$$Mean\ of\ Exponential\ distribution = 45\ minutes$$

$$Rate = \frac{1}{Mean} = \frac{1}{45}$$

Which means 1 patient arrives on an average in 45 minutes

Let X be a random variable denoting number of customers arrive in 45 minutes

Then by the relationship between exponential distribution and Poisson distribution

$$X \sim Poisson(1)$$

Now we are interested in the number of arrivals in 24-hour period, so first convert 45 minutes in 1 hour and then multiply it by 24.

Let Y be a random variable denoting number of arrivals in 24 hours

$$Y \sim Poisson\left(1 * \frac{60}{45} * 24\right)$$

$$Y \sim Poisson(32)$$

$$P(More\ than\ 35\ patients\ arrive\ to\ the\ emergency\ room\ in\ a\ particular\ 24\ hour\ period)$$
$$= P(Y > 35)$$

$$P(Y > 35) = 1 - P(Y \le 35)$$

Following R code is used to get P(Y ≤ 35) –

```
R R Console
> ppois(35,32)
[1] 0.7379278
>
```

$$P(Y > 35) = 1 - P(Y \le 35) = 1 - 0.7379278 = 0.2620722$$

$P(More\ than\ 35\ patients\ arrive\ to\ the\ emergency\ room\ in\ a\ particular\ 24\ hour\ period)$
$= 0.2621$