Bluebird

Tools to Help Manage Special Pathogens

Intelligent Medical Systems (Pty) Ltd
www.intelms.com
support@intelms.com

Table of Contents

Introduction

Special Pathogens have been defined as those infective organisms with an ability to cause significant morbidity and mortality. Healthcare associated infections (HAI) and especially HAIs with multidrug-resistant organisms (MDROs) are significant global threats that impact negatively upon both patient safety as well as a healthcare facility's bottom line. The COVID-19 Pandemic has created additional management challenges for those facilities. Bluebird groups MDROs, COVID-19 and other high risk organisms and high risk conditions for those infections under the heading **Special Attention Flags** (SAF). By monitoring the prevalence of these organisms across individual hospitals and across regions (which might include a country), the Bluebird **SAF Dashboard** can help plan differential management interventions in order to focus scarce and/or expensive resources where they will do the most good to improve public health, individual patient safety and clinical outcomes.

Bluebird uses the CDC's concept of **LabID events** to standardize infection rates across a region or a group of healthcare facilities.

This paper unpacks 3 Bluebird tools that may be used by public health (national and regional), healthcare groups or individual healthcare facilities either as a standalone solution for the surveillance of Special Pathogens or as part of the Bluebird EMR. These tools are:

1. The **SAF Dashboard**
2. The **Supervisory IP SAF Tab** which drills down to #3
3. The individual healthcare facility **IP SAF Tab**

As in the Bluebird ICU module, centralized care helps drive operational efficiency.

Background

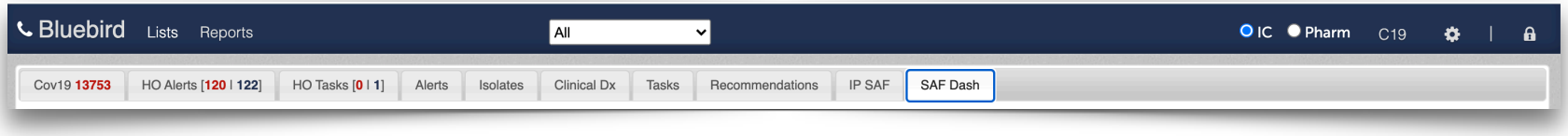
The **Bluebird EMR** incorporates a highly sophisticated infection control and antimicrobial stewardship solution that helps improve the efficiency of clinicians as well as the safety of patients. This cloud based system enables more to be accomplished with fewer clinical and IT resources. The **Bluebird IC and AMS** solution can stand alone or be used as a module of the EMR. The three **Bluebird SAF tools** described below are a further subdivision of the Bluebird IC and AMS module which may be used as a standalone, cloud based solution for Public Health.

Bluebird institutionalizes best practices and facilitates compliance with regulatory mandates. The IC and AMS module was designed from the ground up to exceed both the American CDC and the Australian Commission on Safety and Quality in Health Care guidelines and currently helps more than 70 large facilities in Southern Africa *consistently* achieve *best practice*.

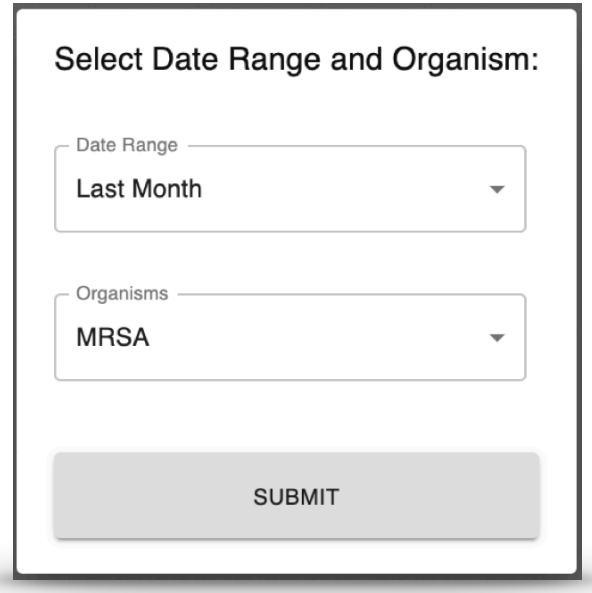
The SAF Dashboard

Clinicians in a Bluebird Clinical Command Centre or regional infection control supervisors will find the IP SAF tab on the right of their management tabs.

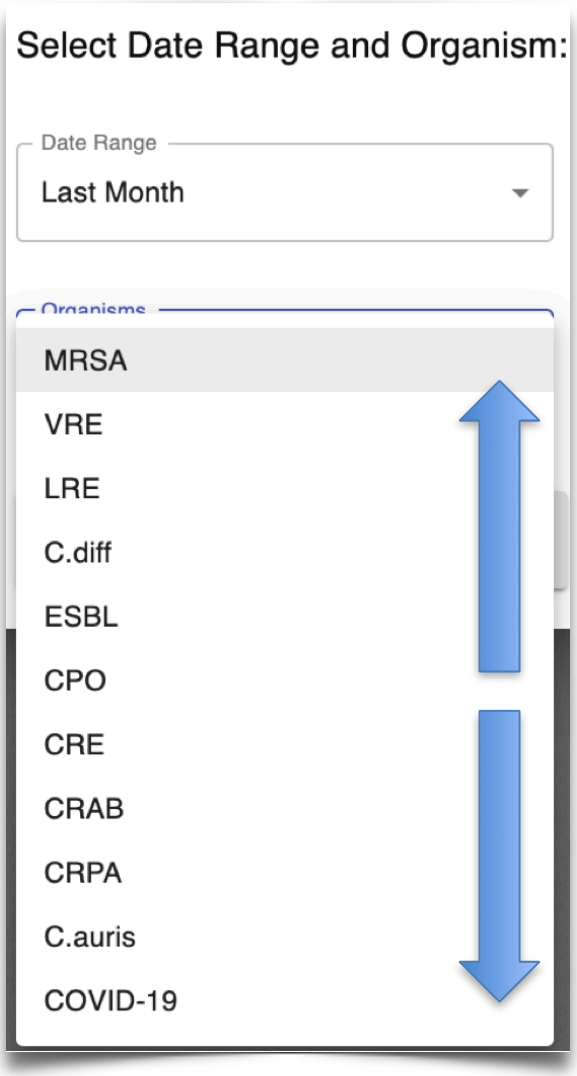
The SAF Dashboard shows Special Pathogens over a selected time period.



Clicking that tab will pop open a search pane:



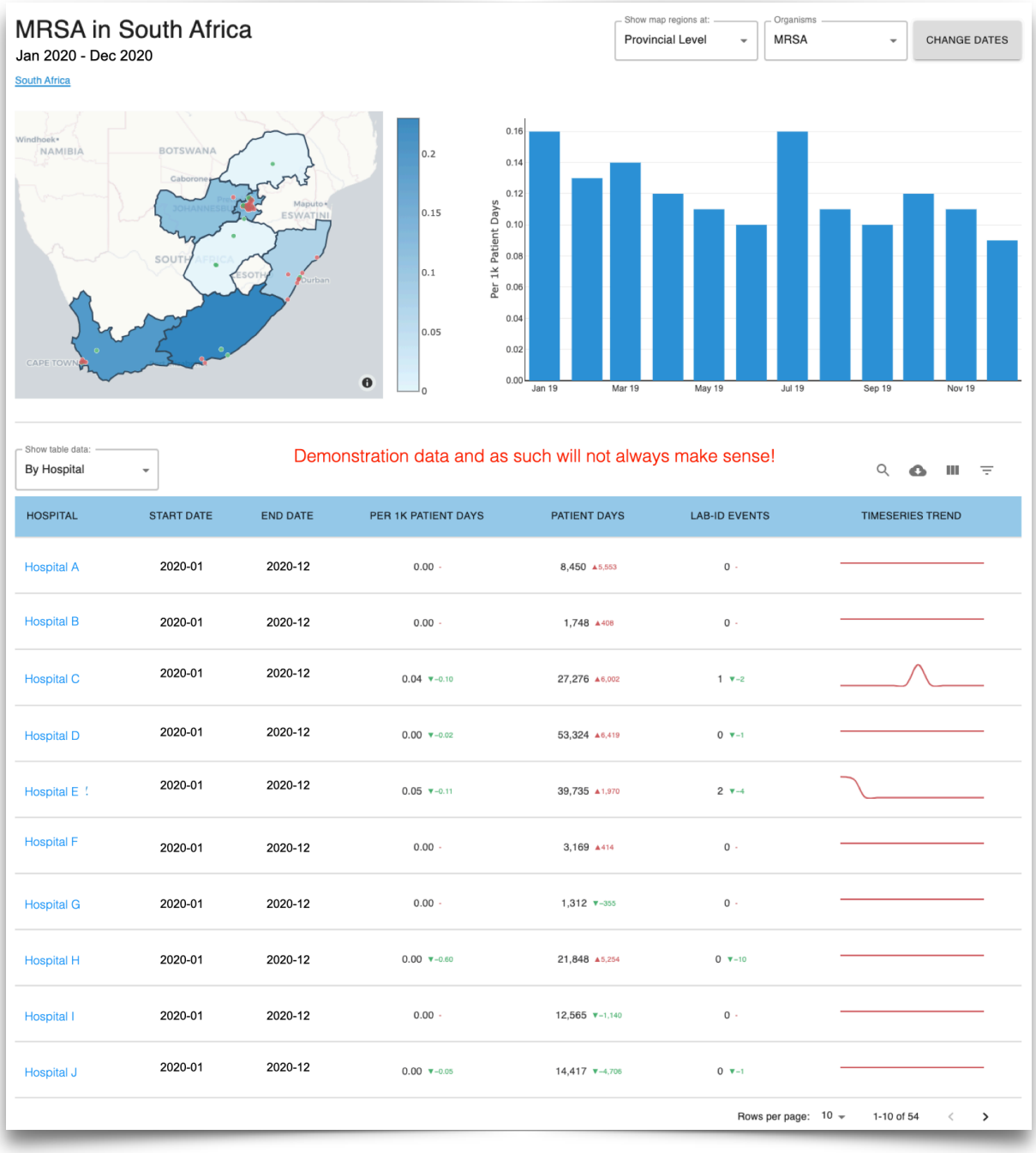
Besides being able to specify the date range of your search one can also specify the Special Pathogen of interest:



This will produce a map of the selected region, a bar chart over time and a table of regional trends (which is exportable to Excel).

Use the drop down menus on the top right to select by region, by organism and by date range.

Red and green dots and numbers show whether there was a rate change over the previous period. (Red numbers indicate an increased rate. Green numbers refer to a decreased rate or no change).



Map

The map is interactive.

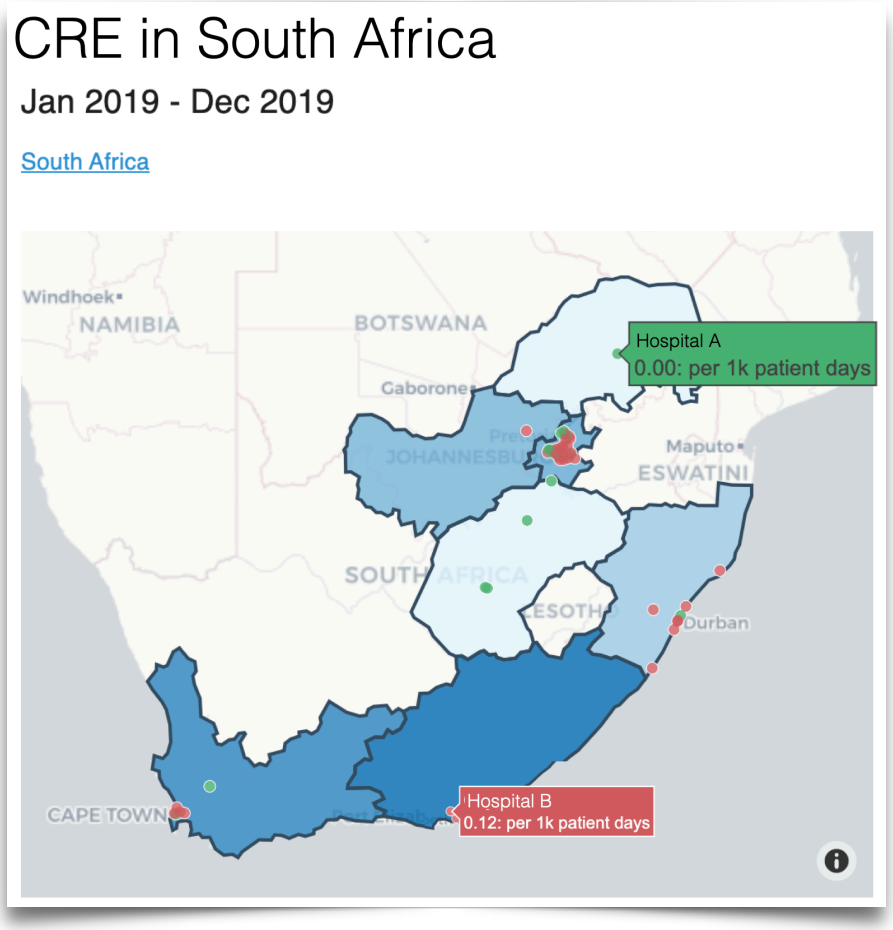
Hover over different regions to see regional data for the period selected.

Individual healthcare facilities are shown as red or green dots, the colours indicating rate.

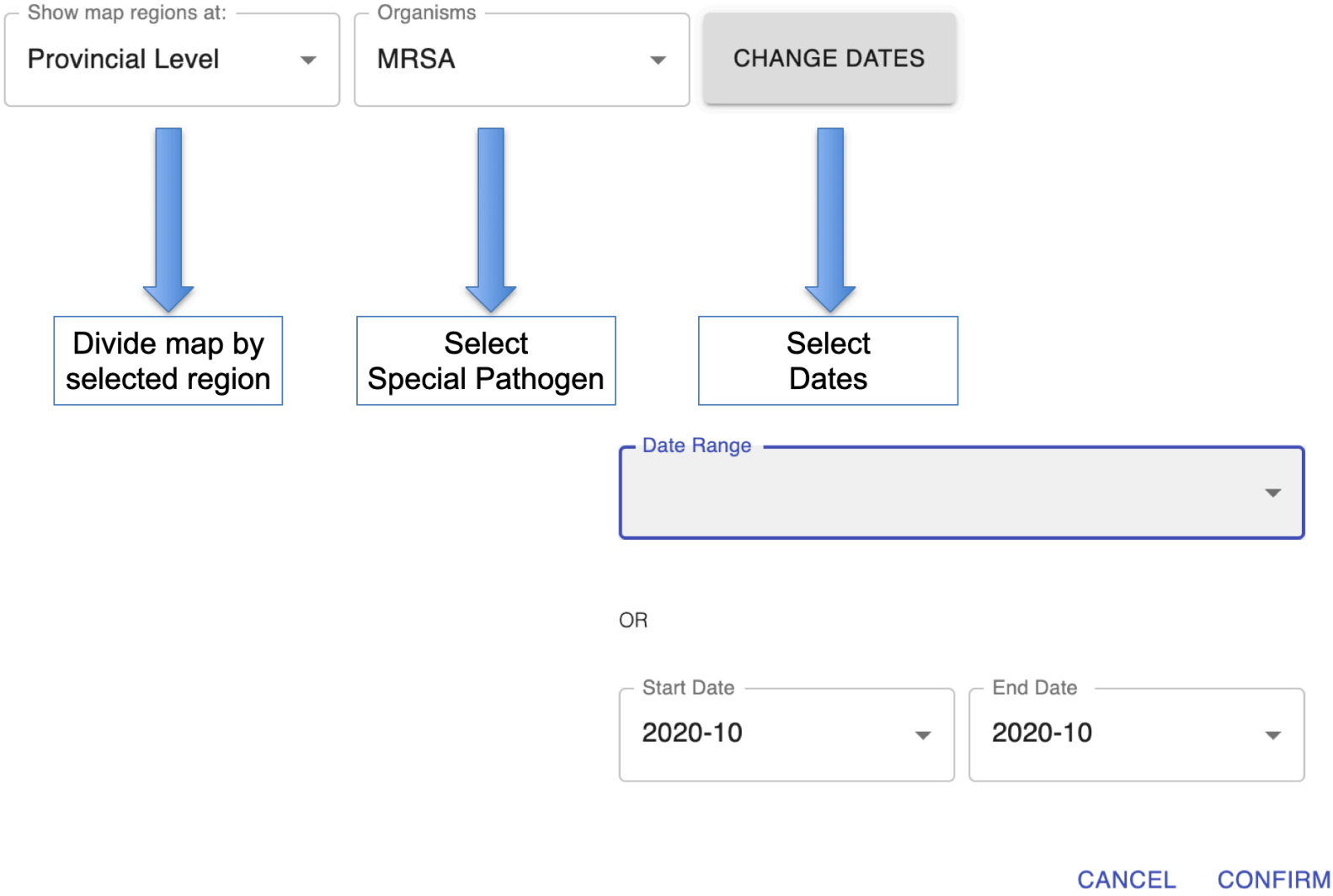
Red implies an increased rate (over the previous period).

Green means that the rate is unchanged or has decreased.

Click any region on the map to drill down and reveal more detailed information about that region.



Use the drop down menus on the top right of the map to select by region, by organism and by date range.

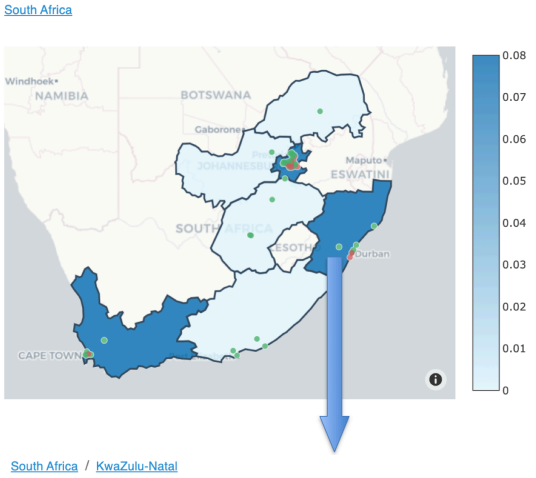


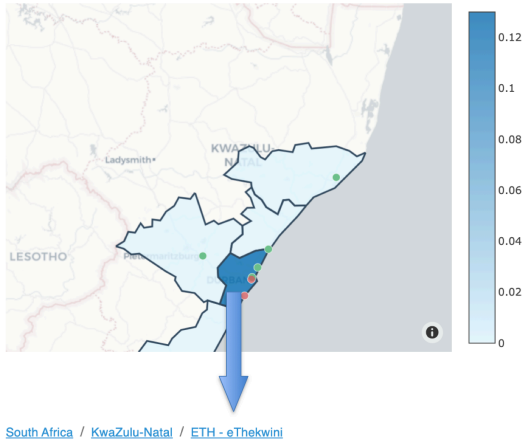
Click any region on the national map to drill down and reveal more detailed information about that region.

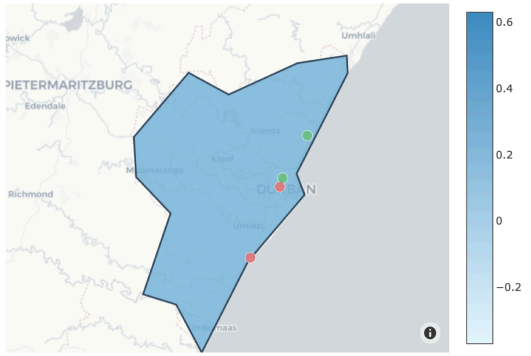
On the first image, KwaZulu-Natal (a province in South Africa) was selected which produced the second image.

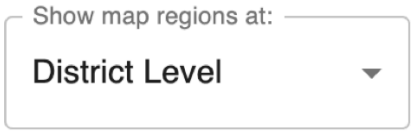
On the second image, eThekwini (a district in KwaZulu-Natal) was selected which produced the third image.

Bluebird can be customized for whatever regions are appropriate in your country.







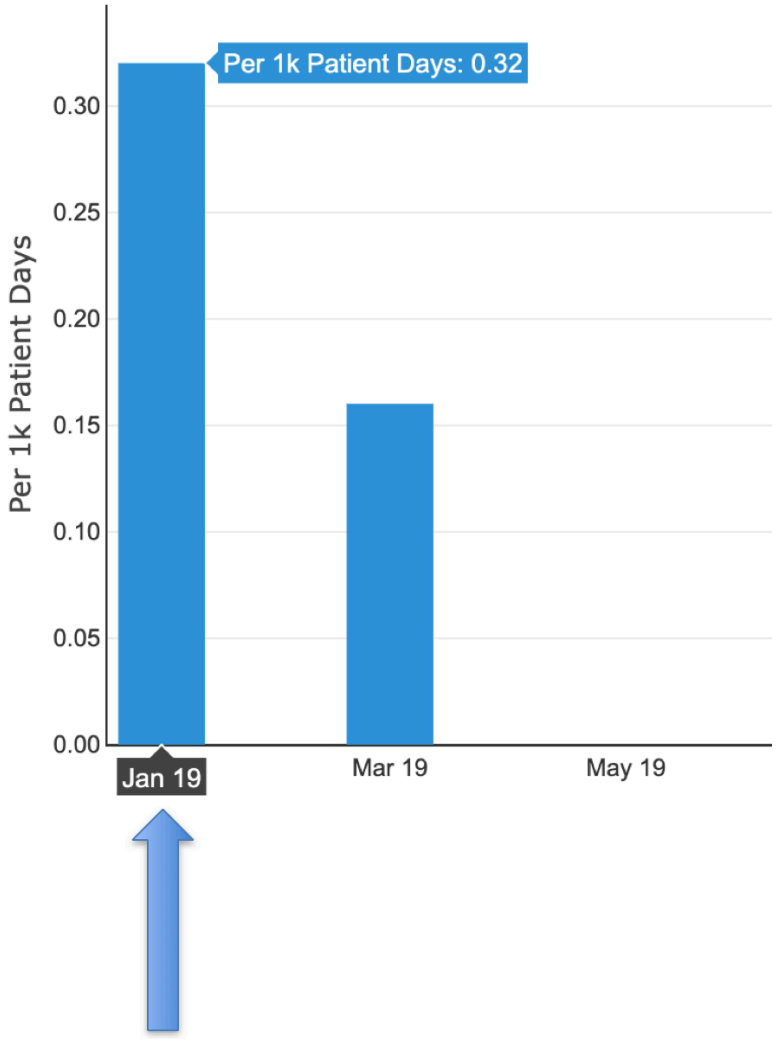


Bar Chart

The bar chart is also interactive.

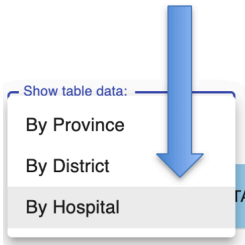
Hovering over a bar reveals more information.

In the example screenshot one can see that the rate was 0.32 per 1000 patient days on the 19th of January.



Trend Table

One can choose to show this table by region or by healthcare facility:



	TART DATE	END DATE	PER 1K PATIENT DAYS	PATIENT DAYS	LAB-ID EVENTS	TIMESERIES TREND
Hospital A	2020-01	2020-12	0.00 -	8,450 ▲5,553	0 -	
Hospital B	2020-01	2020-12	0.00 -	1,748 ▲408	0 -	
Hospital C	2020-01	2020-12	0.04 ▼–0.10	27,276 ▲6,002	1 ▼–2	
Hospital D	2020-01	2020-12	0.00 ▼–0.02	53,324 ▲6,419	0 ▼–1	
Hospital E	2020-01	2020-12	0.05 ▼–0.11	39,735 ▲1,970	2 ▼–4	
Hospital F	2020-01	2020-12	0.00 -	3,169 ▲414	0 -	
Hospital G	2020-01	2020-12	0.00 -	1,312 ▼–355	0 -	
Hospital H	2020-01	2020-12	0.00 ▼–0.60	21,848 ▲5,254	0 ▼–10	

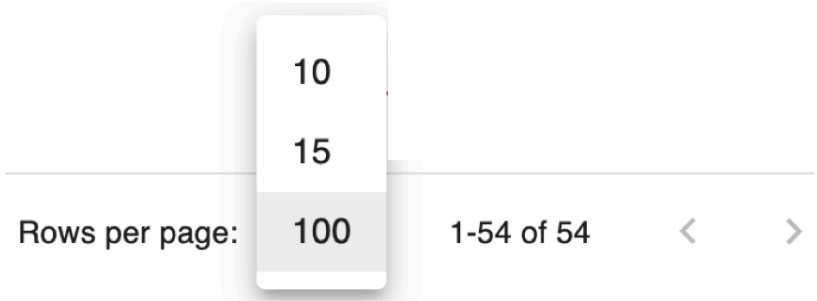
On the top right of the regional trend table one sees these 4 icons:

Practically, only the cloud with the download arrow, is particularly helpful. Clicking this icon allows one to download the data as a CSV file which may be opened with Excel.

Clicking the header will sort the table by that header (an arrow is then shown to indicate the sort order):

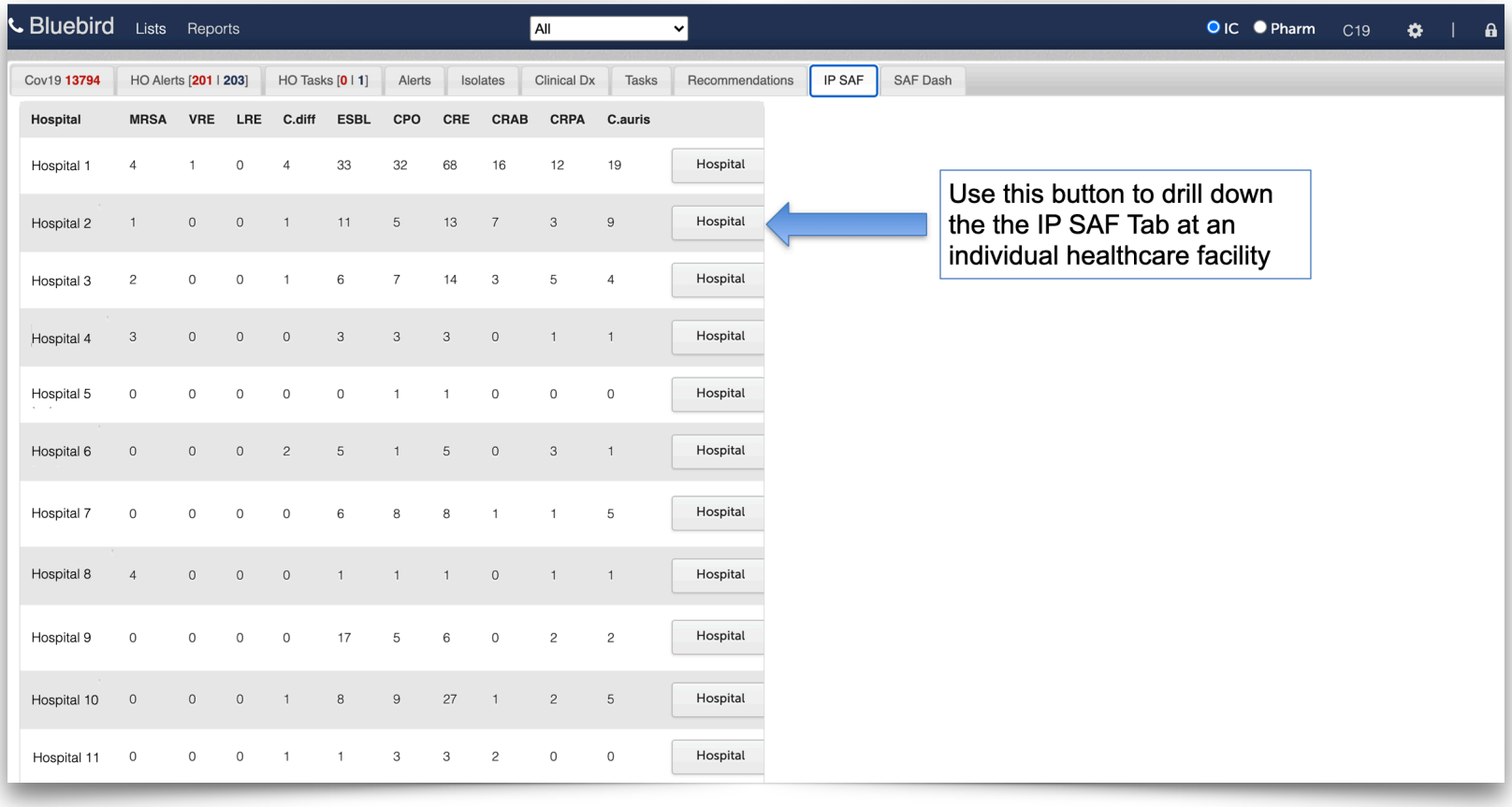
PROVINCE ↑	START DATE	END DATE	PER 1K PATIENT DAYS	PATIENT DAYS	LAB-ID EVENTS	TIMESERIES TREND

At the bottom of the Trend Table one is able to customize the number of rows one wishes to see on each page:



The Supervisory IP SAF Tab

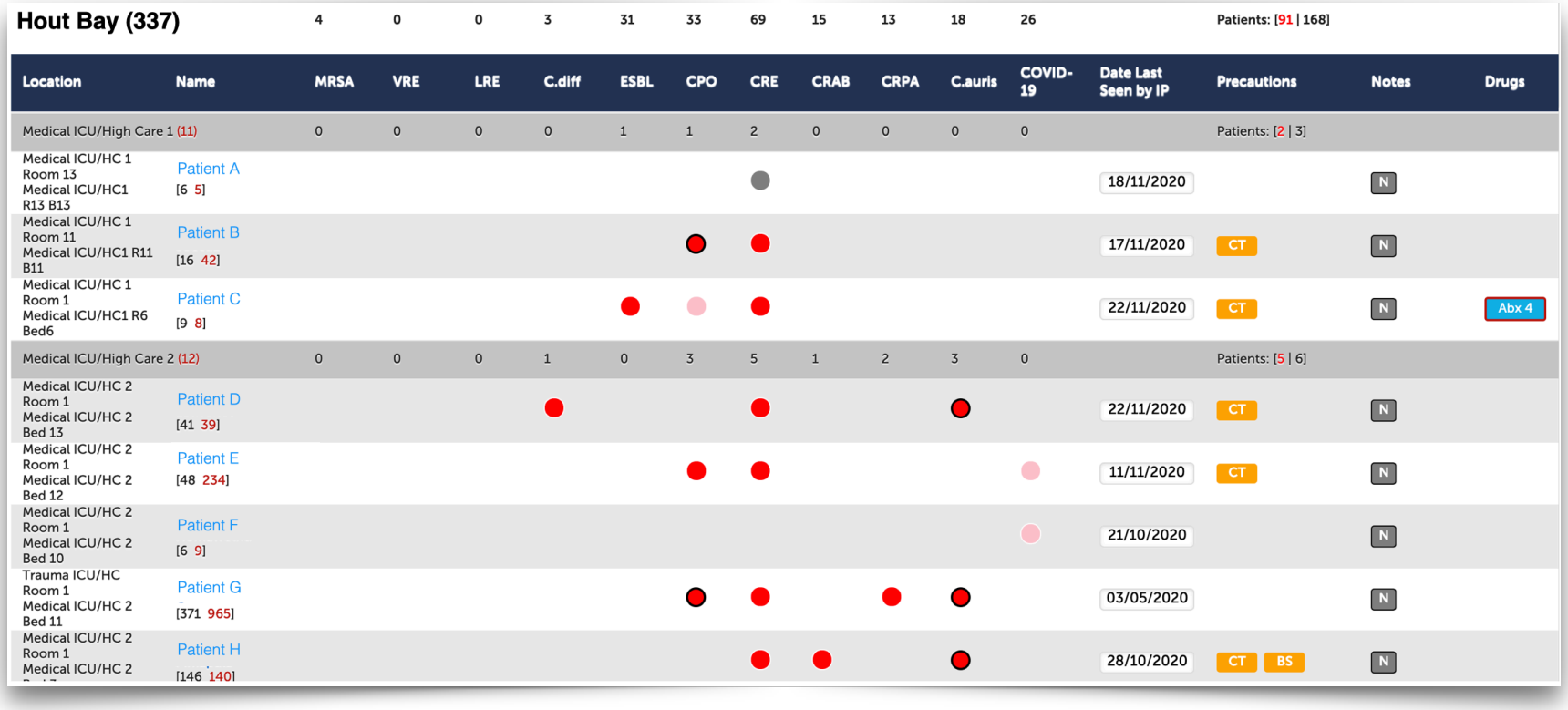
The Supervisory SAF Tab shows selected Special Pathogens in real-time for a group of healthcare facilities. In the image below, in hospital 1 there are currently 68 patients with CRE and 19 with Candida Auris. One can use the “Hospital” button to drill down to that local facility as shown on the next page.



Hospital	MRSA	VRE	LRE	C.diff	ESBL	CPO	CRE	CRAB	CRPA	C.auris	
Hospital 1	4	1	0	4	33	32	68	16	12	19	Hospital
Hospital 2	1	0	0	1	11	5	13	7	3	9	Hospital
Hospital 3	2	0	0	1	6	7	14	3	5	4	Hospital
Hospital 4	3	0	0	0	3	3	3	0	1	1	Hospital
Hospital 5	0	0	0	0	0	1	1	0	0	0	Hospital
Hospital 6	0	0	0	2	5	1	5	0	3	1	Hospital
Hospital 7	0	0	0	0	6	8	8	1	1	5	Hospital
Hospital 8	4	0	0	0	1	1	1	0	1	1	Hospital
Hospital 9	0	0	0	0	17	5	6	0	2	2	Hospital
Hospital 10	0	0	0	1	8	9	27	1	2	5	Hospital
Hospital 11	0	0	0	1	1	3	3	2	0	0	Hospital

The Local Facility IP SAF Tab

The facility IP SAF Tab shows Special Pathogens in one healthcare facility in real-time and helps Regional Supervisors, local IPs, Unit Managers and Hospital Managers to monitor the management of patients at risk for Superbugs (MRSA, VRE, LRE, CDiff, ESBL, CPO, CRE, CRAB and CRPA and C. auris) and viruses such as COVID-19, in *real time*, in their hospitals. This "IC SAF Tab", if used diligently, is an extremely powerful tool in your hospital's fight against Superbugs.



Hout Bay (337) 4 0 0 3 31 33 69 15 13 18 26 Patients: [91 | 168]

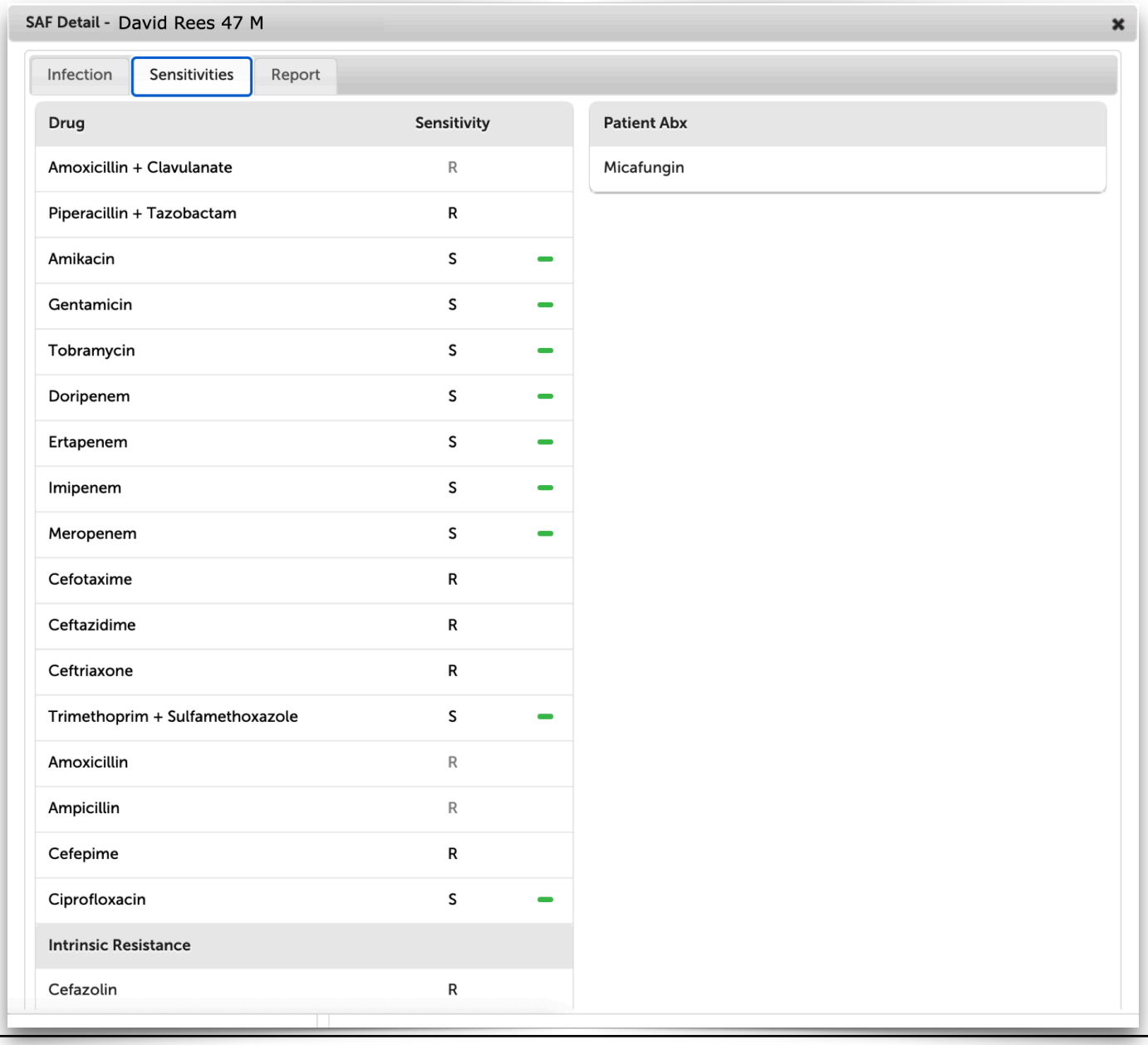
Location	Name	MRSA	VRE	LRE	C.diff	ESBL	CPO	CRE	CRAB	CRPA	C.auris	COVID-19	Date Last Seen by IP	Precautions	Notes	Drugs
Medical ICU/High Care 1 (11)		0	0	0	0	1	1	2	0	0	0	0		Patients: [2 | 3]		
Medical ICU/HC 1 Room 13 Medical ICU/HC1 R13 B13	Patient A [6 5]							●					18/11/2020		N	
Medical ICU/HC 1 Room 11 Medical ICU/HC1 R11 B11	Patient B [16 42]						●	●					17/11/2020	CT	N	
Medical ICU/HC 1 Room 1 Medical ICU/HC1 R6 Bed6	Patient C [9 8]					●	●	●					22/11/2020	CT	N	Abx 4
Medical ICU/High Care 2 (12)		0	0	0	1	0	3	5	1	2	3	0		Patients: [5 | 6]		
Medical ICU/HC 2 Room 1 Medical ICU/HC 2 Bed 13	Patient D [41 39]				●			●			●		22/11/2020	CT	N	
Medical ICU/HC 2 Room 1 Medical ICU/HC 2 Bed 12	Patient E [48 234]						●	●				●	11/11/2020	CT	N	
Medical ICU/HC 2 Room 1 Medical ICU/HC 2 Bed 10	Patient F [6 9]											●	21/10/2020		N	
Trauma ICU/HC Room 1 Medical ICU/HC 2 Bed 11	Patient G [371 965]						●	●		●	●		03/05/2020		N	
Medical ICU/HC 2 Room 1 Medical ICU/HC 2	Patient H [146 140]							●	●		●		28/10/2020	CT BS	N	

It is a realtime snapshot of patients currently in the hospital at high risk for Special Pathogens including MDROs. It shows their location within the facility as well as the management implemented to stop spread and to treat the individual patient. Because the IP SAF Tab is broken out by ward, Unit Managers can quickly focus on local, optimal management. It is recommended that Infection Control, Unit Managers and Hospital Managers start and end their day reviewing this infection control tool. It also gives one an indication of the isolation beds that have been needed over the last month.

Features:

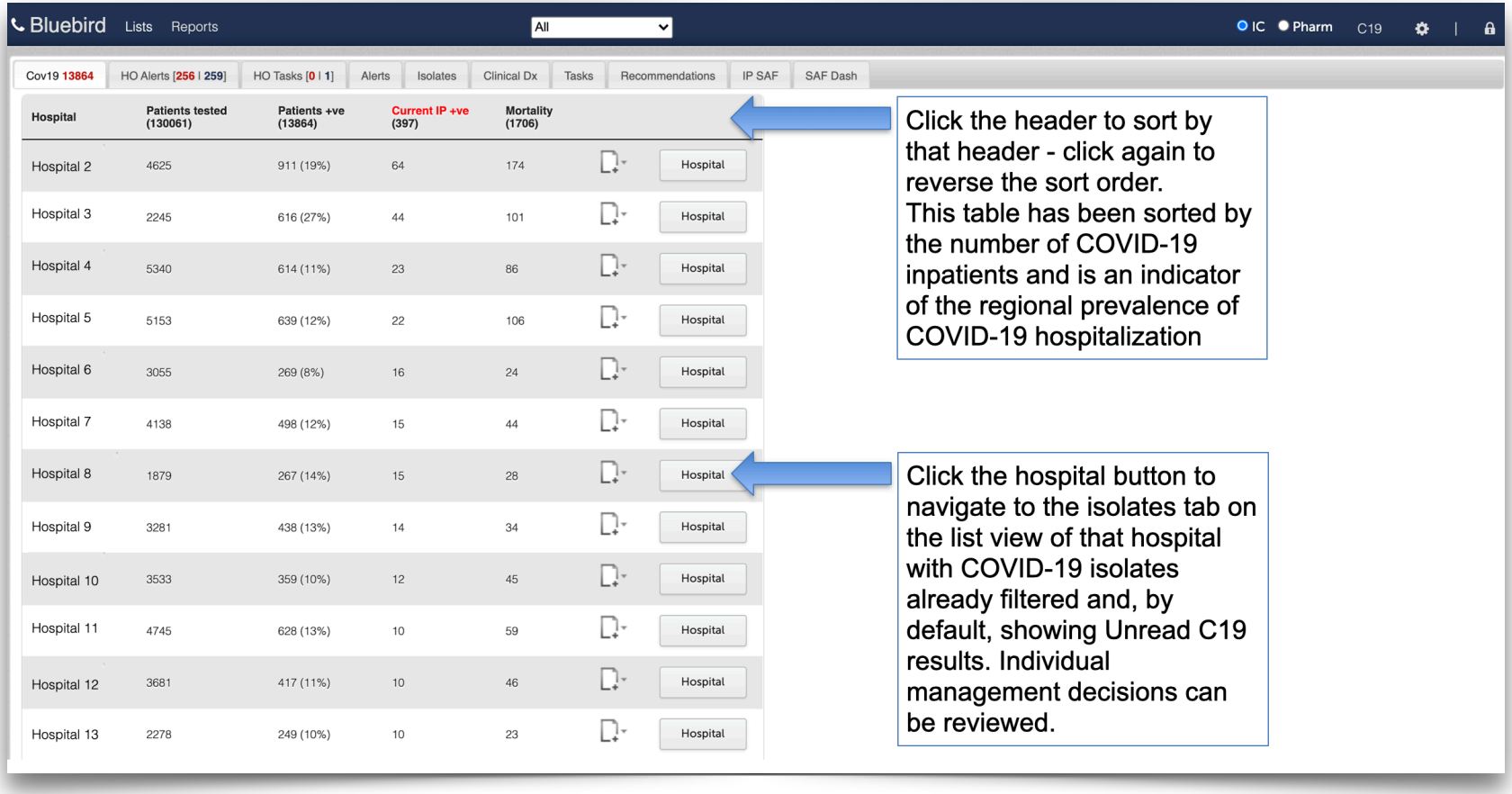
- Senior staff are able to view this information for any hospital in the group and any unit in that hospital.
- The numbers below the search bar indicate the number of patients with specific MDROs in that health facility in *realtime.* The current number of at risk patients is shown to the right of these hospital numbers. The red number refers to isolates during this admission, the black number shows the total patients at risk and is an indicator of the number of isolation beds required.
- These same numbers are broken out in the sub-header for each ward/unit in the hospital.
- **Red dots** show patients that have had that MDR organism isolated during the current admission. Occasionally a white pinpoint is seen in the middle of a red dot - this indicates that the result is provisional and sensitivities will not yet be available to help decide if empiric Rx might be de-escalated. **Pink dots** show patients that have had that MDR organism isolated in your organization within the last 6 months (provided you have been using Bluebird that long). **Yellow dots** show patients that have had that MDR organism isolated in your organization within the last 12 months (provided you have been using Bluebird that long). **Grey dots** show patients that, according the the Bluebird Admission Form, have had that MDR organism isolated outside your hospital group over the last year (dark grey over last 6 months, light grey over the previous 12 months). **Blue dots** show patients that were documented at risk on the Bluebird Admission Form. Clicking the dot pops up more information about that isolate - for example sensitivities and antibiotic treatment appears when a red dot is clicked. If a negative screen comes back from the lab and Bluebird is able to clearly identify that that screen applies to that MDRO (e.g. a rectal swab for CRE), Bluebird will put a white diagonal line through the dot. The facility can use that information to help decide if any infection precautions might be downgraded and an isolation bed freed up.
- Below the red dots one will see one of 3 icons (-, X or ✓). If your facility has elected not to activate the Transmission Checklist for that specific MDRO, a "-" will be shown. If your facility has elected to activate the **Transmission Checklist** for that MDRO and the checklist is not yet complete, an "X" will be shown. A "✓" will be shown if the checklist is complete. Ideally, management should, on a daily basis, confirm that all red dots have ✓s.
- Blood specimens have black borders. This is to indicate the very high mortality associated with many of these BSIs.
- Hovering over a red dot will show the specimen name.
- The date that this patient was last seen by an infection control nurse (auto-entered when a note is made by IC), the infective precautions implemented and IC notes are all immediately visible.
- If there is a blue Abx icon, that patient is on at least one antimicrobial. Clicking the icon pops up detail about the antimicrobial treatment.
- Clicking on any of the header names (e.g. CRPA) will sort the list by that header. Use this function to sort by patient and quickly see all the SAFs for that patient.
- The Patient Name is a link. Clicking that link will open a new (grey) browser tab with the isolate pane open for that patient (shown in the image on the next page).
- Clicking one of the dots will bring up more information about that isolate:

Including the sensitivities and the full, original report from the lab.



The COVID-19 Supervisory Tab

The first Supervisory Tab gives information about COVID-19 infections in each hospital across a region and includes the number of PCR positive patients currently in each facility:



Annual Antibiograms

Summary antimicrobial susceptibility tables, known as cumulative annual antibiograms are essential tools that assist clinicians choose appropriate initial (empiric) antibiotic therapy.

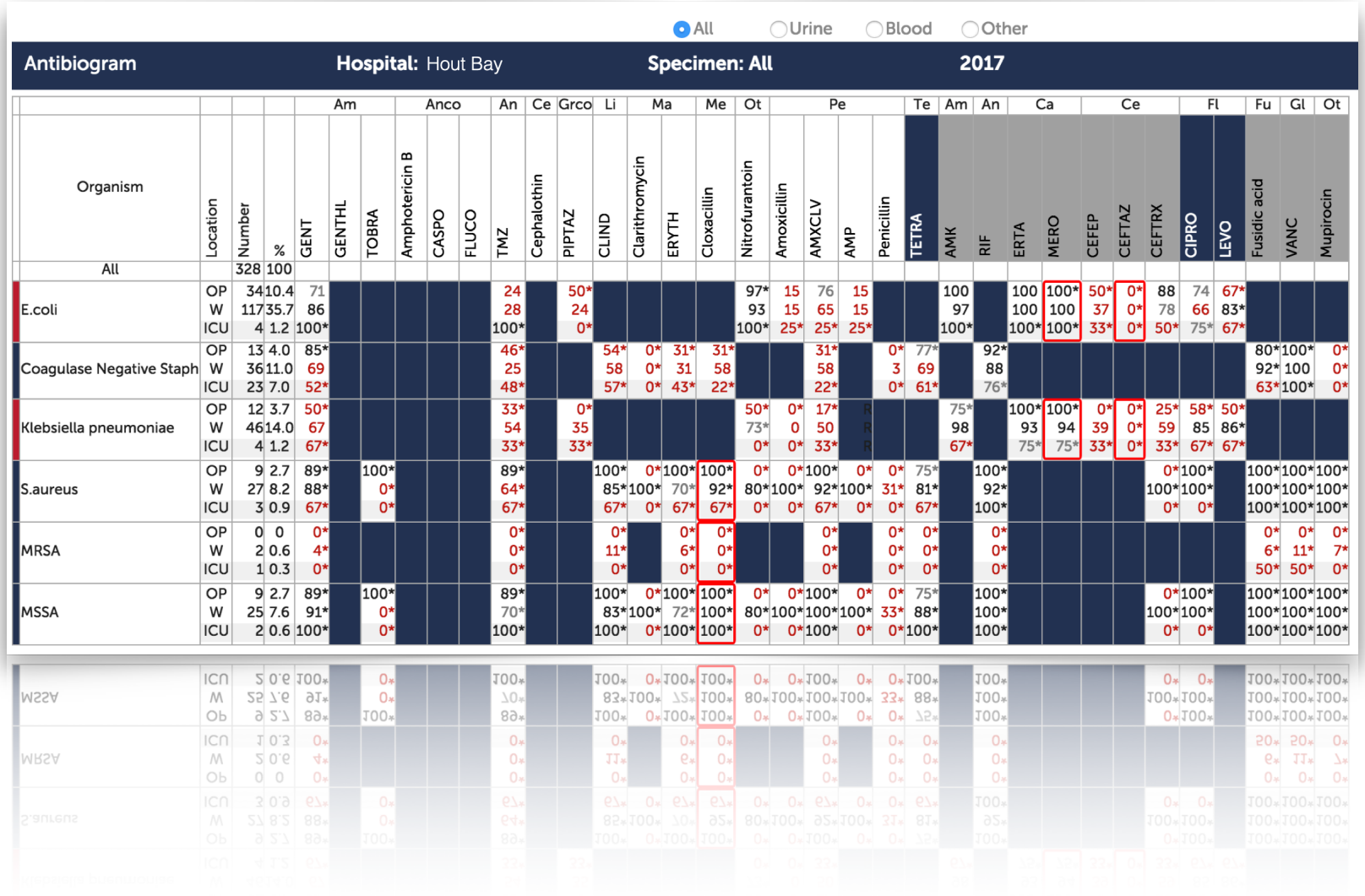
Antibiograms can also be used to monitor the proportion of organisms resistant to antibiotics of interest. Many government organizations around the world (such as the CDC and the Joint commission as well as the Australian National Safety and Quality Health Service Standard) require facilities to monitor antimicrobial resistance.

Besides annual antibiograms for hospitals, Bluebird can produce annual antibiograms for other healthcare facilities (such as long term care) or by geographic region such as zip (postal) code or local region (typically province, district or voting ward). Please see intelms.com/516 is you require more detail.

Constructing an annual antibiogram is an essential compliance tool that requires many hours to construct manually. Bluebird does this automatically and instantly.

The Bluebird specification for annual antibiograms is based on this document:

Analysis and Presentation of Cumulative Antimicrobial Susceptibility Test Data; Approved Guideline – Third Edition, otherwise known as CLSI M39-A3 (http://www.clsi.org).



All Urine Blood Other

Antibiogram **Hospital:** Hout Bay **Specimen: All** **2017**

				Am			Anco			An	Ce	Grco	Li	Ma		Me	Ot	Pe				Te	Am	An	Ca		Ce			Fl		Fu	Gl	Ot
Organism	Location	Number	%	GENT	GENTHL	TOBRA	Amphotericin B	CASPO	FLUCO	TMZ	Cephalothin	PIPTAZ	CLIND	Clarithromycin	ERYTH	Cloxacillin	Nitrofurantoin	Amoxicillin	AMXCLV	AMP	Penicillin	TETRA	AMK	RIF	ERTA	MERO	CEFEP	CEFTAZ	CEFTRX	CIPRO	LEVO	Fusidic acid	VANC	Mupirocin
All		328	100																															
E.coli	OP	34	10.4	71						24		50*					97*	15	76	15			100		100	100*	50*	0*	88	74	67*			
	W	117	35.7	86						28		24					93	15	65	15			97		100	100	37	0*	78	66	83*			
	ICU	4	1.2	100*						100*		0*					100*	25*	25*	25*			100*		100*	100*	33*	0*	50*	75*	67*			
Coagulase Negative Staph	OP	13	4.0	85*						46*			54*	0*	31*	31*			31*		0*	77*		92*								80*	100*	0*
	W	36	11.0	69						25			58	0*	31	58			58		3	69		88								92*	100	0*
	ICU	23	7.0	52*						48*			57*	0*	43*	22*			22*		0*	61*		76*								63*	100*	0*
Klebsiella pneumoniae	OP	12	3.7	50*						33*		0*					50*	0*	17*	R			75*		100*	100*	0*	0*	25*	58*	50*			
	W	46	14.0	67						54		35					73*	0	50	R			98		93	94	39	0*	59	85	86*			
	ICU	4	1.2	67*						33*		33*					0*	0*	33*	R			67*		75*	75*	33*	0*	33*	67*	67*			
S.aureus	OP	9	2.7	89*		100*				89*			100*	0*	100*	100*	0*	0*	100*	0*	0*	75*		100*					0*	100*		100*	100*	100*
	W	27	8.2	88*		0*				64*			85*	100*	70*	92*	80*	100*	92*	100*	31*	81*		92*					100*	100*		100*	100*	100*
	ICU	3	0.9	67*		0*				67*			67*	0*	67*	67*	0*	0*	67*	0*	0*	67*		100*					0*	0*		100*	100*	100*
MRSA	OP	0	0	0*						0*			0*		0*	0*			0*		0*	0*		0*								0*	0*	0*
	W	2	0.6	4*						0*			11*		6*	0*			0*		0*	0*		0*								6*	11*	7*
	ICU	1	0.3	0*						0*			0*		0*	0*			0*		0*	0*		0*								50*	50*	0*
MSSA	OP	9	2.7	89*		100*				89*			100*	0*	100*	100*	0*	0*	100*	0*	0*	75*		100*					0*	100*		100*	100*	100*
	W	25	7.6	91*		0*				70*			83*	100*	72*	100*	80*	100*	100*	100*	33*	88*		100*					100*	100*		100*	100*	100*
	ICU	2	0.6	100*		0*				100*			100*	0*	100*	100*	0*	0*	100*	0*	0*	100*		100*					0*	0*		100*	100*	100*

Summary

Bluebird provides Public Health authorities, hospitals, long term care and other health facilities powerful tools to help them measure and then manage Special Pathogens.

Because Bluebird is cloud based there is little information technology or hardware required by Bluebird clients. Intelligent Medical Systems handles the security, and plumbing (connections to labs and healthcare facilities) and ensures the service is available 24/7.

Bluebird has been trusted by the medical profession for more than 25 years - please allow us to show you what we do!