



Measles outbreak in Gurayat, Saudi Arabia

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Abstract

An outbreak of measles had occurred in Gurayat, Saudi Arabia, from July 2018 to April 2019, all suspected cases of measles during measles outbreak was 477 confirmed cases by IgM serology for measles was 286 (60%) negative cases 191(40%), confirmed cases in 2018 was 86 (30.1%), 39 patients were males and 47 patients were females and 200 patients in 2019 was 116 patients were males and 84 patients were females, peak of measles outbreak was in February 2019 their ages ranged from 1 month to 13 years, children aged 2-5 years accounted for the highest number of cases, most of cases presented with fever, cough and rash, 95.5% of patients non vaccinated.

Among all measles cases 286, only 12 patients (4.2%) were admitted at pediatric intensive care unit were complicated with sever measles related pneumonia and pneumothorax, among those patients six patients treated with pulse therapy of methylprednisolone 30 mg /kg/d for 3 days two of them had Pneumonia with pneumothorax and the others had pneumonia and two of them was connected to mechanical ventilation, after treated with pulse therapy of methylprednisolone their conditions were improved, on the other hand the other six patients didn't treated with pulse therapy of methylprednisolone only one of them improved and the other five patients were died. patients were successfully treated with intravenous methyl prednisolone as its administration during early severe ARDS is associated with significant improvement in pulmonary and non-pulmonary organ dysfunction.

Keywords: *Measles, Gurayat, methylprednisolone, pneumonia and pneumothorax.*

Introduction

Measles is a highly contagious viral infection that is transmitted via airborne droplets from the nose, mouth, or throat of an infected individual. The infected person becomes symptomatic 10–14 days after exposure. Initial symptoms include high fever, runny nose, and tiny white spots on the inside of the mouth (Koplik spots). Several days later, a rash develops, starting on the face and upper neck and gradually spreading downwards

(Suter, Buergi et al. 2015; Al-Qayoudhi, Al-Kindi et al. 2016).

Measles may be transmitted from 4 days before to 4 days after rash onset. Maximum communicability occurs from onset of prodrome through the first 3–4 days of rash (*Control, Prevention et al. 2005*).

Measles is a highly contagious childhood disease with high morbidity and remarkable mortality (*Jahan, Al Saigul et al. 2008*).

Death from measles was reported in approximately 0.2% of the cases in the United States from 1985 through 1992. With other complications of measles, the risk of death is highest among young children and adults. Pneumonia accounts for about 60% of deaths, the most common causes of death in children is measles related pneumonia (MRP) (*Duke and Mgone 2003; Control, Prevention et al. 2005*).

Approximately 30% of reported measles cases have one or more complications which more common among children younger than 5 years of age and adults 20 years of age and older. The most commonly reported complication of measles otitis media, Pneumonia may be viral or superimposed bacterial, and is the most common cause of measles-related death (*Control, Prevention et al. 2005*).

In the past few years, several endemic outbreaks of measles have been recognised, not only in children but also in adults, with severe and, occasionally, even fatal complications (*Suter, Buergi et al. 2015*).

There is no specific treatment for measles, and most people recover within two to three weeks. However, particularly in malnourished and immunocompromised children, measles can cause serious complications, including blindness, encephalitis, croup, severe diarrhea, ear infection, and pneumonia (*Al-Qayoudhi, Al-Kindi et al. 2016*).

The WHO recommends administration of once-daily doses of 200,000 IU of vitamin A for two consecutive days to all children aged ≥ 12 months who have measles (*Al-Qayoudhi, Al-Kindi et al. 2016*).

Corticosteroids having shown to inhibit measles virus and led to rapid recovery from respiratory distress and normalisation of oxygenation and lung function parameters over time (*Suter, Buergi et al. 2015*).

Corticosteroids such as IV methyl prednisolone have proven to reduce inflammation in many diseases. Methyl prednisolone induces transcription of many genes which produces anti-

inflammatory proteins and switch off genes responsible for activation of inflammatory process (*Goldani 2018*).

A randomized controlled trial in USA revealed that methyl prednisolone administration during early severe ARDS is associated with significant improvement in pulmonary and non-pulmonary organ dysfunction, which in turn reduces the duration of mechanical ventilation (*Zipprich, Winter et al. 2015*).

Intravenous immunoglobulins have been effectively used for the post exposure prevention of measles pneumonia. When IG is administered to susceptible persons within six days of initial exposure, it may provide protection or modify the clinical course of the disease (*Duke and Mgone 2003*).

Patients and Methods

This study was carried out in Gurayat general hospital, which located in the northern borders of kingdom of Saudi Arabia and serving a population of 147,000 and based on admitted pediatric patient to Gurayat general hospital with different age group July 2018 to April 2019, cases were collected from infection control department, public health department and pediatric intensive care department, electronic file of each patient was reviewed and recorded in the questioner and data analysis done by using statistical package for social science (SPSS v23) (*George and Mallery 2016*).

Results

An outbreak of measles among children had occurred in Gurayat, Saudi Arabia, from July 2018 to April 2019, all suspected cases of measles cases during measles outbreak was 477 confirmed cases by IgM serology for measles was 286 (60%), ages ranged between 1 month to 13 years (mean 2.1 year) all cases were Saudis and 54.2% males and 45.8% females negative cases 191(40%) as shown in (table 1) and (figure 1).

Table (1): Suspected cases of measles

Suspected cases of measles		No. (%)
Result (n=477)	Negative	191(40)
	Positive	286(60)

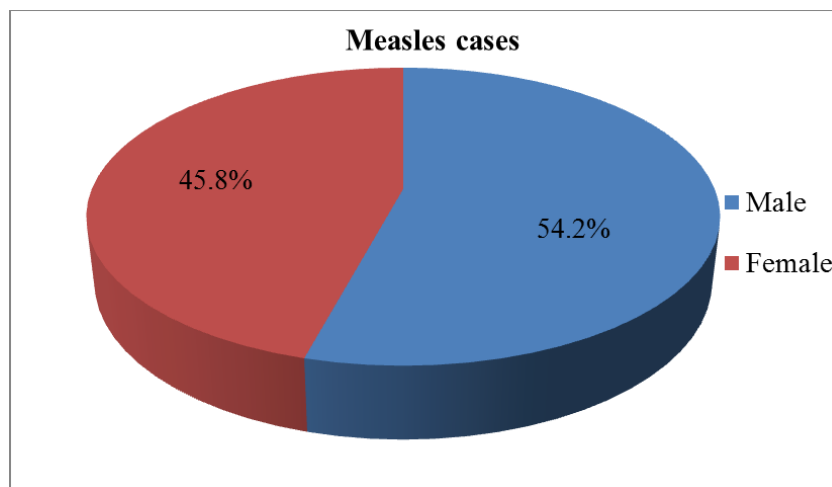


Figure (1): Sex distribution of measles cases

The onset of the outbreak was July 2018, the offset was in April 2019 and the peak was in

February 2019, number of patients was 101 (35.2%), as shown in (table 2) and (figure 2).

Table (2): Epidemic curve of measles outbreak at Gurayat, Saudi Arabia, from July 2018-April 2019

Year	Month	Measles cases	
		Number	%
2018	July	12	4.2
	August	4	1.4
	September	6	2.1
	October	23	8.0
	November	25	8.7
	December	16	5.6
2019	January	40	14.0
	February	101	35.3
	March	41	14.3
	April	18	6.3
Total		286	

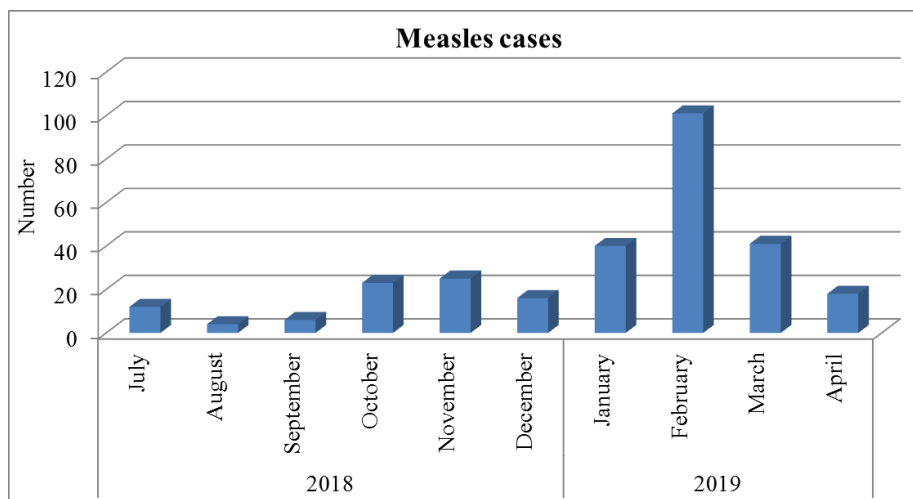


Figure (2): Epidemic curve of measles outbreak at Gurayat, Saudi Arabia from July 2018-April 2019.

The incidence for lab-confirmed cases was highest for children aged (2-5 year) 83 patients (29%), followed by age groups (6-11 month) 73 patients (25.5%) and (1-2 years) 72 patients (25.2%) and

the lowest cases for children aged more than 12 year were 2 patients (0.7%) as shown in (table 3) and (figure 3).

Table (3): Age distribution of measles cases

Age	Measles cases	
	Number	%
<6 month	40	14.0
(6-11) month	73	25.5
(1-2) year	72	25.2
(2-5) year	83	29.0
(6-12) year	16	5.6
(>12) year	2	0.7
Total	286	

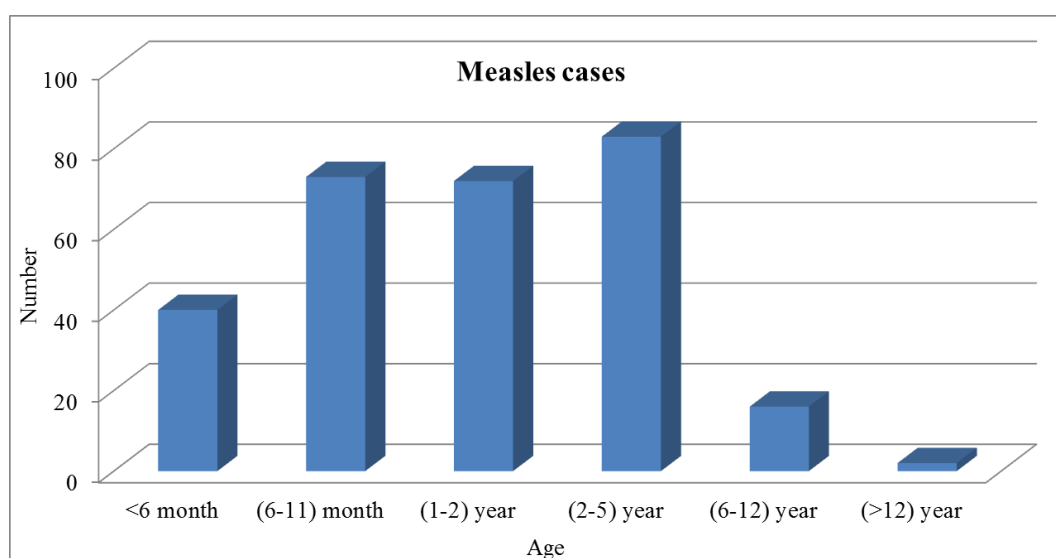


Figure (3): Age distribution of measles cases

Suspected cases for measles in 2018 was 121 and confirmed cases by IgM serology for measles was 86 (30.1%) of all confirmed cases, 39 patients were males and 47 patients were females, while suspected cases for measles in 2019 was 356 and

confirmed cases 200 (69.9%) of all confirmed cases, 116 patients were males and 84 patients were females as shown in (table 4 and 5) and (figure 4 and 5).

Table (4): IgM result for Measles

IgM result for Measles	Year		Total
	2018	2019	
Negative	35 (28.9)	156 (43.8)	191
Positive	86 (71.1)	200 (56.2)	286
Total	121	356	477

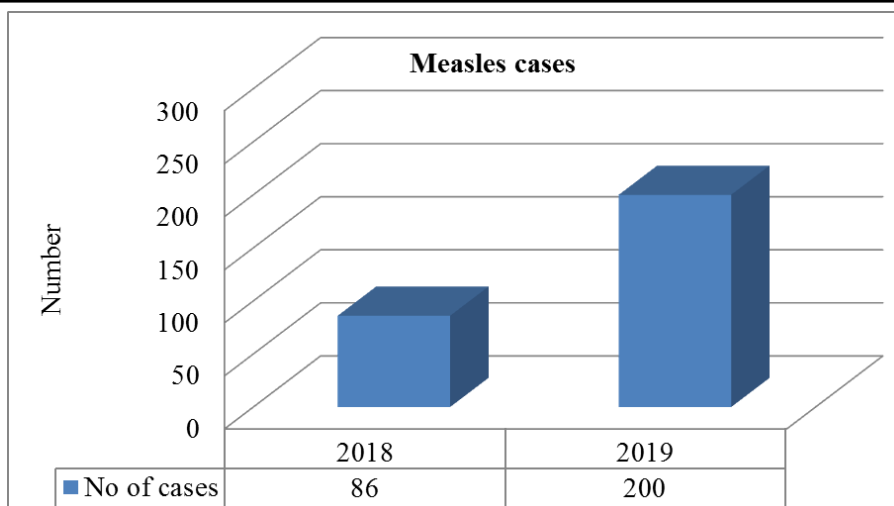


Figure (4): Number of measles cases during the outbreak at Gurayat, Saudi Arabia from July 2018-April 2019

Table (5): Distribution of measles cases according to sex in 2018 and 2019

Year	Measles cases (n=286)		Total
	Male	Female	
2018	39	47	86 (30.1)
2019	116	84	200 (69.9)
Total	155 (54.2)	131 (45.8)	286

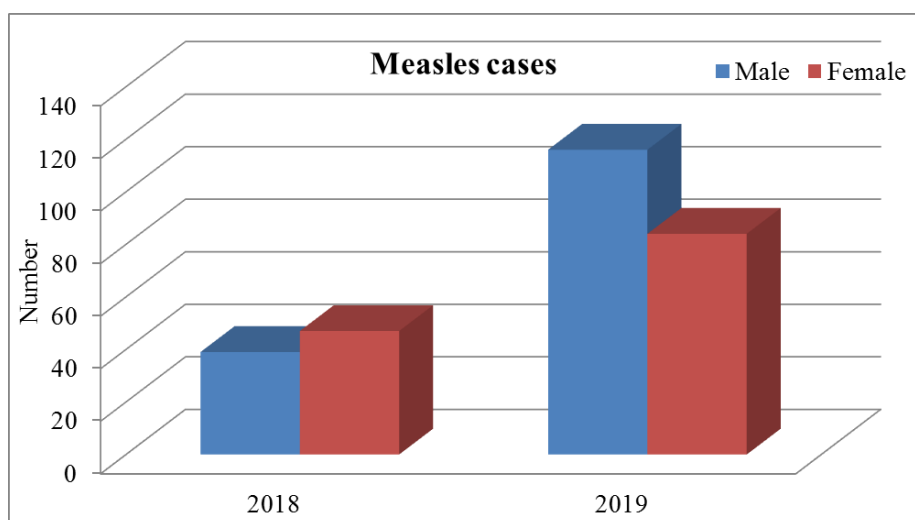


Figure (5): Distribution of measles cases according to sex in 2018 and 2019

All cases (100%) experienced fever, skin rash and cough, while Coryza 85.3%, sore throat 69.2%, Conjunctivitis 46.2% and Koplik’s spot 1%, most of patients 95.5% were non-vaccinated,

complicated cases pneumonia 65%, massive bilateral pneumonia 1.4% and Pneumonia with pneumothorax 1% as shown in (table 6) and (figure 6).

Table (6): The properties of measles cases

		Measles cases (n=286)	
		Number	%
Sex	Male	155	54.2
	Female	131	45.8
Vaccine status	Vaccinated single dose	9	3.1
	Not vaccinated	274	95.8
	Unknown	5	1.7
Symptoms	Fever	286	100
	Cough	286	100
	Rash	286	100
	Sore throat	198	69.2
	Coryza	244	85.3
	Conjunctivitis	132	46.2
	Koplik's spot	3	1
	Joint pain	0	0
Complication	Pneumonia	186	65
	Massive bilateral pneumonia	4	1.4
	Pneumonia with pneumothorax	3	1

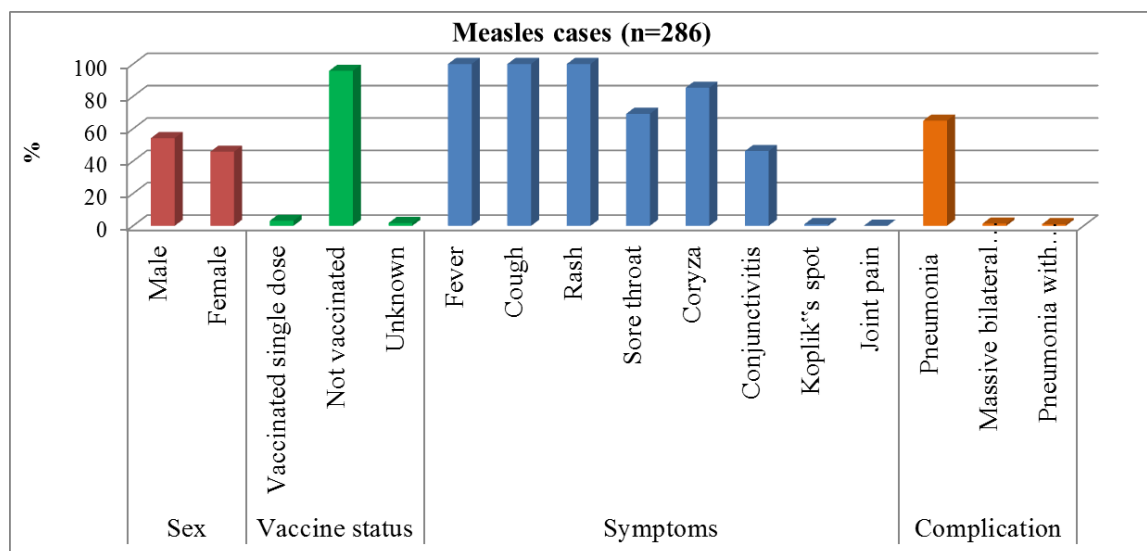


Figure (6): The properties of measlescases

Among all measles cases 286, only 12 patients (4.2%) were admitted at Pediatric intensive care unit (PICU) were complicated with sever measles related pneumonia and pneumothorax, among those patients 6 patient treated with pulse therapy of methylprednisolone 30 mg /kg/d for 3 days (group A), 3 males and 3 females their age ranged between 6 month to 13 month with mean (\approx 9 month), two of them had pneumonia with pneumothorax and the others had pneumonia and two of them was connected to mechanical ventilation, after treated with pulse therapy of methylprednisolone their conditions were improved and discharged from PICU to the pediatric ward then discharged to the home.

On the other hand the other sex patients (group B) didn't treated with pulse therapy of methylprednisolone only one of them improved and the other five patient was died, one of them had congenital heart disease and another one had failure to thrive and their age ranged between 5 month to 20 month with mean (\approx 11 month), 4 males and 2 females one of them had Pneumonia with pneumothorax while the other four patients had massive bilateral pneumonia, two of them was connected to mechanical ventilation, comparison between group A; Patient who treated with pulse therapy of methylprednisolone and group B; Patient who didn't treated with pulse therapy of methylprednisolone at PICU in (table 7) and

(figure 7), there were significant difference between both groups as regarding, complication, associated problem and patients outcome, there

was no significant difference between both groups as regarding, sex, age and use of mechanical ventilation.

Table (7): Comparison between group A and B (who admitted at PICU) as regarding the flowing parameters

		Group A No.(%)	Group B No.(%)	P value	Sig.
Sex	Male	3 (50)	4 (66.7)	0.575	NS
	Female	3 (50)	2 (33.3)		
Age	<6 month	0 (0)	1 (16.7)	0.859	NS
	(6-11) month	4 (66.7)	2 (33.3)		
	(1-2) year	2 (33.3)	3 (50)		
Complication	Massive bilateral pneumonia	0 (0)	4 (66.7)	0.027	*
	Pneumonia with pneumothorax	2 (33.3)	1 (16.7)		
	Pneumonia	4 (66.7)	1 (16.7)		
Mechanical Ventilation	No	4 (66.7)	4 (66.7)	1	NS
	Yes	2 (33.3)	2 (33.3)		
Associated problem	No	6 (100)	3 (50)	0.048	*
	Congenital heart disease	0 (0)	2 (33.3)		
	Failure to thrive	0 (0)	1(16.7)		
Patients outcome	Improved	6 (100)	1 (16.7)	0.005	**
	Died	0 (0)	5 (83.3)		

Group A: Patient who treated with pulse therapy of methylprednisolone

Group B: Patient who didn't treated with pulse therapy of methylprednisolone

P value > 0.05 (NS) Not significant

P value <0.05 * Significant at 0.05 level

P value < 0.01 ** Significant at 0.01 Level

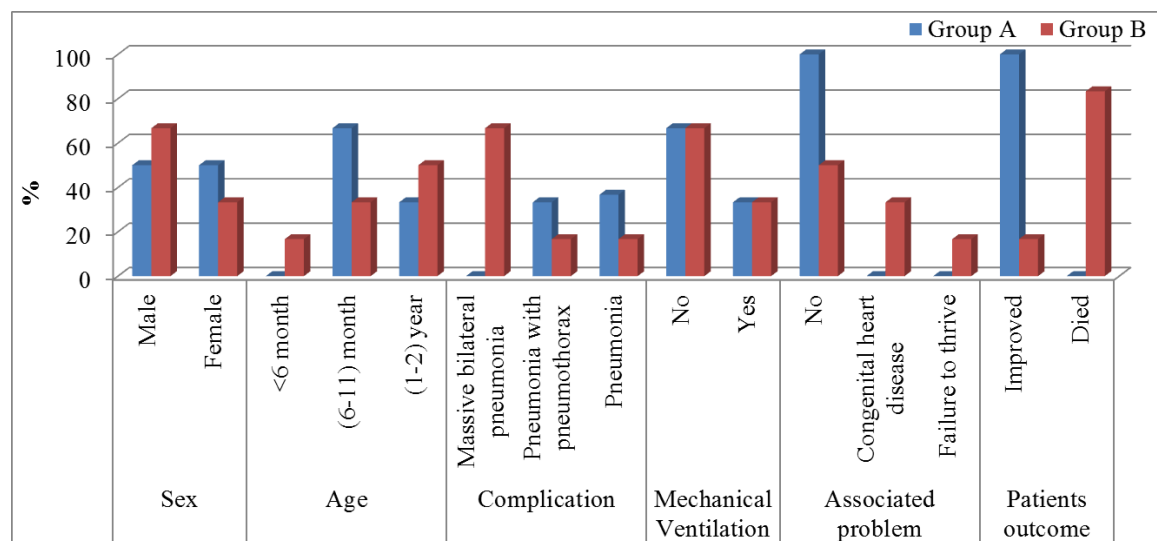


Figure (7): Comparison between group A and B as regarding the flowing parameters

Comparison between patient's outcome at PICU in (table 8) and (figure 8), number of improved PICU patients 7 (58.3%) and 6 of them treated with pulse therapy of methylprednisolone, while 5 (41.7%) of PICU patients were died, there were

significant difference between both groups as regarding, complication only and no significant difference between both groups as regarding, sex, age, connection to mechanical ventilation and associated problem.

Table (8): Comparison between patient’s outcome (who admitted at PICU) as regarding the flowing parameters

		Patients		P value	Sig.
		Improved (n=7) No.(%)	Died (n=5) No.(%)		
Sex	Male	4(57.1)	3(60)	0.925	NS
	Female	3(42.9)	2(40)		
Age	<6 month	0(0)	1(20)	0.588	NS
	(6-11) month	5(71.4)	1(20)		
	(1-2) year	2(28.6)	3(60)		
Complication	Massive bilateral pneumonia	0(0)	4(80)	0.004	**
	Pneumonia with pneumothorax	2(28.6)	1(20)		
	Pneumonia	5(71.4)	0(0)		
Mechanical Ventilation	No	5(71.4)	3(60)	0.692	NS
	Yes	2(28.6)	2(40)		
Associated problem	No	6(85.7)	3(60)	0.432	NS
	Congenital heart disease	1(14.3)	1(20)		
	Failure to thrive	0(0)	1(20)		

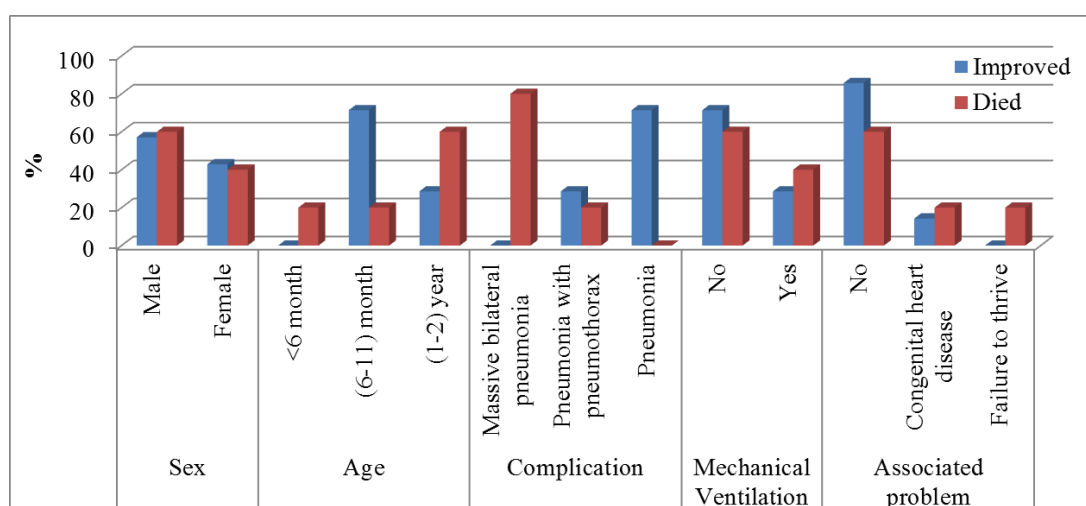


Figure (8): Comparison between patient’s outcome (who admitted at PICU) as regarding the flowing parameter

Discussions and Conclusions

Measles is one of the leading causes of death among young children all case who died during measles outbreak less than 2 years, The study concludes that the most common age group affected during this outbreak is 2-5 years, more in males than females, the measles outbreak at Gurayat occurred due to lack of vaccination as 95.5% of patients were non-vaccinated so to prevent future outbreaks we should encourage the people to follow the instruction of the immunization programs and vaccinate their children to protect them from infectious diseases. Comparing treatment responses in two groups of patients with measles who admitted at PICU,

group A received methylprednisolone group B was managed with supportive measures and didn't received methylprednisolone. Patients who received methylprednisolone showed 100% recovery compared to 17% of patients managed with supportive measures and didn't received methylprednisolone and death in this group was 83%, our patients showed an excellent response to steroid therapy with full recovery within two weeks, so the use of steroids should be considered in management of complicated cases of measles. Public health departments helped in the diagnosis of measles, trace contacts, and offer post-exposure prophylaxis by prevention through vaccination with two doses measles vaccine, at least 28 days

apart, with the first dose given at 12 months of age or older, If a patient exposed to measles, without presumptive immunity to measles and is > 6 months old, vaccinate with MMR within 72 hours of exposure to prevent or modify measles severity also vaccination of health care workers and pregnant women should not receive the vaccine.

Recommendation

Increase the awareness of population to the importance of vaccination programs, good ventilation, aeration and personal hygiene in prevention of infectious diseases through the Public health departments. The use of steroids should be considered in management of complicated cases of measles.

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