.
6.	Trolley (swab)	*Klebsiella* spp. grown on culture.
	Cardiothoracic vascular surgery (CTVS)	
1.	Air bioload	3 cfu
2.	Wall (swab)	*Bacillus* species
3.	Bed (swab) No. 8	*Klebsiella* spp. grown on culture
4.	Bed rail (swab) No. 4	*Klebsiella* Spp. grown on culture
5.	Switch (swab)	*Pseudomonas* spp. grown on culture
6.	Door Handle (swab)	*Pseudomonas* spp. grown on culture
	Dialysis	
1.	Air bioload	>10 cfu
2	Wall (swab)	*Bacillus* species
3	Bed (swab) No. 1	*Klebsiella* spp. grown on culture
4	Bed rail (swab) No. 6	*Klebsiella* spp. grown on culture
5	Switch (swab) No. 4	*Bacillus* species
6	Trolley (swab)	*Klebsiella* spp. grown on culture

Fig. 2B: Environmental sampling report of critical care areas (Prereports)

Sr No.		*Opp*	*Action*	*%*
	Hand-hygiene ICU Direct observation month of Sep.			
1	Doctors	140	104	74.14
2	Nursing staff	160	126	78.75
3	Housekepping staff	80	51	63.75
	Hand-hygiene ICU Video survallance month of Sep.			
1	Doctors	117	58	49.42
2	Nursing staff	122	57	46.72
3	House keeping staff	110	43	39.66

Fig. 3: Direct observation and video surveillance of hand-hygiene practices in critical care areas

Conclusion

A multidisciplinary team approach of infection control practices helps in combating any multidrug resistant organism spread, like *Klebsiella* in our study;[4] a special emphasis on hand hygiene practices should be laid as a single most important prevention strategy to prevent health care infections[5] and ultimately decreases the hospital stay of critical patients.[6]

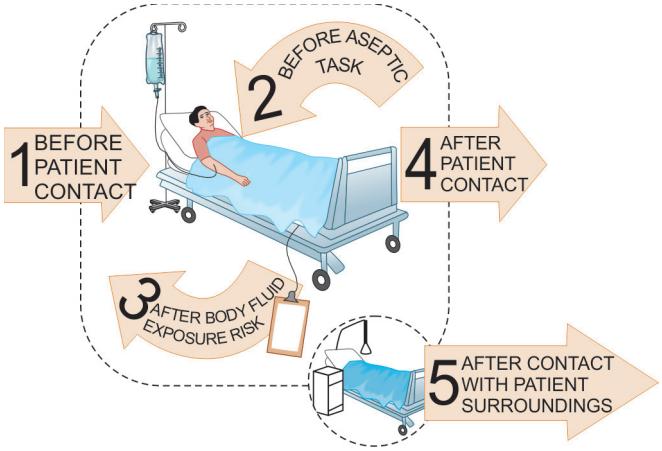

Fig. 4: Five key moments of hand hygiene

Center: Malviya Nagar Date of Procedure: 18/10/2018

Sr. No		*Remarks*
	ICU=1ST	
1	Air bioload	64 cfu
2	Wall (swab)	No growth sterile
3	Head (swab) No. 3	*Bacillus* species
4	Bed ruling (swab) No. 5	*Bacillus* species
5	Switches (swab)	*Bacillus* species
6	Trolley (swab) No.12	*Bacillus* species
	ICU-IInd	
1	Air bioload	63 cfu
2	Wall (swab)	*Bacillus* species
3	Bed (swab) No. 16	*Bacillus* species
4	Bed railing No. 18	*Bacillus* species
5	Switches (swab) No.18	*Bacillus* species
6	Trolley (swab) No.19	*Bacillus* species
	CCU	
1	Air bioload	08 cfu
	CSSD	
1.	Air bioload	63 cfu
	CATH LAB	
1.	Air bioload	63 cfu

Fig. 5A

Center: Malviya Nagar Date of Procedure: 18/10/2018

Sr. No		*Remarks*
	HDU	
	ICU=1ST	
1	Air bioload	>-10 cfu + 1 fungal colony
2	Wall (swab)	*Bacillus* species
3	Bed (swab) No. 4	*Bacillus* species
4	Bed ruling (swab) No. 9	*Klebsiella* spp. grown on culture
5	Switches (swab) No. 5	*Bacillus* species
6	Trolley (swab) No. 12	*Bacillus* species
	CTVS	
1	Air bioload	65 cfu + 1 fungal colony
2	Wall (swab)	*Bacillus* species
3	Bed (swab) No. 3	*Bacillus* species
4	Bed rail (swab) No. 1	*Bacillus* species
5	Switch (swab)	*Escherichia coli* grown on culture
6	Door handle (swab)	*Bacillus* species
	Dialysis	
1	Air bioload	05 cfu
2	Wall (swab)	*Bacillus* species
3	Bed (swab)	*Klebscilla* spp. grown on culture.
4	Bed rail (swab)	*Bacillus* species
5	Switch (swab)	*Bacillus* species
6	Trolley (swab)	*Bacillus* species

Figs 5A and B: Environmental sampling reports after hand-hygiene practices implemented

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