Let’s Talk Informatics

How Public Health Used Workforce Modeling in the Pandemic

- Audience audio and video options have been disabled.
- To interact in the Q & A portion of the presentation, select Q & A from the top menu bar, then type your question.
- Today’s session is being recorded and registered guests will be emailed a link to access from EventBrite.
- Want to stay informed about future sessions? Get on our mailing list here: **letstalkinformatics@nshealth.ca.**

Let’s Talk Informatics

How Public Health Used Workforce Modeling in the Pandemic

Mark Bennett & Lori McCracken
Oct. 13 2022

Acknowledgement

We acknowledge we are gathered today
in Mi’kma’ki (*Mig-***_maw_**-gee), the traditional ancestral
unceded territory of the Mi’kmaq (*Mig-**maw**) people.

Informatics

Informatics utilizes health information and health care technology to enable patients to receive best treatment and best outcome possible.

Let’s Talk Informatics Objectives

This series is designed to enable participants to:

- Identify knowledge and skills healthcare providers need in order to use information now, and in the future.
- Prepare health care providers through an introduction to concepts and experiences in Informatics.
- Acquire knowledge to remain current by becoming familiar with new trends, terminology, studies, data and news.
- Collaborate with a network of colleagues to establishing connections with leaders who can provide advice on business issues, best-practice and knowledge sharing.

Conflict of Interest Declaration

We do not have an affiliation (financial or otherwise) with a pharmaceutical, medical device, health care informatics organization, or other for-profit **funder of this program**.

Session Specific Objectives

At the conclusion of this activity, you will be able to:

1. Describe the model attributes, inputs, and outputs used to support Public Health workforce planning
2. Outline how the model was used and the applications in Public Health
3. Explain barrier/facilitators of the modelling approach in Public Health, and next steps to continue the methodology

Acknowledgments

- Sara Wuite and Paula Burghgraef
- Public Health Epidemiologists Team and Manager of Foundations, Mary-Anne Finlayson
- James Broesch, Marc Arseneau, Marcia DeSantis and the rest of Provincial Public Health Leadership Team who paved the road for using work force measurements in our early Covid-19 planning
- Regional Medical Officers of Health (MOHs)
- COVID-19 Directors
- Public Health System for leaning in during a challenging time

The problem and challenge

How do we understand the maximum work volume in relation to our finite resources?

Components of a solution

Inform COVID Capacity Planning

Data driven workforce planning

Test scenarios & ask questions

Communicate decision process

We needed a tool that was:

Data Driven

Routinely collected data in Public Health

Test Scenarios

Capture variation in population level scenarios

Communicative

Track & plot results through time

The tool we used to inform planning

Data Driven

Test new Scenarios

Results Communication

Discrete Event Simulation

Balancing scarce hospital resources during the COVID-19 pandemic using discrete-event simulation

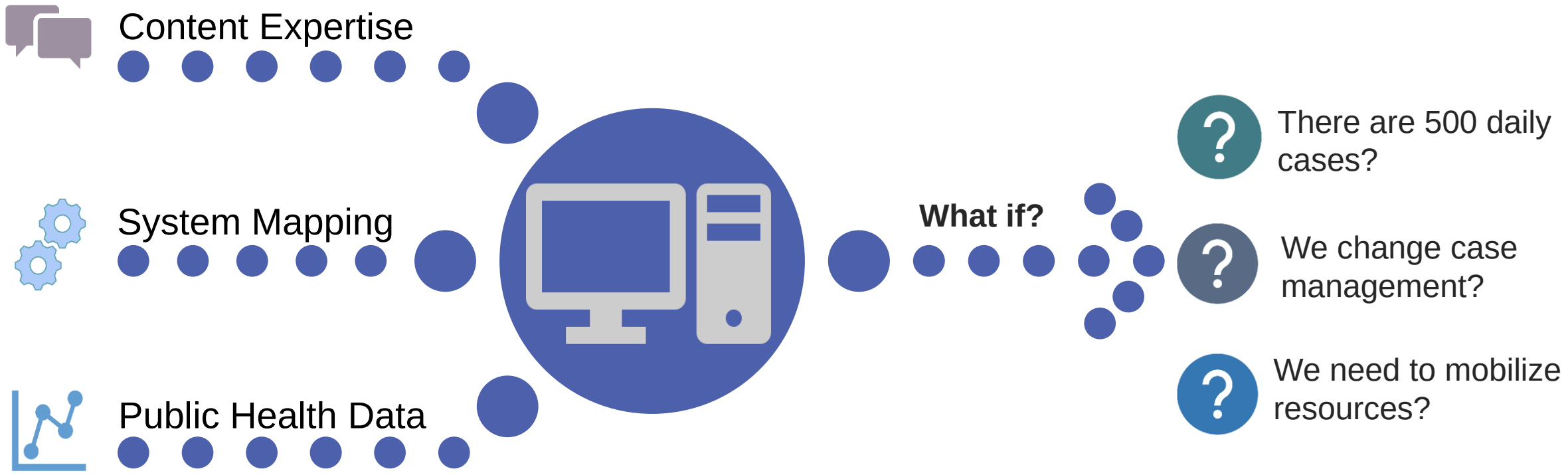
A framework for developing generalizable discrete event simulation models of hospital emergency departments

Attributes of discrete event simulation

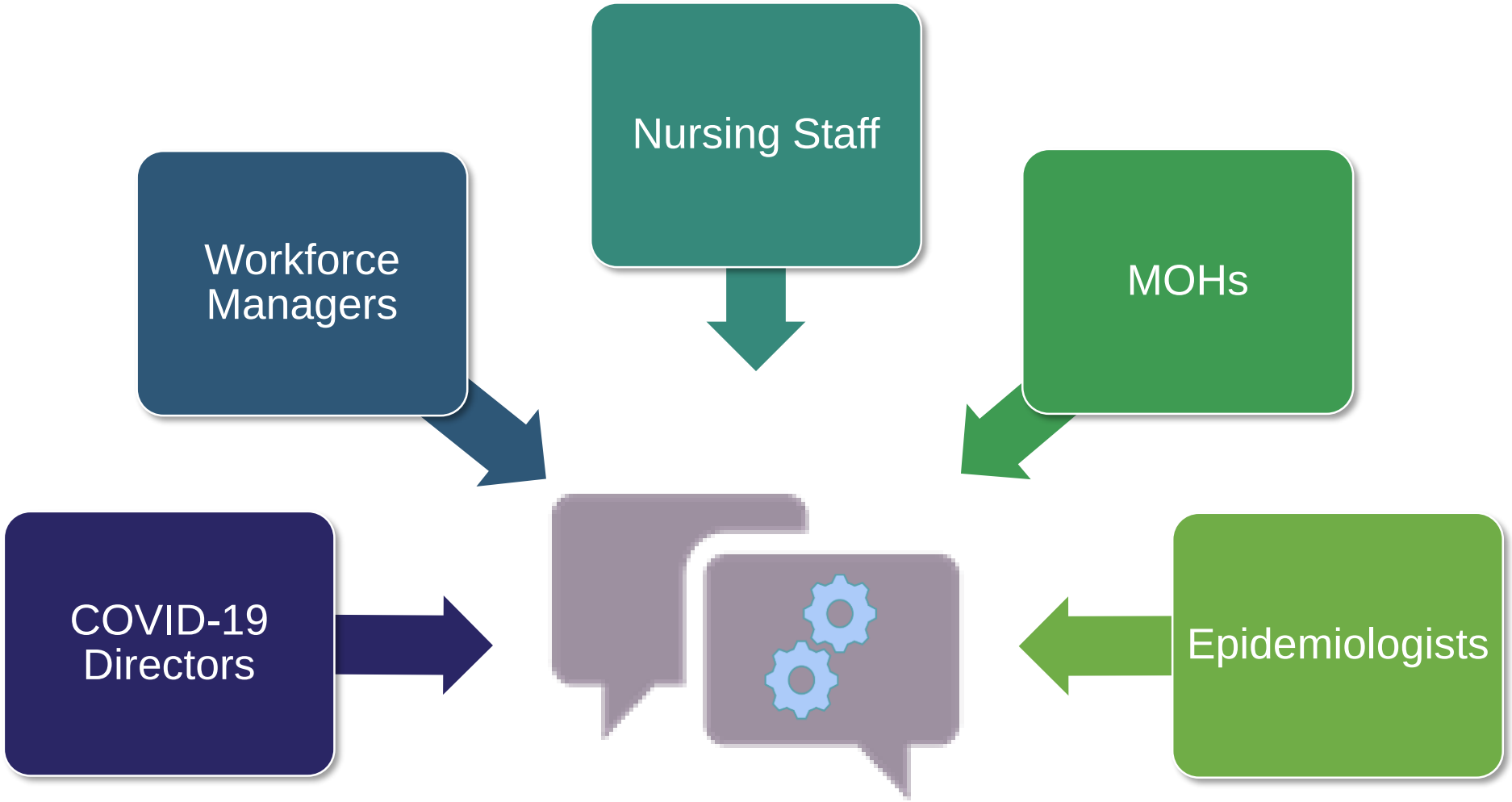
Discrete	Model entities (cases/contacts) have specific states
Event	We track the time between the specific states changing
Simulation	Create a computer model that abstracts the real-world system and allow for “what-if” scenarios

Collect data to generate new data

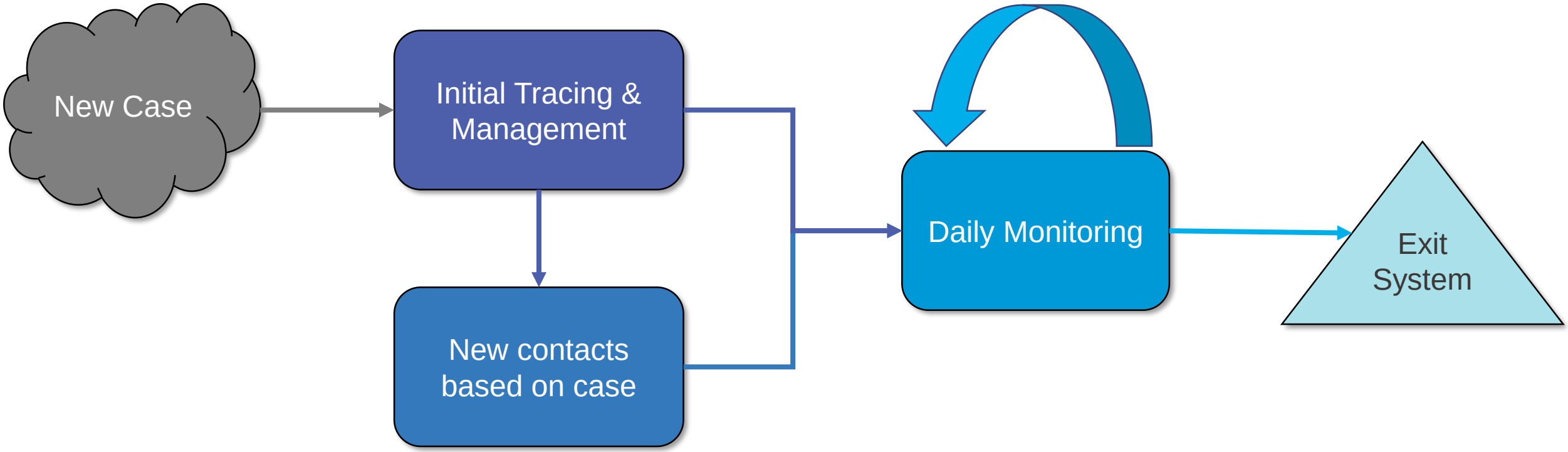
What goes into a discrete event simulation



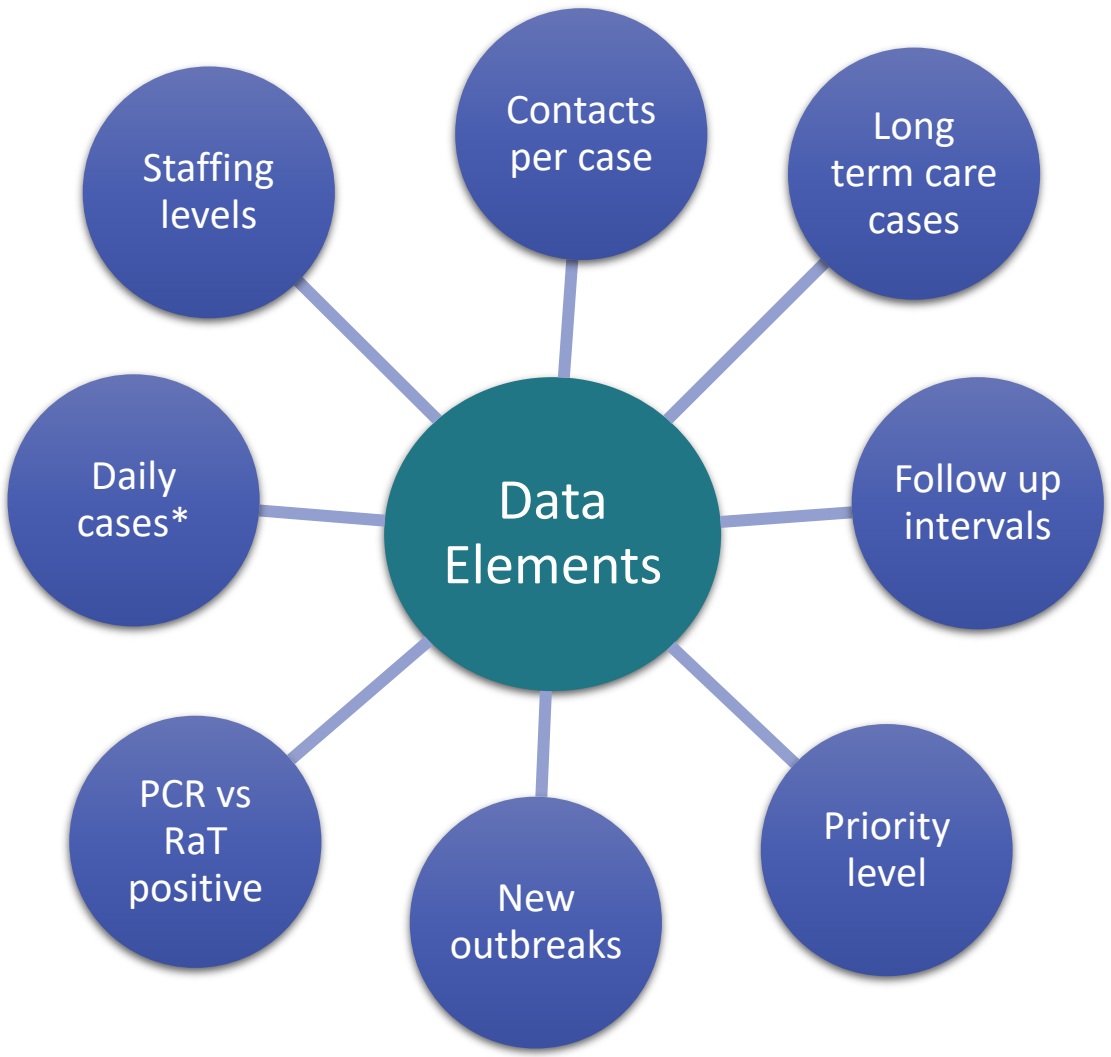
Content expertise - Who helped?

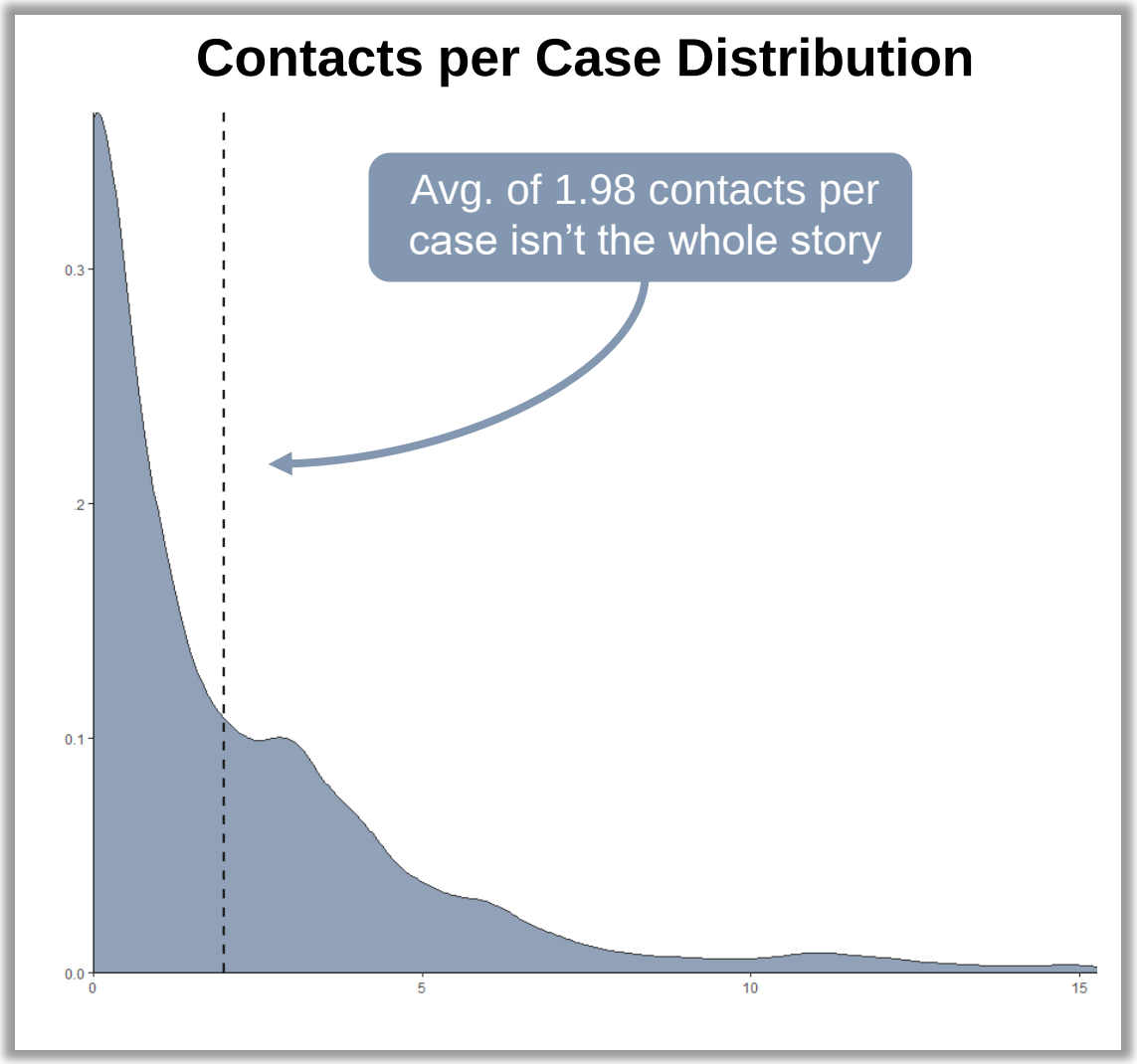


System mapping - Model conceptual path

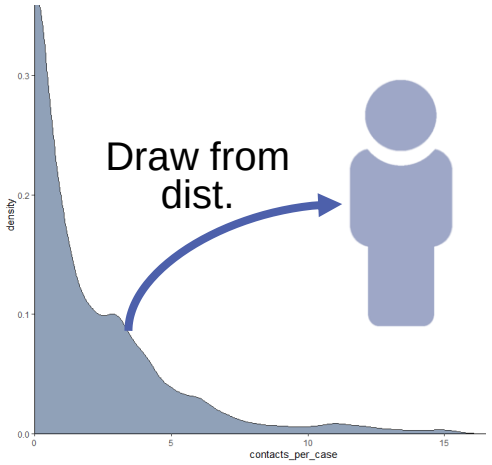


Model inputs (data captures)





Modelling uncertainty using inputs

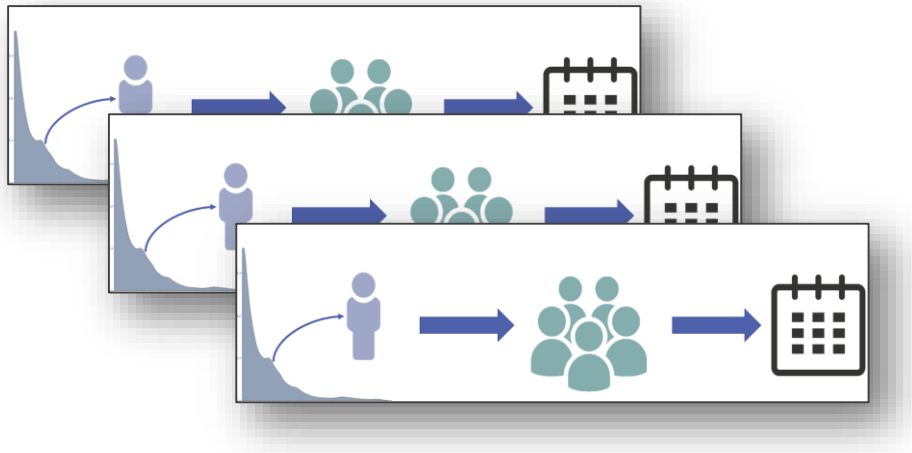


Draw from dist.

Each daily case & contact

Every simulation day

Simulation replicate #1



Variation captured in:

1. Every data input
2. Every case/contact
3. Every day
4. Every replicate

How did we implement the simulation

Example Frontend Excel Inputs

Variation	R&S Positives	Minutes per Case Min	Mid	Max	Wave Scenario?
20%	412				Yes
	Requiring FU				
5%	10%	20	30	40	
	Of FU, LTC				
5%	73%	20	30	40	
	Direct Refs				
20%	24	20	30	40	
	Daily FU % of Total				
	0.03%	10	15	20	
	Death/Hosp % of Tot.				
	5%	5	10	15	

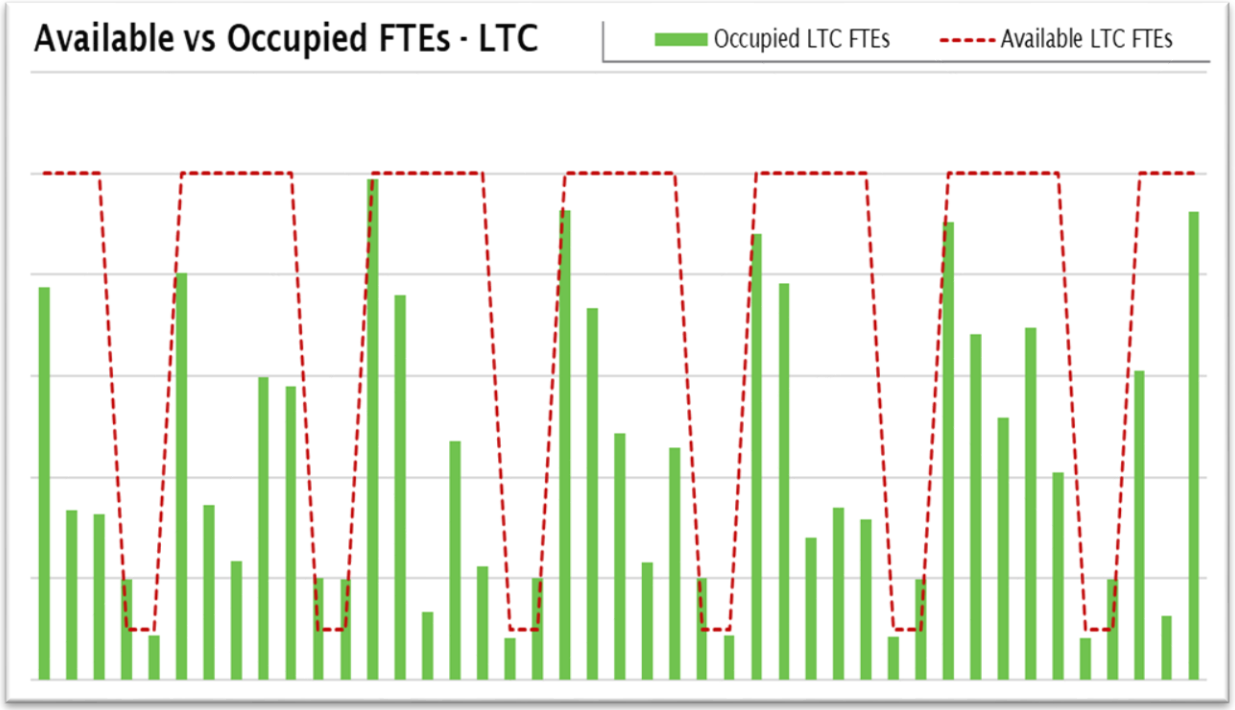
OB Ratio*	Outbreak Type	Daily FTE Min	Mid	Max	Days Open
100	Cluster	0.20	0.25	0.30	3
250	OB1 (2-10 cases)	0.45	0.50	0.55	5
400	OB2 (11-19 cases)	0.70	0.75	0.80	7
2500	OB3 (20+ cases)	0.95	1.00	1.05	10

‘Behind the Scenes’ VBA Process

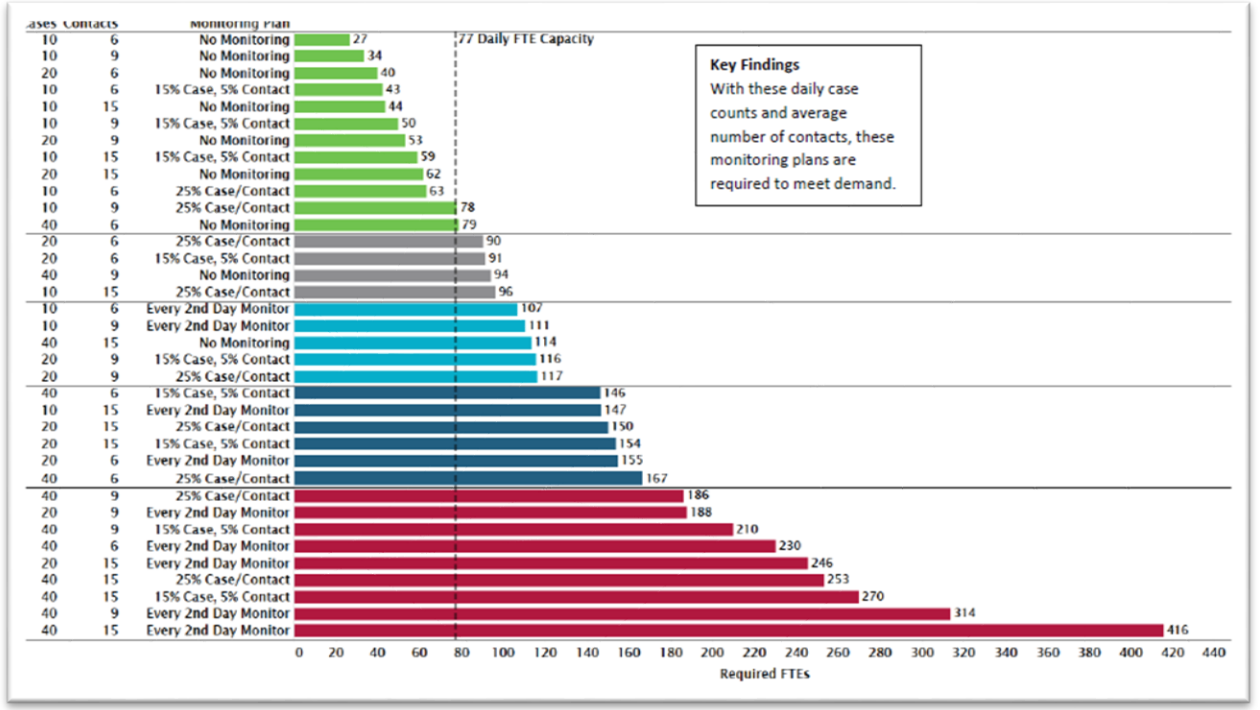
```
For replicate = 1 To 10

    'Clear out collections before next replicate
    Set OpenContacts = Nothing
    Set OpenCases = Nothing

    For repDay = 0 To repLength

        '****** Resetting and re-counting all daily counter stats that need to be cleared
        dailyCases = ThisWorkbook.Sheets("DailyCasesInput").Cells(repDay + 2, "B")
        dailyOutbreaks = ThisWorkbook.Sheets("DailyCasesInput").Cells(repDay + 2, "C")
        dailyContacts = 0

        ' Clear daily time of tasks
        For i = 1 To 9
            dailyStats(i).ClearStats
        Next i



        For Each CvCase In OpenCases
            'If the case is new today, must do the initial day tasks
            If CvCase.FirstDay = repDay Then
                dailyStats(1).value = CvCase.NewManageTime
                dailyStats(2).value = CvCase.NewEntryTime
                'Update all information for next day
                CvCase.NextIdmDay = CvCase.NextIdmDay + caseIDM
            'If it's their next moniter day, OR last day, complete tasks
            ElseIf (CvCase.NextIdmDay = repDay Or CvCase.CloseDay = repDay) Then
                dailyStats(3).value = CvCase.DailyManageTime
                dailyStats(4).value = CvCase.DailyEntryTime
                'Update all information for next day
                CvCase.NextIdmDay = CvCase.NextIdmDay + caseIDM
            End If


        Next CvCase
        For j = 1 To dailyCases
            Set CvCase = New clsCases
            CvCase.name = repDay & "-" & j
            CvCase.FirstDay = repDay

            CvCase.CloseDay = repDay + 10

            CvCase.NewManageTime = myVariates.triRV(newCaseManage_min, newCaseManage_max, newCaseManage_mid)
            CvCase.NewEntryTime = myVariates.triRV(newCaseEntry_min, newCaseEntry_max, newCaseEntry_mid)
```

Communicating results – Model outputs

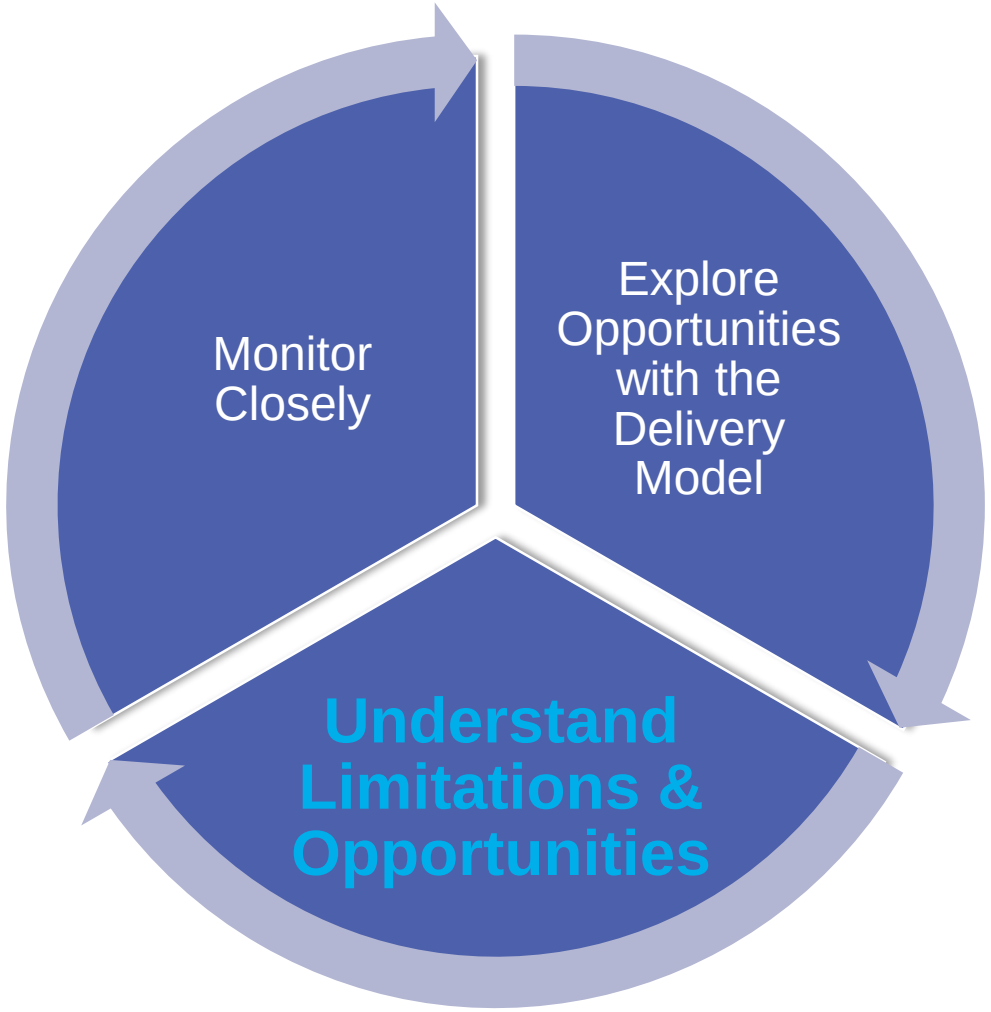
One Scenario – Over time



Many Scenarios – Overall



How the information and output was used:



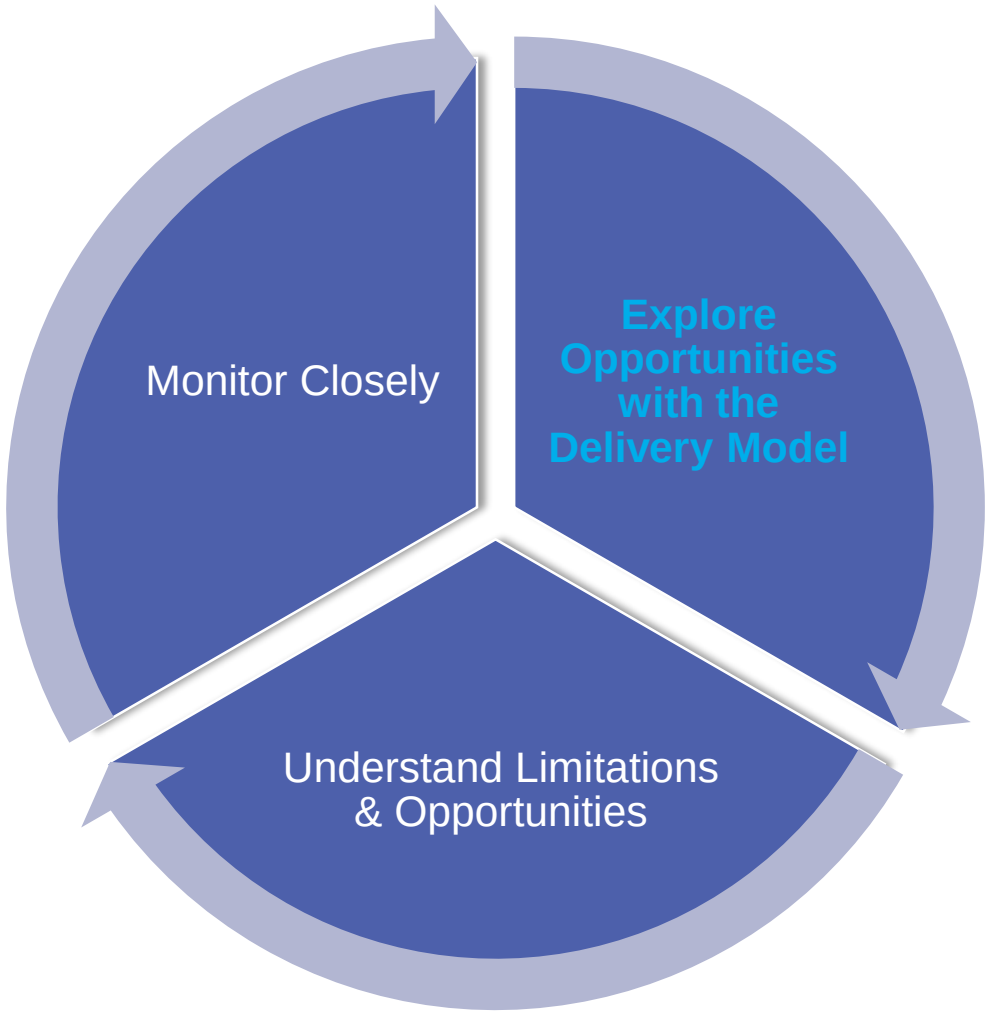
Understand Limitations & Opportunities

- Loosening of Public Health Measures
- Covid-19 High Priority Disease
- Increasing number of contacts for every case
- Covid teams were challenged to keep up with demand

- Community desire to resume activity
- Population understanding of Covid prevention messages
- Testing was widely available
- High immunization rates
- Understanding of priority populations

- **Total staff numbers, the business and training impacts**

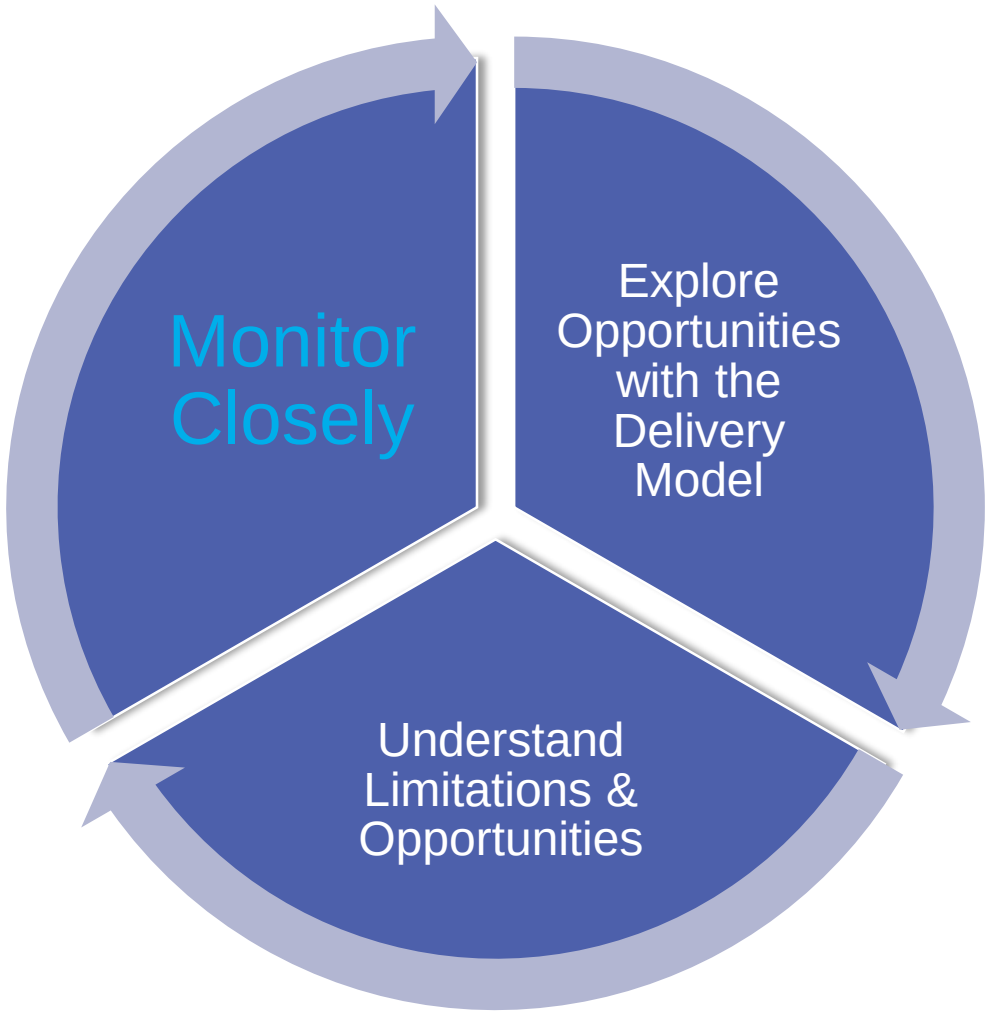
How the information and output was used:



Explore Opportunities with the Delivery Model

- ✓ Understanding a maximum volume of work within PHN resources
- ✓ Ability to shift the work based on priority populations
- ✓ Examined scope of practice and legislative responsibilities of other health professions
- ✓ Find and shift resources from available locations to the team to help prioritize the work
- ✓ Find ways to automate the sorting of priority populations
- ✓ And accept we are trying our best in a very challenging situation

How the information and output was used:



Monitor Closely

- Progressive comfort within the team for the work and evolving work processes
- The community became comfortable with messaging, using ‘Support and Report’, and the adjustments to the testing strategy
- Just enough resources to keep the work process flowing
- Easing of restrictions to test how the system would handle these changes
- Patience and understand when we needed to say we could not keep up

Decision example: Case management monitoring

Case Summary Report Example A *(if CRT has no case carryover)*

TOTAL NEW CASES	NEW PCR CASES	NEW POCT CASES
TOTAL TRIAGED P1/P2 CASES	**PCR TRIAGED P1/P2**	**POCT TRIAGED P2**
PCR COMPLETED REPORT & SUPPORT (%)		

ASSIGNED FOR CASE MANAGEMENT					
	TEAM A	TEAM C	ZONE	SUBTOTAL	TOTAL
LTC					
CORRECTIONS					
SHELTER					
FN					
AFNS					
DR*					

A. Case Assignment with no carryover

B. Case Assignment with carryover

Case Summary Report Example B *(if CRT has a carryover of cases)*

TOTAL NEW CASES	NEW PCR CASES	NEW POCT CASES
TOTAL TRIAGED P1/P2 CASES	**PCR TRIAGED P1/P2**	**POCT TRIAGED P2**
PCR COMPLETED REPORT & SUPPORT (%)		

TO BE ASSIGNED FOR CASE MANAGEMENT						
	>72 HRS	>48-72 HRS	>24-48 HRS	<24 HRS	SUBTOTAL	TOTAL
P1						
LTC						
FN/CORRECTIONS/ANS						
SHELTER						
P2						
LTC						
FN/CORRECTIONS/ANS						
SHELTER						

ASSIGNED FOR CASE MANAGEMENT					
	TEAM A	TEAM C	ZONE	SUBTOTAL	TOTAL
LTC					
CORRECTIONS					
SHELTER					
FN					
AFNS					
DR*					

Barriers and facilitators to development & use

Facilitator

- Knew our end goal & metrics at start
- People embedded in the work
- Robust data entry & extract

Barrier

- Time to understand & develop a trusted model
- Shifting context of COVID & management
- Capacity/skills to maintain & edit model

Opportunities for this approach in Public Health?

ND Planning

- Disease modelling
- Validation

E-Prep Planning

- Trigger points
- When action is needed

Imms Delivery

- Needs based framework
- Delivery decisions

Other PH Programs

- Assessing population need against capacity
- Business case development

Take home messages and learnings

- A tool in a toolkit that uses data in a new way to inform decisions
- All you need is time and effort to do these models, seek out the skills
- Look for ways to implement these types of models when applicable
- How do we become more efficient and comfortable with measuring the work:
  - Knowing that we are working with real clients with lives and variation in circumstance
  - Variation in practice between professionals, comfort with the variation of efficiency while establishing standard expectations
- Focus on processes as a system:
  - Need to consider the individuals in front of us but also those lining up for care (population and needs based approach)
- Heart in Healthcare

Let’s Talk Informatics Certifications

- **Digital Health Canada -** participants can claim 1CE hour for each presentation attended.
- **College of Family Physicians of Canada and Nova Scotia Chapter -** participants can earn one Mainpro+ credit by providing proof of content aimed at improving computer skills applied to learning and access to information.
- **Canadian College of Health Information Management -** approves 1 CPE credit per hour for this series for professional members of Canada’s Health Information Management Association (CHIMA).

Thank you

Need More Info?

letstalkinformatics@nshealth.ca