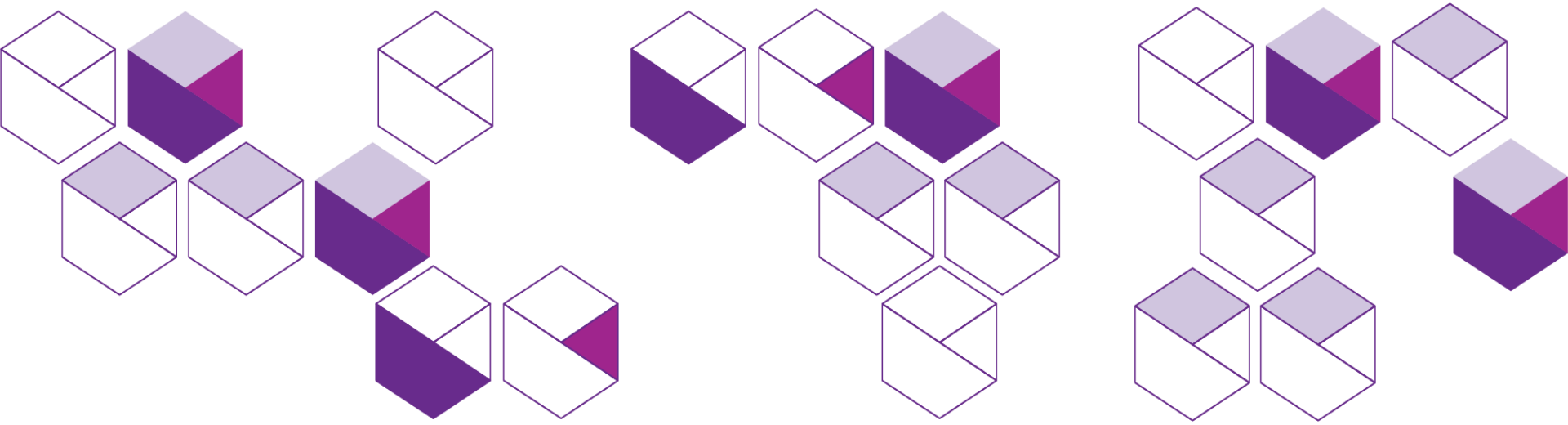
Government of Western Australia
South Metropolitan Health Service

Virtual Immunology Clinics (VIC) and VIC for General Practice (VIC-GP) – are there any Problems we can't Manage Together?

Rural Health WA / WACHS Conference 17th March 2024

Dr Dominic Mallon, Clinical Immunologist
Fiona Stanley Hospital



Happy St Patrick's Day!

Scotland is a beautiful place…..

….. When you can see it!

We have a world class health system…..

- ……when you can access it!

Tija's headaches a distant memory thanks to Virtual Immunology Clinic

November 5, 2021

Left to right: Asta and Tija Kins with Head of Service Immunology, Dr Dominic Mallon

A dusty house is not a problem for most, but for 14-year-old Tija Kins who is allergic to house dust mites, the allergy was causing debilitating headaches that were interrupting her sleep, schooling and daily life.

Turning to immunotherapy, Tija's quality of life quickly improved thanks to an innovative Virtual Immunology Clinic which opened at Fiona Stanley Hospital (FSH) last year.

Led by FSH Immunology Head of Service Dr Dominic Mallon and supported by the South Metropolitan Health Service (SMHS) Innovation Team (external site), the service

Summary – Tija's Case

Care delayed is care denied

Care rejected is care denied

Urgency does not equate to importance

Virtual care can be as clinically effective as care delivered in person

Themes

WA has a world class Health System….for those who can access it

Care delayed is care denied

Don’t make (clinical) perfection the enemy of the good

Agenda – Part I (0900-0945)

VIC

The Problem

The Drivers of the Problem

The Strategy

Revised Workflows

Achievements

Barriers overcome

VIC-GP

Pilot

Expansion

Feedback

Issues

Illustrative Cases we Can Manage Together

Community of Practice Education

Agenda – Part II (0950 – 1030)

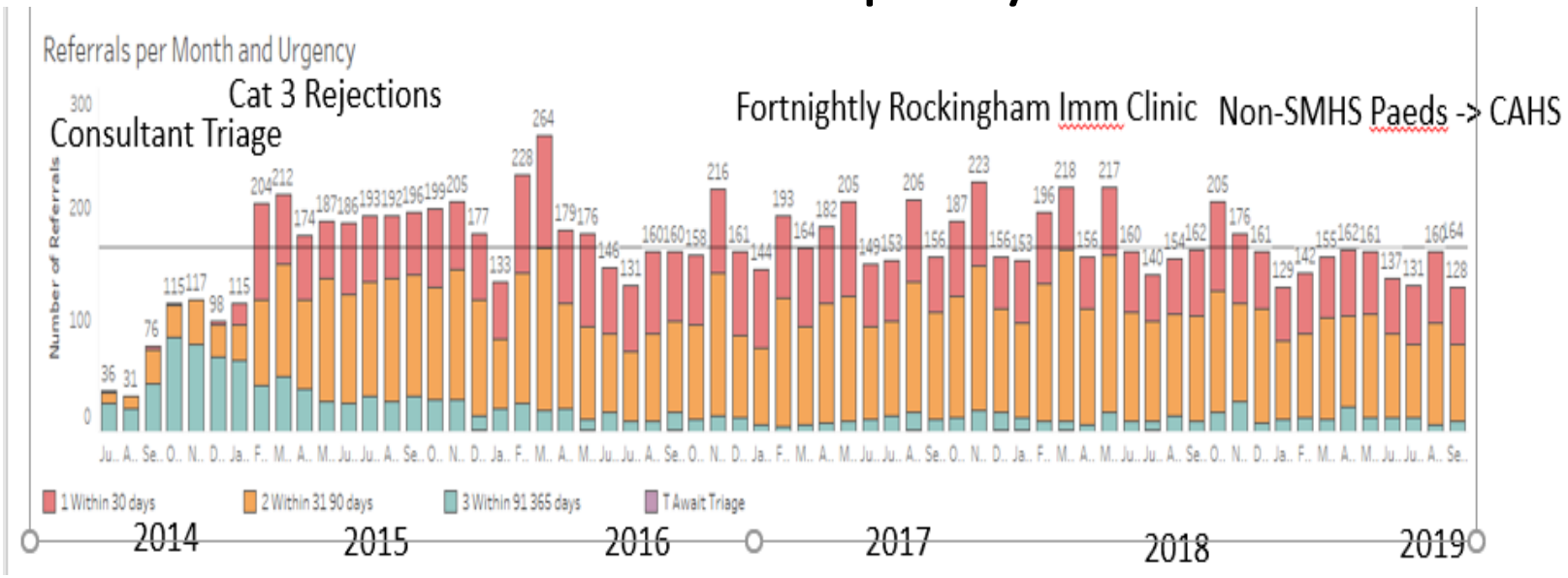
How to Register, log in and refer to VIC-GP

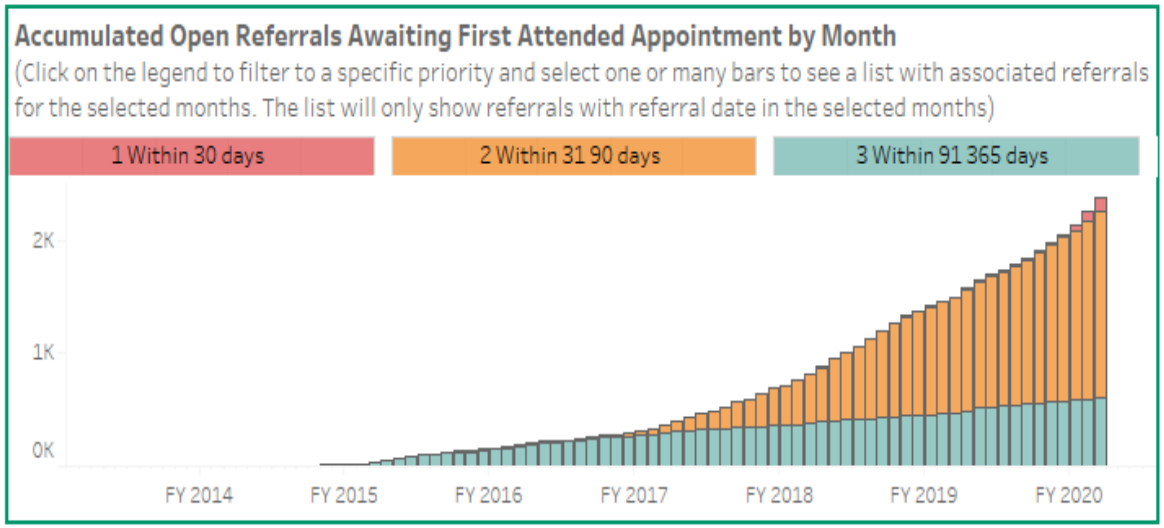
Open Discussion – applicability of this shared model of care to the WA Rural Health Context

(Education Topics

- Use of the Diagnostic Laboratory to investigate allergic symptoms
- Cows Milk Protein Allergy)

The Problem – Mismatch in Capacity versus Demand



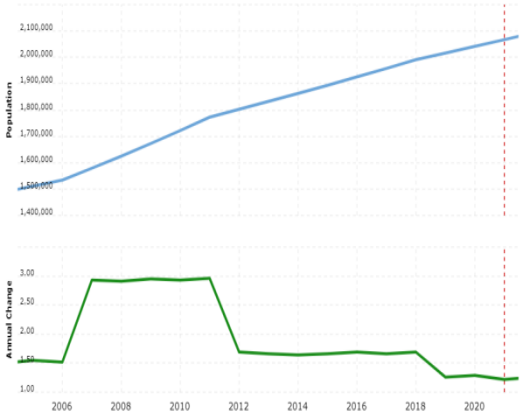


Common Referrals to Immunology

- Category 1 – anaphylaxis requiring adrenaline, autoimmune disease with organ dysfunction, new HIV, immunodeficiency with active, refractory infections, drug allergy requiring desensitisation for active condition
- **Category 2 – severe eczema, active autoimmune disease on steroids without organ dysfunction; chronic or recurrent sinopulmonary infections (? immunodeficiency); chronic urticaria on steroids, drug allergy, food allergy without anaphylaxis**
- Category 3 – allergic rhinitis, chronic sinusitis, mild – moderate eczema, mild-moderate allergic asthma, organ based autoimmune disease, chronic fatigue, ?drug allergy in otherwise well person

The Drivers

WA's Population Growth



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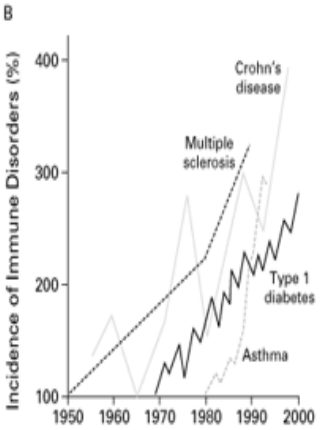

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"Immunology is difficult……."

The Strategy

Foundational anecdote

Late - 2018 Dr Southgate telephones DM regarding a patient with spontaneous urticaria…saves 9 months wait

"This is the way the system should work – integrated, seamless, efficient…"

Immunology FSH 2019 Strategic Statement

"Provide all patients referred to our service with timely access to the care they need, regardless of where they are"

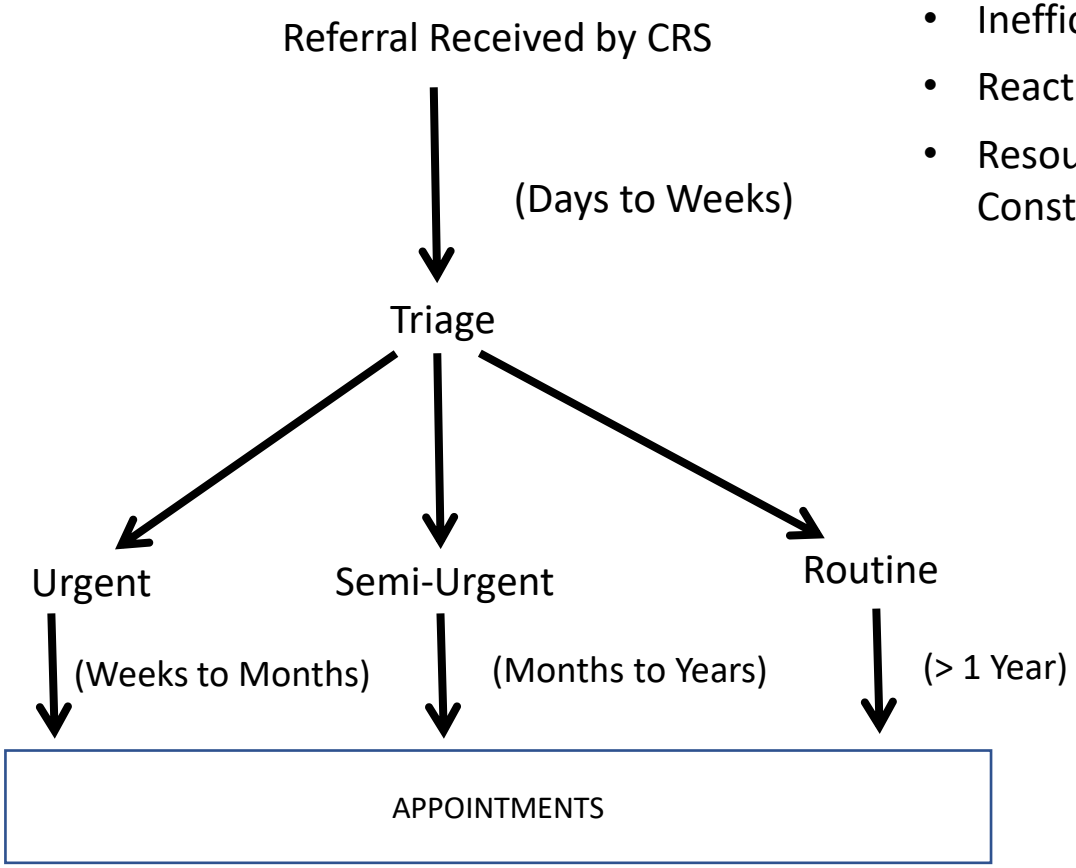
Strategy Becomes the VIC

SMHS 2019 Innovation Pitch

2019 FSGHG Briefing Note submitted to FSFHG Executive Director

0.5 FTE Consultant (Stevenson) appointed January 2020 to assist DM to work with the SMHS Innovation Team (Goodred and Matthews) implement the VIC

WA Health Referral Mx Process



- Inefficient
- Reactive
- Resource Constrained

Virtual Immunology Clinic Process

E-Referral triaged to VIC Intake *criteria

Clerk registers pt on REDCap (auto-entry) appt allocated

SMS appt details

Scheduled 15min "Phone Intake" appointment with senior clinician; Consent, Initial advice
* Email obtained

DISCHARGE with plan / advice

REDCap communication e.g. bloods, spirometry, symptom scores, telehealth link

SMS appt + link

(Secure) Telehealth VIC review

DISCHARGE with plan / advice

Telehealth VIC review

GP-linked VIC telehealth review

F2F / nurse review e.g. SCIT / challenge

F2F clinician +/- nurse review e.g. skin testing

F2F follow-up e.g. challenge

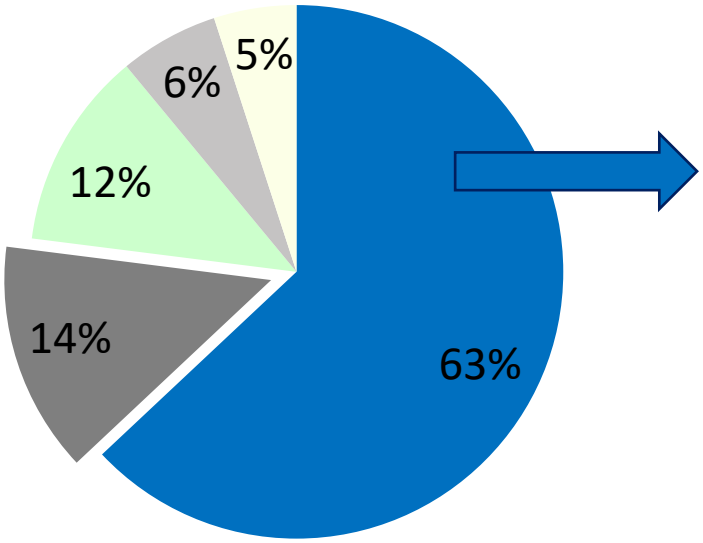
DISCHARGE with plan / advice

DISCHARGE with plan / advice

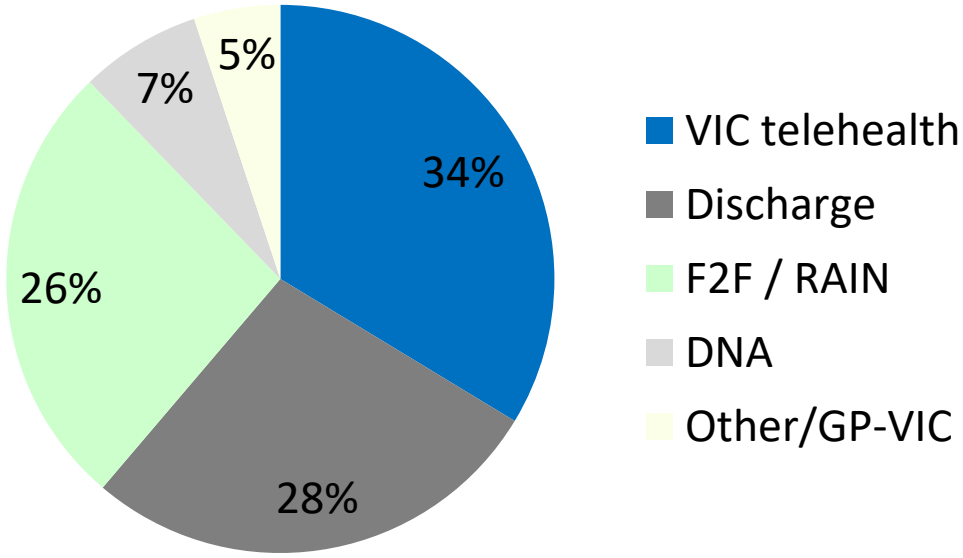
Referral	4-8 weeks	4-6 weeks to VIC review 4-12 weeks to F2F / SPT review	Timely follow-up if required

Clinic statistics (n=1,755)

Phone intake apt outcome

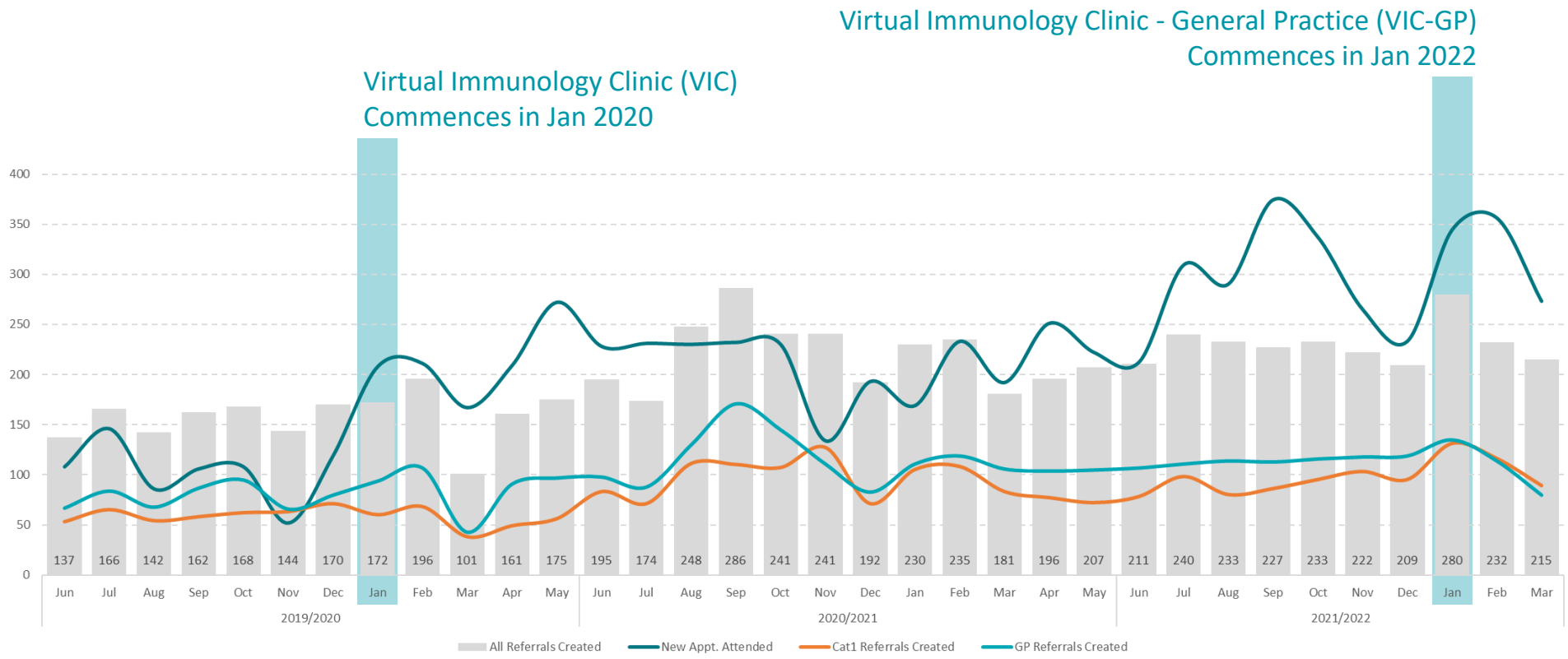


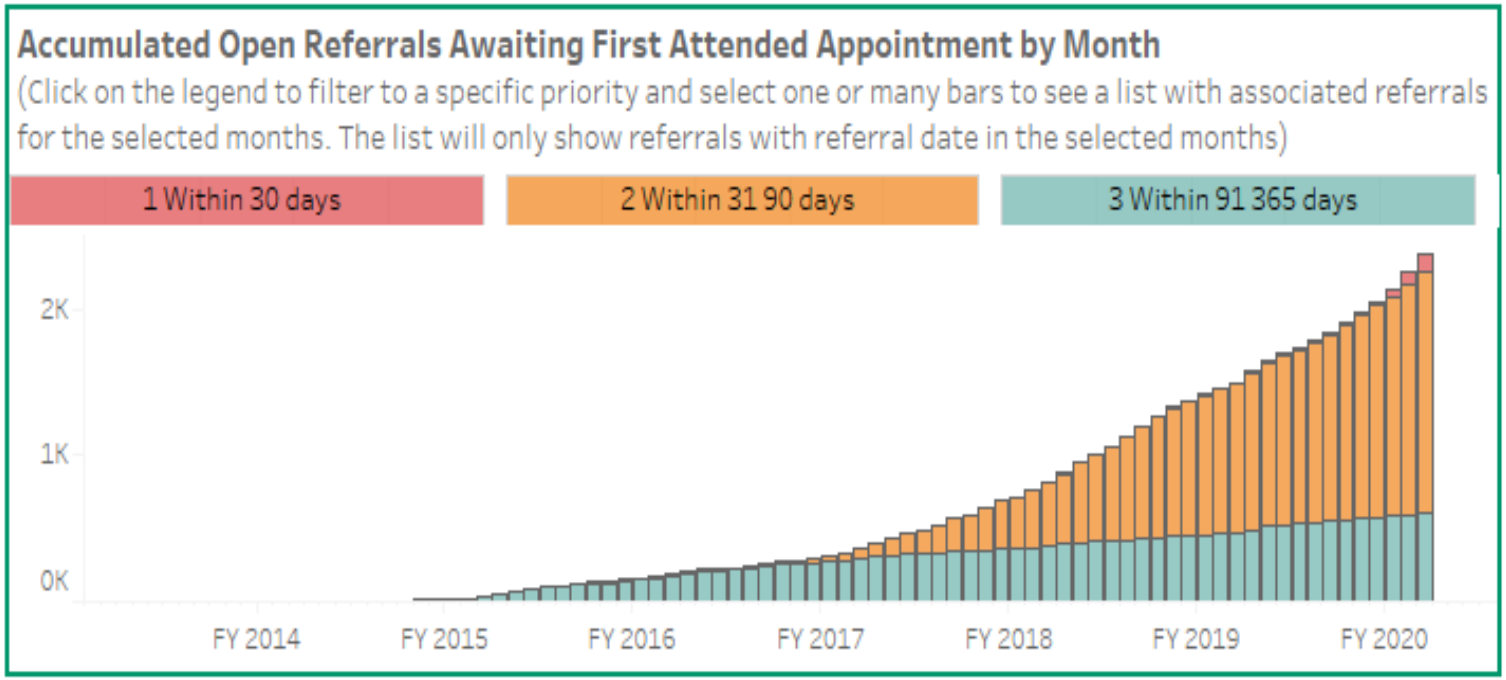
VIC Telehealth outcome

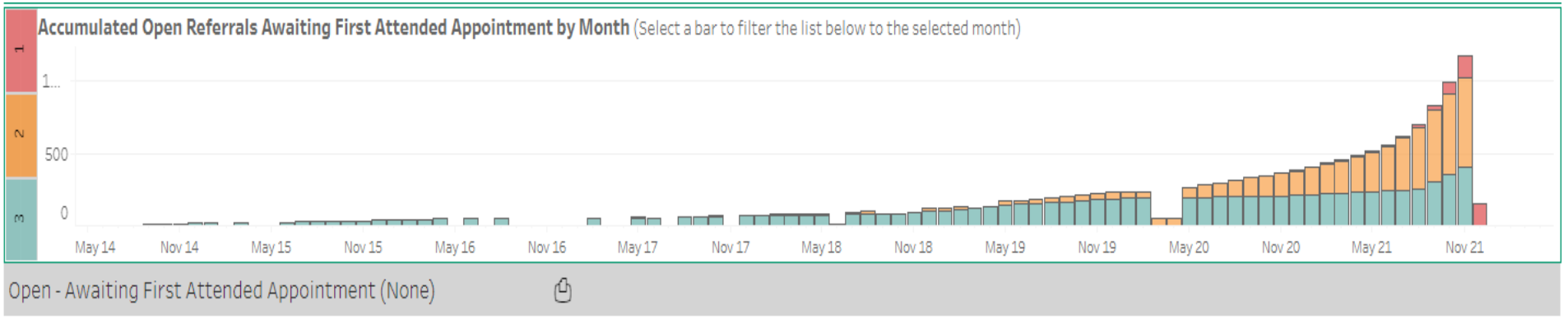


Ongoing VIC pts: 50% are allergic rhinitis pts who go onto receive SCIT

Substantial and Sustained Increase in New Appointments Seen Following Introduction of VIC







Open - Awaiting First Attended Appointment (None)

VIC Achievements - Summary

Improved access to patient care and service efficiency

- Greater patient participation in own care
- Integration into BAU clinical immunology service – 3 consultants, one advanced trainee, one nurse
- Information rich first telehealth appt (referral, health survey, investigations; patient education) => higher value appts, management plan developed sooner
- 40% reduction in DNA rates compared to BAU
- Earlier discharge and 25% increase in New:FU ratio
- Paediatric WL reduced from >1,000 pts waiting a median of 4.5yrs; to now 194 pts - almost meeting our access targets for paediatric cases

Barriers overcome

- **Hardware:** Phone, Desktop PCs, Production quality issues
- **Software:** complex suite of un-/partially integrated programs (REDCap, BossNet, eReferrals, iCM, MS Teams, IMPAX)
- **Immunology staff engagement and education**
- **Patient Engagement and Education**
- **Administration Staff – Passive Resistance:** VIC's patient management processes represented significant variance from 'standard process'
- **Policy barrier** – eg Electronic communication with patients
- **No 'clinical workflow' system** – Configured REDCap to enable revised workflows

Observations from VIC

- Level of GP understanding and ability to manage commonly referred immunological conditions is variable
- Small improvements in understanding will reduce need for referral, to the benefit of the patient and the system
- GP linked follow up appointments through the VIC educationally valuable but logistically difficult and do not fit well with the current patient focused workflow

2021 Innovation Pitch Real Time consultation to empower and provide in context education to the GP

- Adapt Emergency Telehealth Service (ETS) concept for Immunology outpatient referrals
  - Implement User friendly Telehealth program in GP offices – “VIC-GP”
  - Provide access in real time to an immunology specialist available 0900-1700

VIRTUAL IMMUNOLOGY CLINIC – GENERAL PRACTICE WORKFLOW – "REAL TIME"

AVAILABLE
MS Teams consultation *concurrent* with GP and patient

DISCHARGE with plan / advice

Telehealth VIC review

GP-linked VIC telehealth review

F2F clinician +/- nurse review e.g. clinical examination, skin testing, SCIT

Message received by Immunologist

UNAVAILABLE

– Referral Mxed according to current VIC workflows

Referral	1-2 Minutes	20-40 Minutes	Timely follow-up if required

VIRTUAL IMMUNOLOGY CLINIC – GENERAL PRACTICE WORKFLOW – "SCHEDULED"

AVAILABLE AT REQUESTED TIME
MS Teams consultation *concurrent* with GP and patient scheduled

Appointment Request received by Immunologist

UNAVAILABLE AT REQUESTED TIME

DISCHARGE with plan / advice

Telehealth VIC review

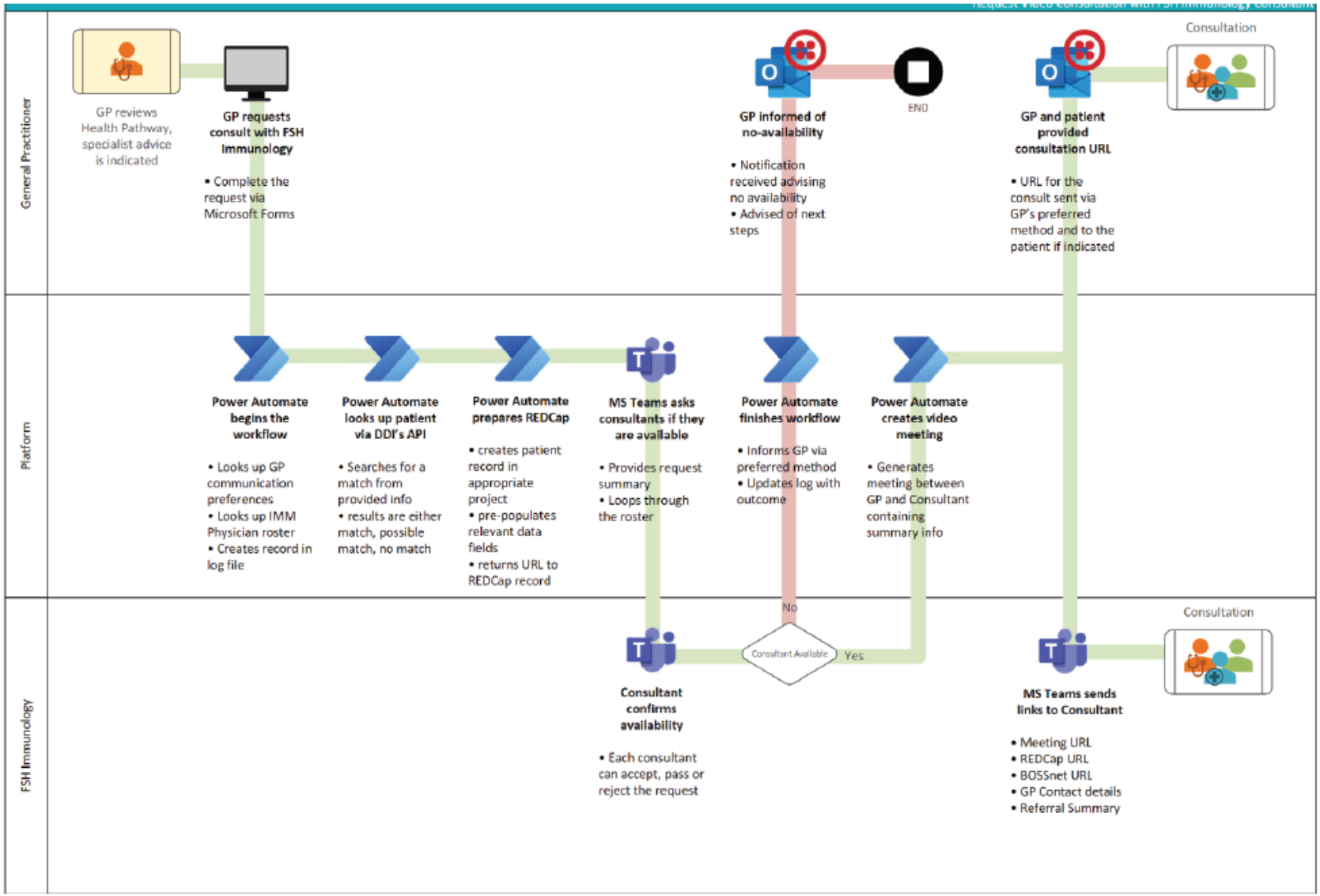
GP-linked VIC telehealth review

F2F clinician +/- nurse review e.g. clinical examination, skin testing, SCIT

– Referring Doctor advised and given option to re-refer or to have Referral Mxed according to current VIC workflows

Referral	1-2 Minutes	20-40 Minutes	Timely follow-up if required

The digital workflow automations that enable the VIC-GP model



VIC-GP Outcomes – Pilot Phase: January 2022 – June 2023

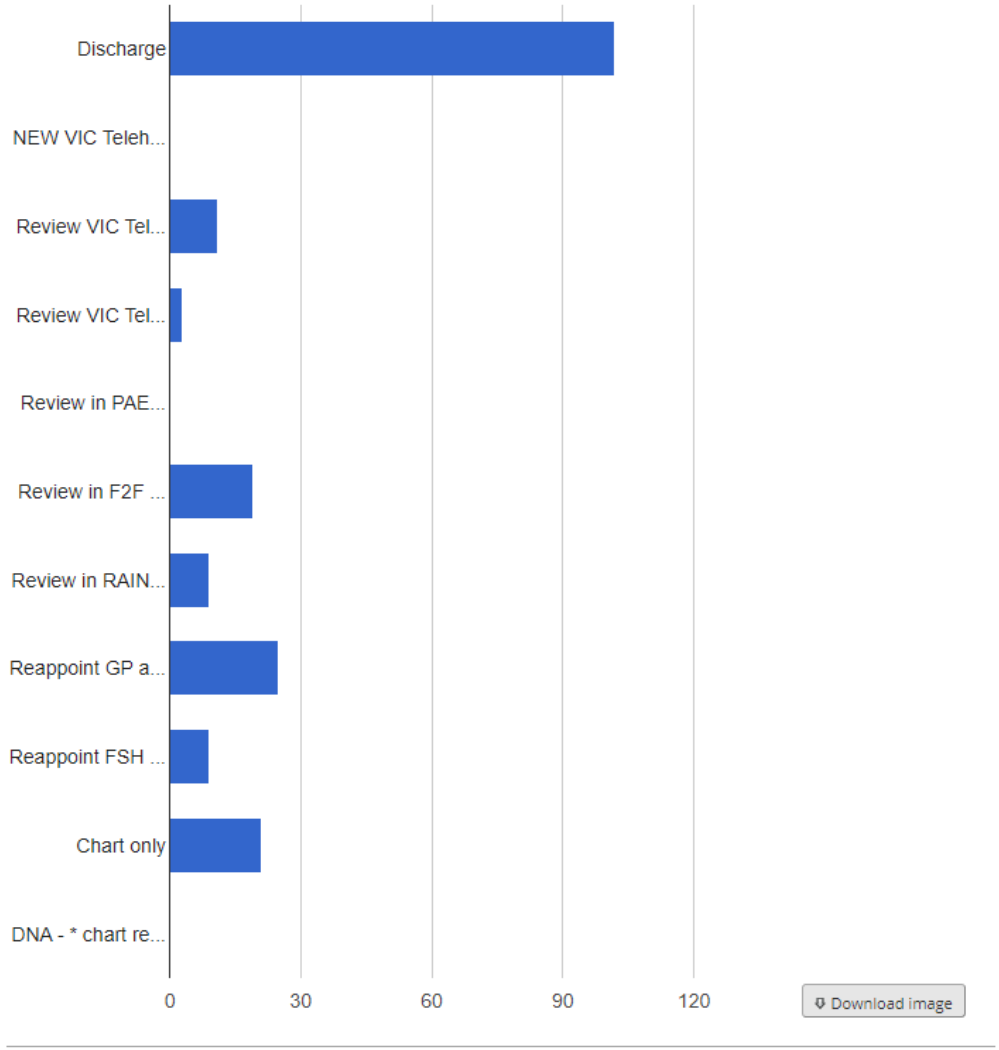
- Established automated workflows
- Established administrative processes
- 65 GPs registered from 13 practices
    - 25 successfully referred at least one patient
    - 3 practitioners have referred >10 patients
- >240 new patient referrals >
    - 55% discharged after first consultation
    - 12% reviewed via Telehealth with GP
    - 20% seen F2F at FSH
        - 10% reviewed F2F – VIC-GP clinician
        - 5% Nursing procedure
        - 5% on-referred to other Immunology Clinics
    - 11% chart review / results follow up
    - 0 DNA
    - Time from referral to being assessed - minutes

Conditions referred

- COVID vaccine advice
- Acute and chronic urticaria
- Allergic rhinitis
- Food allergies
- Eczema
- Angioedema
- Antibiotic allergy
- Facial rash - ? Lupus
- SLE
- ANCA+ vasculitis

VIC-GP First Appointment Outcomes (n=187)

Counts/frequency: Discharge (102, 54.5%), NEW VIC Telehealth at home (30 minute time slot) (0, 0.0%), Review VIC Telehealth at home (15 minute time slot) (11, 5.9%), Review VIC Telephone at home (15 minute time slot) (3, 1.6%), Review in PAED VIC clinic (0, 0.0%), Review in F2F VIC (same clinician's stream) (19, 10.2%), Review in RAIN nursing clinic (9, 4.8%), Reappoint GP and VIC - * chart review in 3 months (automatically triggers telehealth link to patient) (25, 13.4%), Reappoint FSH Immunology Other clinic (e.g. CON1,2,3) (9, 4.8%), Chart only (21, 11.2%), DNA - * chart review in 6 weeks (0, 0.0%)

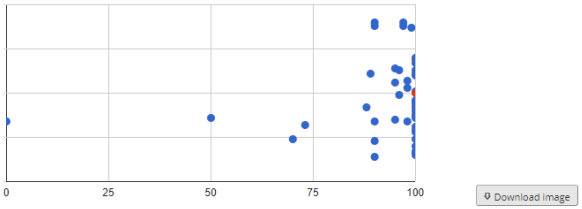


Patient Feedback (n=46)

What is your overall level of satisfaction with the VIC-GP process? *(gpl_2_v2)* Refresh Plot

Total Count (N)	Missing*	Unique	Min	Max	Mean	StDev	Sum	Percentile						
								0.05	0.10	0.25	0.50 Median	0.75	0.90	0.95
46	214 (82.3%)	13	0	100	93.13	16.91	4,284	70.75	88.50	95	100	100	100	100

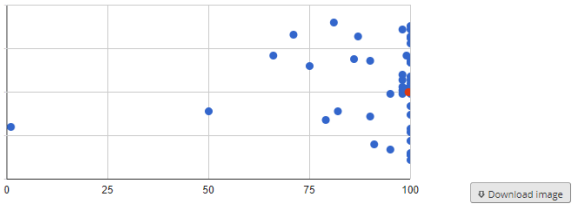
Lowest values: 0, 50, 70, 73, 88
Highest values: 100, 100, 100, 100, 100



How well did the VIC-GP process address the problem you attended your doctor for? *(gpl_4_v2)*
Refresh Plot

Total Count (N)	Missing*	Unique	Min	Max	Mean	StDev	Sum	Percentile						
								0.05	0.10	0.25	0.50 Median	0.75	0.90	0.95
46	214 (82.3%)	16	1	100	91.85	17.46	4,225	67.25	77	90.25	99.50	100	100	100

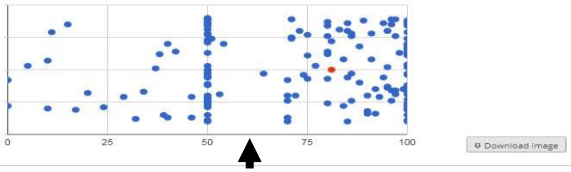
Lowest values: 1, 50, 66, 71, 75
Highest values: 100, 100, 100, 100, 100



Overall, with regards to this appointment, how satisfied were you with how soon and how well your condition was managed? *(q8)* Refresh Plot

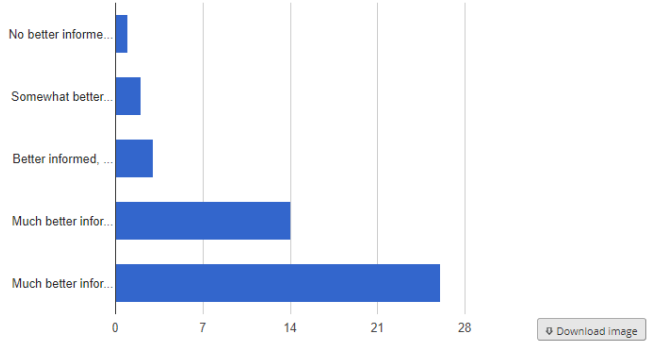
Total Count (N)	Missing*	Unique	Min	Max	Mean	StDev	Sum	Percentile						
								0.05	0.10	0.25	0.50 Median	0.75	0.90	0.95
163	378 (69.9%)	48	0	100	73.27	26.82	11,943	20.40	40	50	81	100	100	100

Lowest values: 0, 0, 5, 10, 10
Highest values: 100, 100, 100, 100, 100



(Comparison – VIC Phase I Feedback)

How much better informed…?

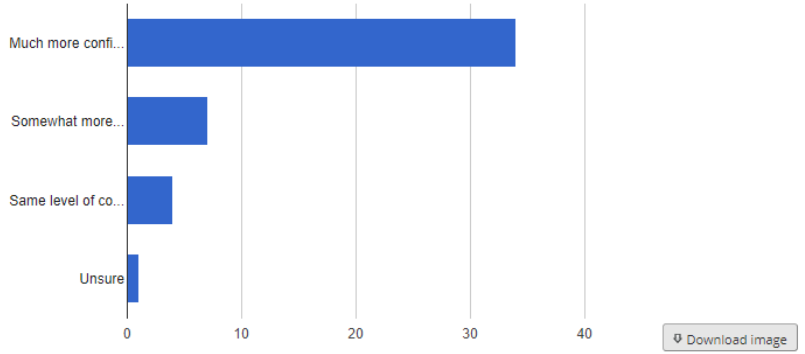


Patient Feedback (n=46)

After the VIC-GP process, how confident are you that you can now manage your immunological problem with your GP? *(gpl_6_v2)* Refresh Plot | View as Bar Chart

Total Count (N)	Missing*	Unique
46	214 (82.3%)	4

Counts/frequency: Much more confident I can manage it (34, 73.9%), Somewhat more confident that I can manage it (7, 15.2%), Same level of confidence as I had before the VIC-GP process (4, 8.7%), Unsure (1, 2.2%)



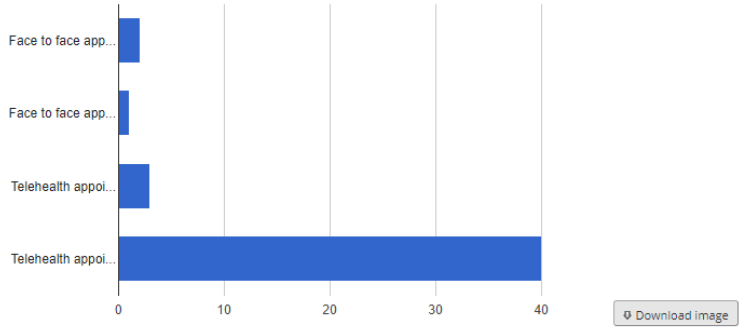
Having been through the VIC-GP process for your condition, what would be your preferred way to receive Specialist Immunologist advice for your condition? *(gpl_7_v2)* Refresh Plot | View as Bar Chart

Total Count (N)	Missing*	Unique
46	214 (82.3%)	4

Counts/frequency: Face to face appointment with the Specialist in Private Practice (2, 4.3%), Face to face appointment with the Specialist or Registrar at the Hospital (1, 2.2%), Telehealth appointment with the specialist via the Hospital on my own (3, 6.5%), Telehealth appointment with the specialist with my GP present (VIC-GP) (40, 87.0%)

-GP

+GP



Patient Feedback - Qualitative

- "Thanks for making specialist advice more accessible. Perhaps provide some information to frequently asked questions for the particular immunological problem via link or email."

"Very happy with the first round of talks , questions and answers, I feel that they have advised me of the best steps to take for the next of discussions."

"**…. I really like having my GP and Specialist in the same room- as the GP knows the doctor speak and some of the things I forget, but i know the details on the day to day. Also, as the GP helps with ongoing care I think it's very useful for them to be involved**. …"

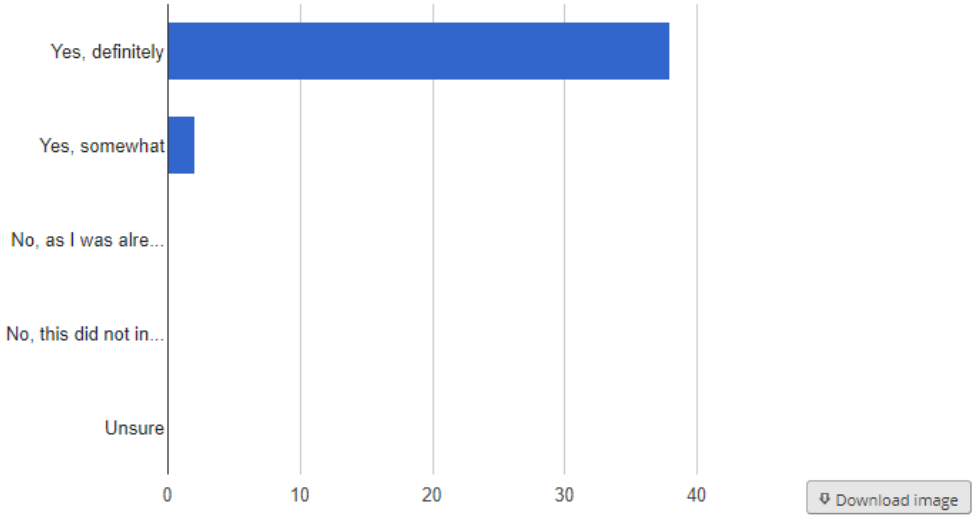
"**As a health professional myself, I found the overall experience great**. The chance to have a more cohesive interdisciplinary approach far more beneficial. This approach will see I believe a decrease in wait times and significant gaps in receiving care via multiple specialists."

GP Feedback (n=40)

Did the VIC-GP assessment increase your ability to provide optimal primary care for this and future patients with similar Immunological issues? *(gpvic_drsurvey_4)* Refresh Plot | View as Bar Chart

Total Count (N)	Missing*	Unique
40	265 (86.9%)	2

Counts/frequency: Yes, definitely (38, 95.0%), Yes, somewhat (2, 5.0%), No, as I was already confident in managing this issue (0, 0.0%), No, this did not increase my understanding of this issue (0, 0.0%), Unsure (0, 0.0%)



GP Feedback

"**……..**really appreciate this 3 way consult for my own learning and timely patient care"

"Really thorough, easy to connect with (Immunologist), such a relief to get the pt seen so quickly."

"Seamless and easy to initiate in a timely and convenient manner for patient and clinician. An incredibly useful tool, particularly in terms of telehealth involving the patient and GP from home/clinic."

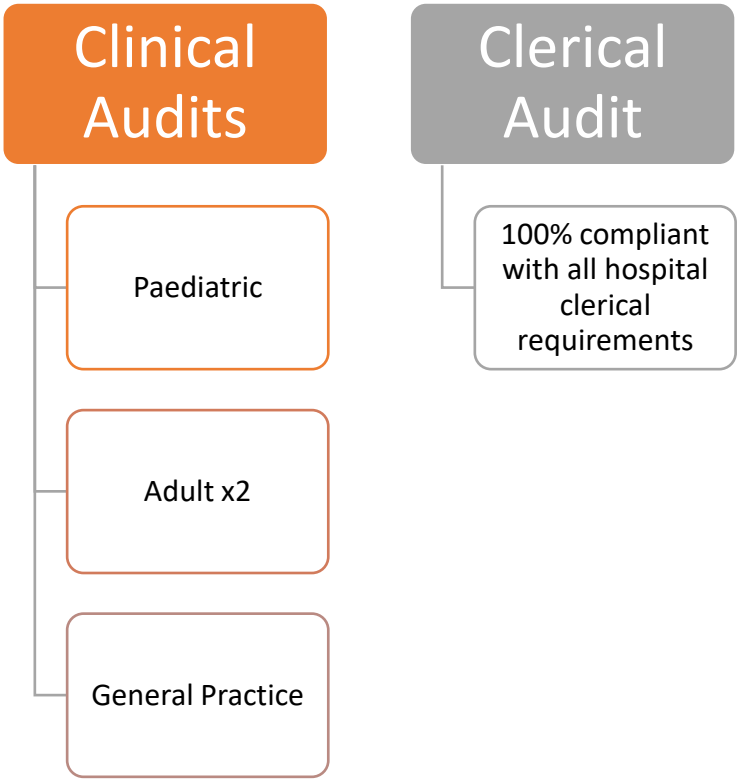
"Went well, positive for patient and myself. **…….** I imagine there will be very high demand around the state for this eventually. ….."

"It was really good learning experience for myself, and convenient for the patient**…….."**

"Excellent pilot consult. ….."

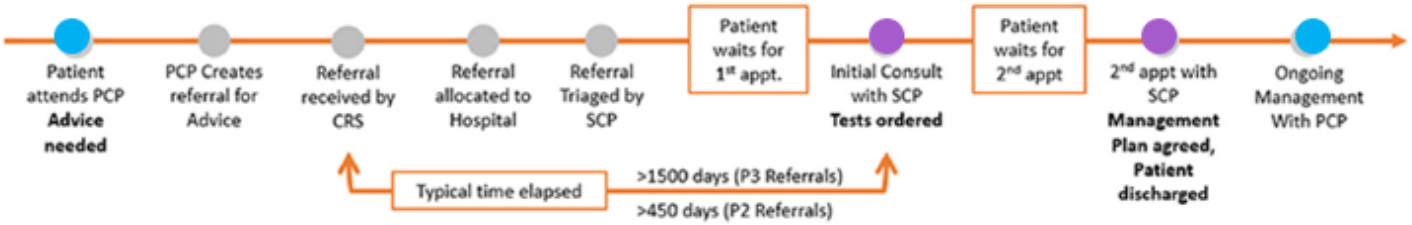
"Very well run!"

Quality Assurance (n=53)

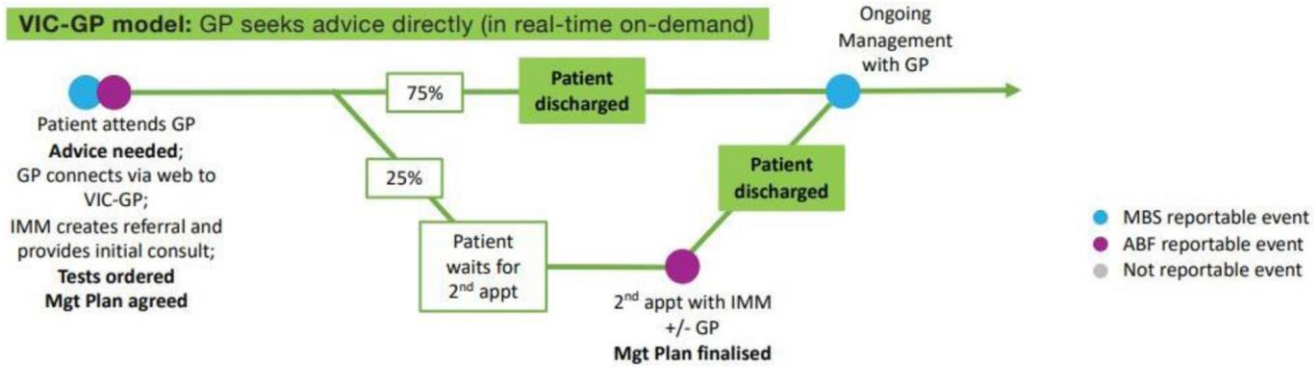


VIC-GP model is more integrated and efficient than BAU

BAU



VIC-GP



GP Education Model

Community of Practice

- Via MS Teams
- Using referred patients as material from which to teach
- Incorporating subject matter experts from within the Dept

Three tutorials held this far

- Cows Milk Protein Allergy (with Michael O'Sullivan)
- Penicillin Allergy (with Jack Bourke)
- Use of the Immunology Laboratory in the Investigation of Allergic Symptoms

VIC-GP Pilot - Summary

Successful engagement with 13/13 General Practices

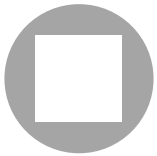
Efficient reliable workflows

High rates of GP and Patient satisfaction

GP involvement valued by patient and specialist

Achieving educational objectives

Clinically effective



Progress Following the Pilot

- 127 Practitioners from 48 Practices
  - Include one Nurse Practitioner and 2 General Physicians
- > 500 new case referrals
- Transitioning to “business as usual”
  - Funding under ABF is being clarified
  - Strategies to roll out beyond the pilot practices
  - Scalability and cybersecurity of MS Forms
  - Management of Demand
    - Referring Incoming referrals

- GP Education Model

Working together via VIC-GP can be better than in person attendance

- Timely Access
  - RT – 56yo chef from Manjimup with ANCA+ vasculitis ;
  - KT – 86yo retired farmer from Denmark with ANCA+ vasculitis
  - Many infants with initial presentation with food allergies (minimum wait in Private Practice 6 months)
  - multiple enquiries regarding COVID vaccine in the face of occupational risk / vaccination mandates
  - SL 52yo man from Esperance with Eosinophilic Oesophagitis
- Equitable Access
  - MM 52yo Afghani from Manjimup with refractory chronic spontaneous urticaria
    - Successful Rx with Omalizumab
  - TB – 62yo with severe, refractory atopic eczema – last seen SCGH early 2000s
    - Successful treatment with Dupilumab
- Evidence of learning
  - Paediatric Allergy
  - Penicillin delabelling

Summary - Virtual Immunology Clinics

- ✓ Revised work flows and used available technology to "Provide all patients referred to our service with timely access to the care they need, regardless of where they are"

VIC News…..

Re: I have cited a publication of yours... [EXTERNAL]

Rea, Corinna <Corinna.Rea@childrens.harvard.edu>
To Mallon, Dominic

Reply | Reply All | Forward
Wed 30/11/2022 11:27 PM

You replied to this message on 01/12/2022 3:03 AM.
If there are problems with how this message is displayed, click here to view it in a web browser.

CAUTION External Communication: This email originated from outside of the organisation. Do not click links or open attachments unless you recognise the sender and know the content is safe.

This is so interesting! I wanted to try a video consult model too, but never got it off the ground. I'm impressed you did it! And I will let Danny know

I have two first cousins in Perth—small world!

Corinna Rea, MD, MPH
Assistant Professor, Harvard Medical School
Director, General Academic Pediatric Fellowship
Boston Children's Hospital

Celebrating VIC-GP initiative breaking down barriers for health care to the regions

Feb 23
17

Chronic immunological conditions often require lifelong care coordination between hospitals and general practitioners (GPs), which can make accessing regular treatment challenging, particularly for regional patients.

In an Australian (and possibly world) first, the Virtual Immunology Clinic – GP (VIC-GP) provides all patients referred to the service with timely access to the care they need, regardless of where they live.

Led by Fiona Stanley Hospital (FSH) Immunology Head of Service Dr Dominic Mallon, with support from the Kaartdijin Innovation team, the service enables:

- GPs to easily directly refer their patients to the FSH immunology specialists
- FSH immunology specialists to discuss test results and provide appropriate management advice to patients via telehealth, in real time while the patient is attending their GP, with much of the management being able to be done at their local GP.

Recently, 7News Regional WA visited FSH to learn more about VIC-GP and how it is helping our regional patients.

Dominic, along with Manjimup restaurateur, Prithvi 'Raj' Thyagarajan and his GP Dr Lillian Daniels, spoke to 7News Regional WA to promote the initiative and the life-changing impact it has had for Raj since being diagnosed with a potentially life-threatening autoimmune disease.

Watch the report (external link) which ran on 7News Regional WA throughout the State.

Thank you Dominic for your massive contributions to patient outcomes of our community, both locally and regionally!

7 REGIONAL
Today

Went to Air 8th February 2023

Clinical Communications

Use of modern information communication technology to enable real-time consultation between primary and specialty care providers

Dominic Francis John Mallon, MB, BS, FRACP[a,b], Justin Callaghan[c], Chloe Goodred, BSc[d], Brittany Rose Stevenson, MB, BS, FRACP[a], and Jack Bourke, MB, BS, FRACP[a]

Clinical Implications

This novel model of care uses available technology to provide patients with immediate access to advice from a specialist care provider via their primary care provider, enabling improved coordination of care and more advanced skills through additional education and training within context for the primary care provider.

Journal of Allergy and Clinical Immunology In Practice 2023;11:966-7

ascia
australasian society of clinical immunology and allergy

Poster Prize

awarded to

Professor Dominic Mallon

Winner

South Metropolitan Health Service
Excellence
Awards
2022

Home > About SMHS > SMHS Excellence Awards >

Excellence in clinical care

Recognising team excellence in the delivery of safe, high quality clinical care

This award recognises excellence in the delivery of safe, high quality clinical care and service by a team.

Virtual immunology clinic – Fiona Stanley Fremantle Hospitals Group

Chronic immunological conditions often require lifelong care coordination between hospitals and general practitioners (GPs) which can be challenging due to service capacity, and can result in lengthy wait times for patients.

To help alleviate these pressures and improve the patient experience, the establishment of the Fiona Stanley Hospital (FSH) Immunology Service telehealth clinic doubled the service's capacity to deliver care more efficiently and closer to the patient's home. Access to care was improved for 4,000 patients who were able to receive treatment outside of hospital. The long-term adult and paediatric wait lists were eliminated, including expediting treatment for over 1,000 children who had been waiting for an appointment.

This model was subsequently extended to GPs to refer patients to an FSH clinical immunologist via videocall. It resulted in the team delivering timely, high quality, integrated patient care while building relationships and providing in-context education for participating GPs. Patients have reported high levels of satisfaction with the clinic's services.

Congratulations to our other 2022 finalists:

- Assessment liaison escalation response team – Fiona Stanley Fremantle Hospitals Group
- SABSI reduction and minimisation program – Fiona Stanley Fremantle Hospitals Group

You're a Finalist! - 2024 WA Rural Health Excellence Awards

Thanks....

SMHS Innovation and Outpatient Reform

- Justin Callaghan
- Chloe Goodred
- Tim Leen

Service 1 Executive

- Nyrene Jackson/ Paul Cannell
- Loletta Hii
- Cheng Chiou

TRANSFORM

- Sarala Matthews

SMHS Executive

- Paul Forden
- Neil Doverty
- Kate Gatti

FSH SHIMS

- Lisa Davey / Gemma Maschler

FSH Outpatients

- Karen Tasker

FSH Clerical Service

- Melody Moulang
- Jasmine Dwyer
- Previous VIC clerks 2020 - 21

FSH Immunology

- Brittany Stevenson
- Jack Bourke
- Luckshman Ganeshanandan
- Rebecca Cleaver + Immunology Nursing Team
- Meera Thalayasingam
- Clinical ATs
- Patty Martinez
- Ben McGettigan
- Michael O'Sullivan

WA Primary Healthcare Alliance

- Jody Niven

SMHS GP Liaison

- Monica Lacey

Microsoft Australia

- Charles Poulsen

Pilot General Practitioners

- Adele Austin – Parkwood MC
- Chieh Cheng – Next Practice
- Lillian Daniels – Manimup MC
- Chris Jensen – Dunsborough MC
- Humera Khanum - Westcare MC
- Priya Krishnan – Pramana Medical
- Linda Muntz – Ellen Health
- Olivia Pegram – East Fremantle MC
- Stephen Southgate – Booragoon MC
- Lyn Stoltze – Denmark MC
- Mike Walsh – Fremantle Family Doctors

Questions?

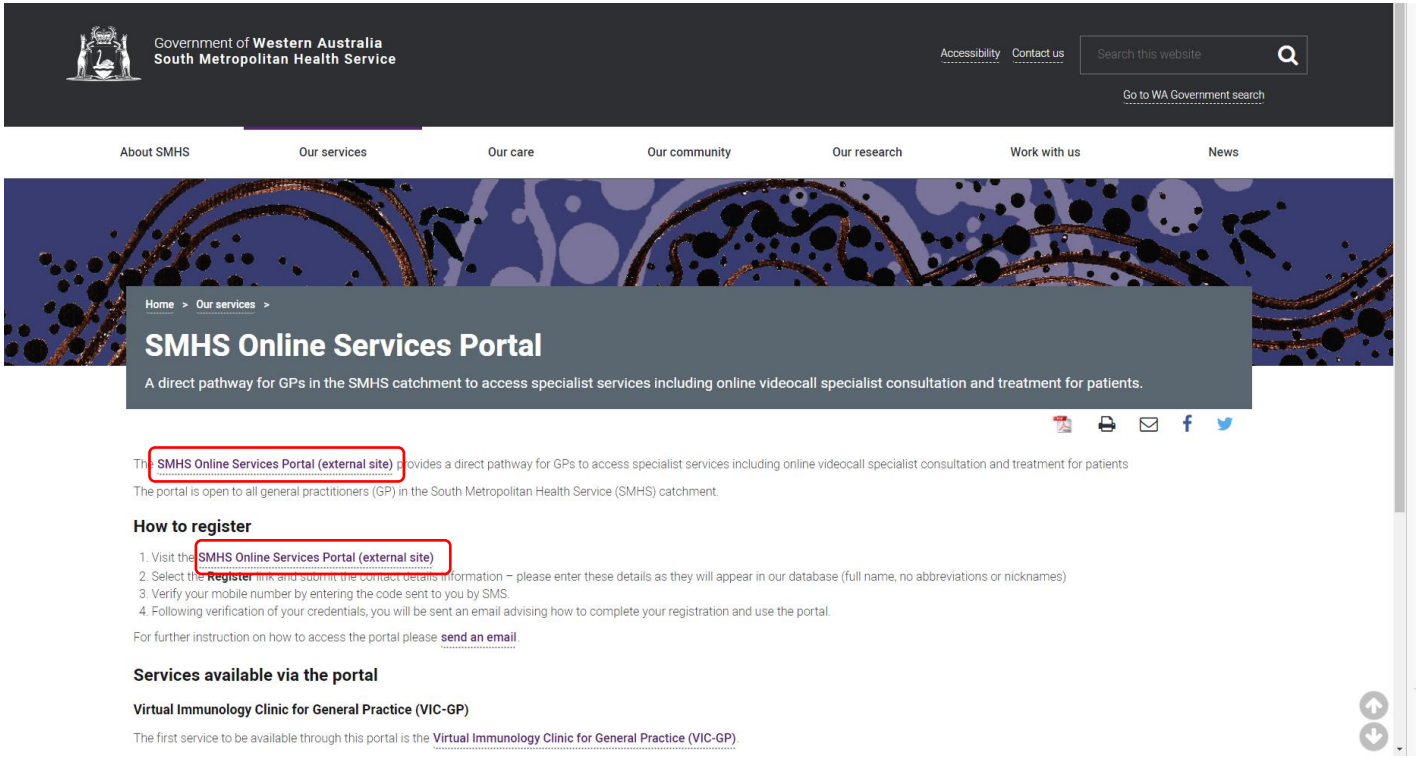
SMHS Online Services

Registration to Access Online Services

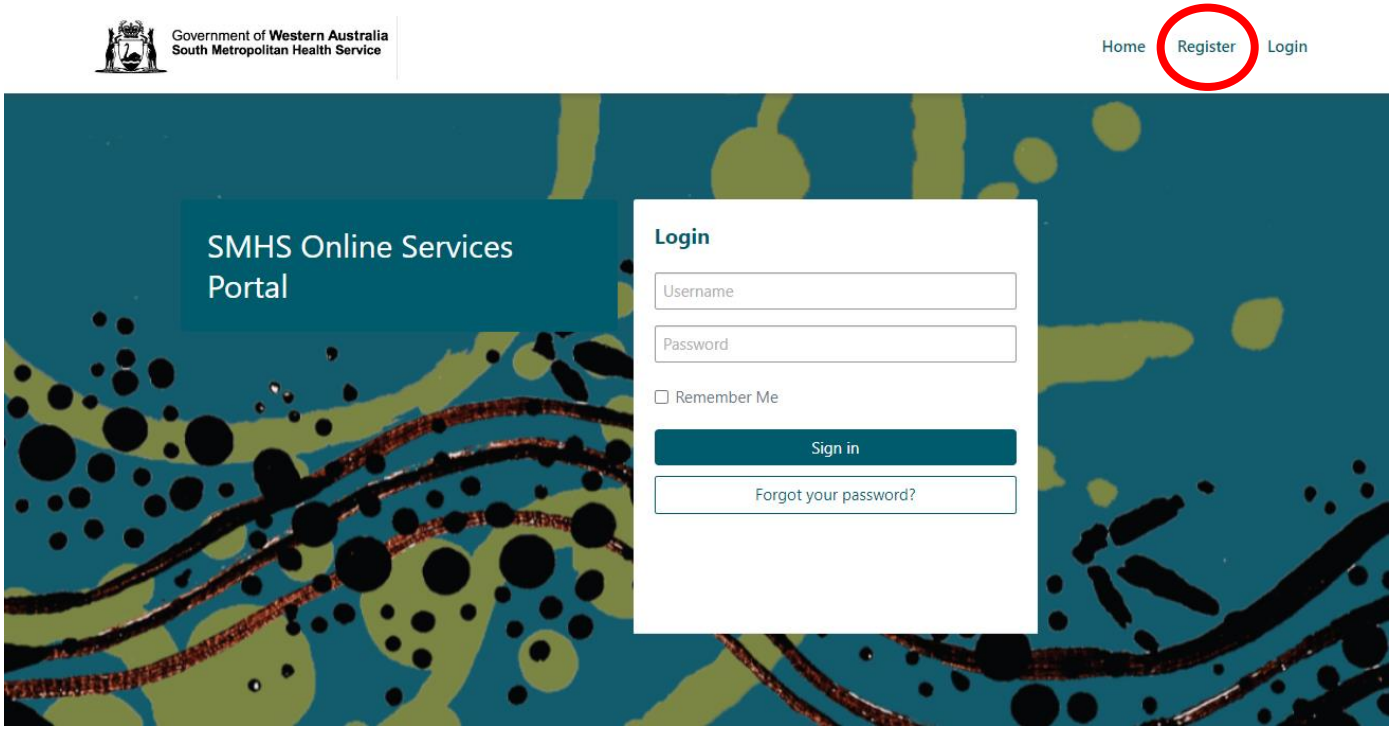
Welcome to the New SMHS Online Portal – Your Cybersecure way to Access SMHS services, including VIC-GP

- The Go-Live date of this new portal is **Monday 6th March, 2023**
- This new portal incorporates multifactor identification to provide greater cyber security and practitioner verification (eg at registration, your identity will be checked against our database of referring GPs).
- All practitioners wishing to access VIC-GP (including those registered during the pilot phase and those who tested the new portal) will need to Register via the new portal before you will be able to access the VIC-GP
- To get started, use this link: South Metropolitan Health Service - SMHS Online Services Portal in either Google Chrome or Microsoft Edge web browser. Save to Favourites

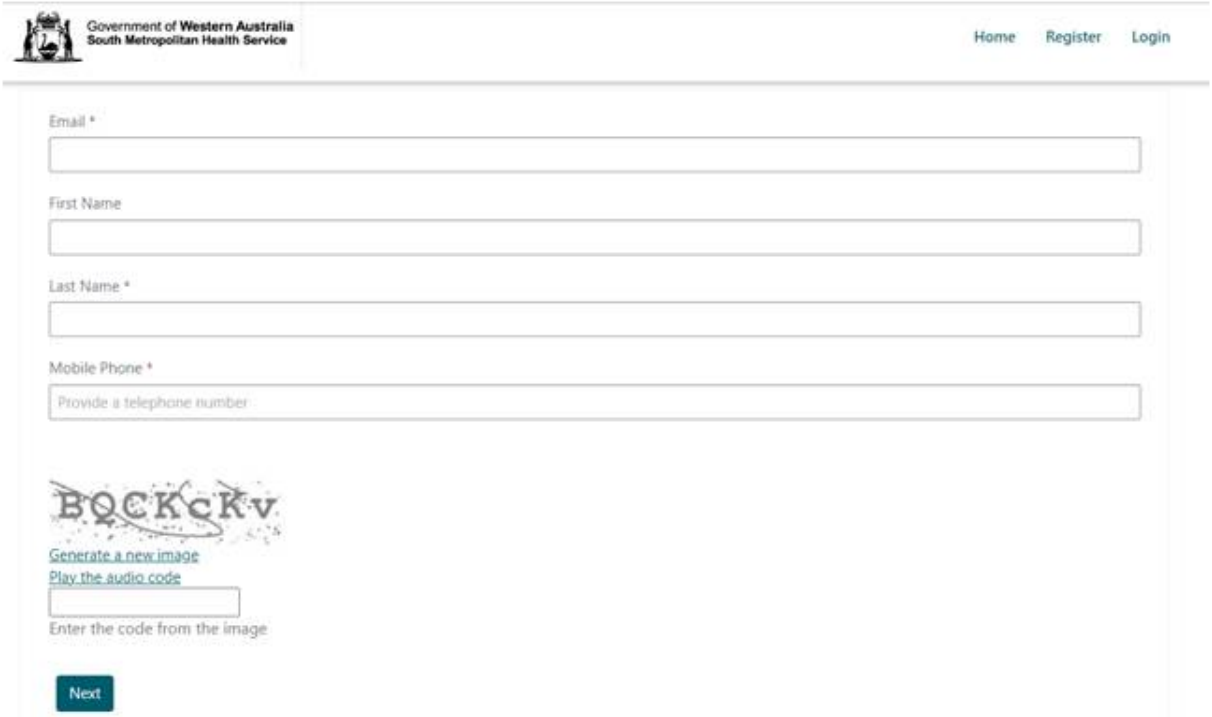
….then click on “SMHS Online Services Portal (external site)”



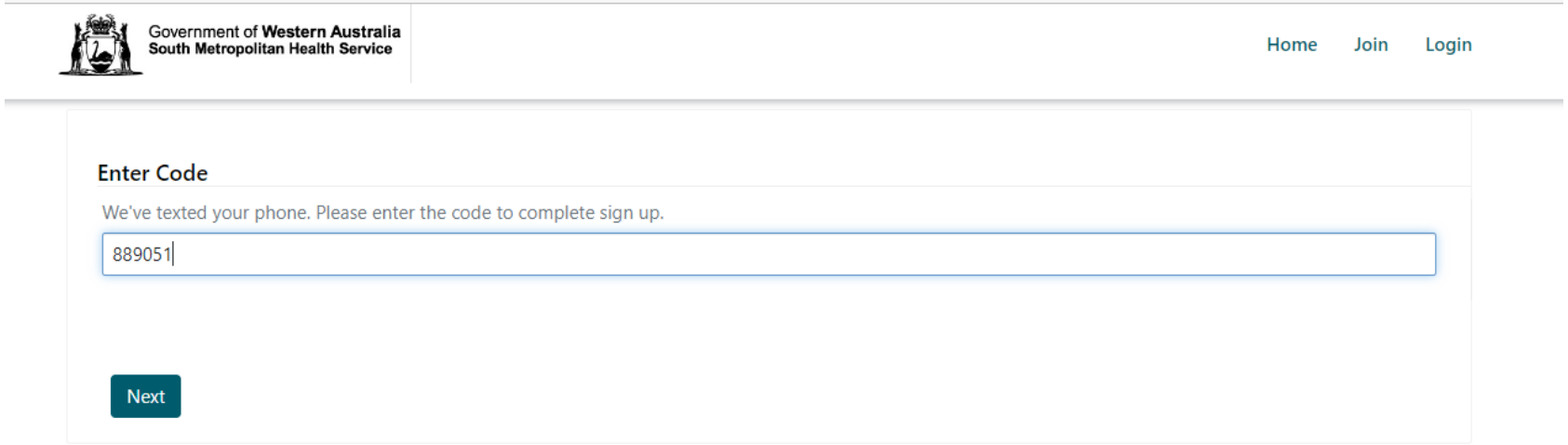
Click on “Register” to register the first time…..



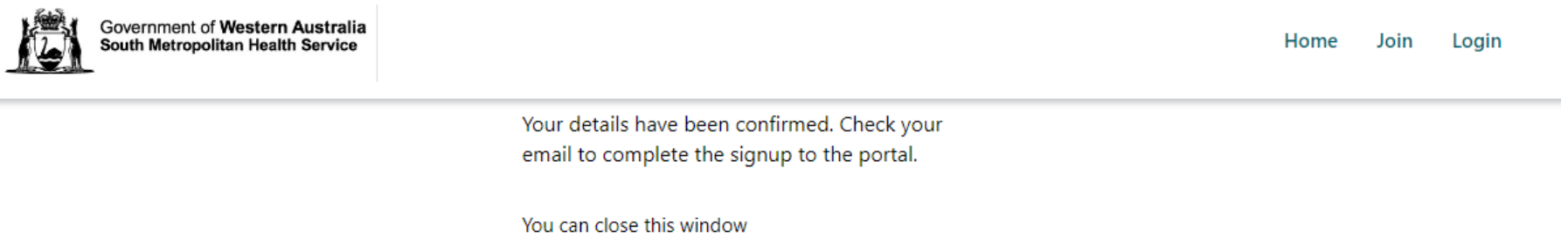
Enter details as they would appear in our database (eg full name, no abbreviations or nicknames)



Verify your mobile # by entering the code SMS'ed to you



Once verified, respond to the email to continue the registration…



…the next stage is a link to an invitation to register sent via email…

From: DoNotReply SMHS <DoNotReply_SMHS@wahealthdept.onmicrosoft.com>
Sent: Wednesday, February 22, 2023 4:55:22 PM
To: [redacted]
Subject: SMHS Online Services Portal Sign Up

Hi Sherril

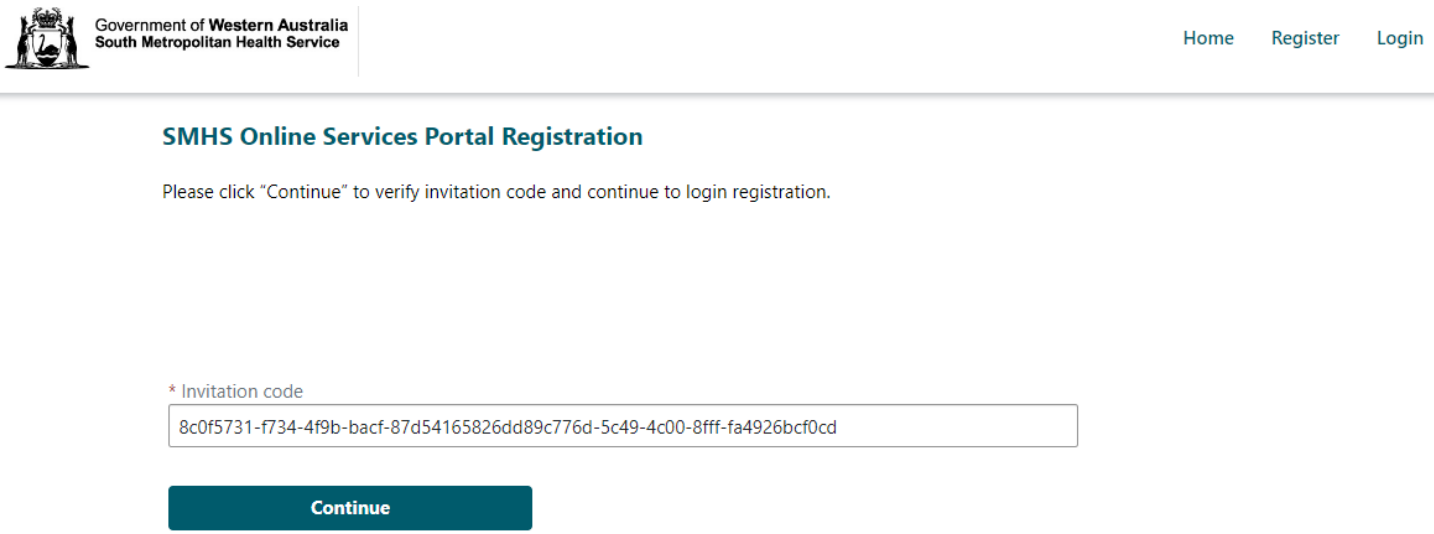
We received a request to create an Online Services Portal account with South Metropolitan Health Service using the email address.

To continue with the process, please click the link below or copy the URL into your browser.

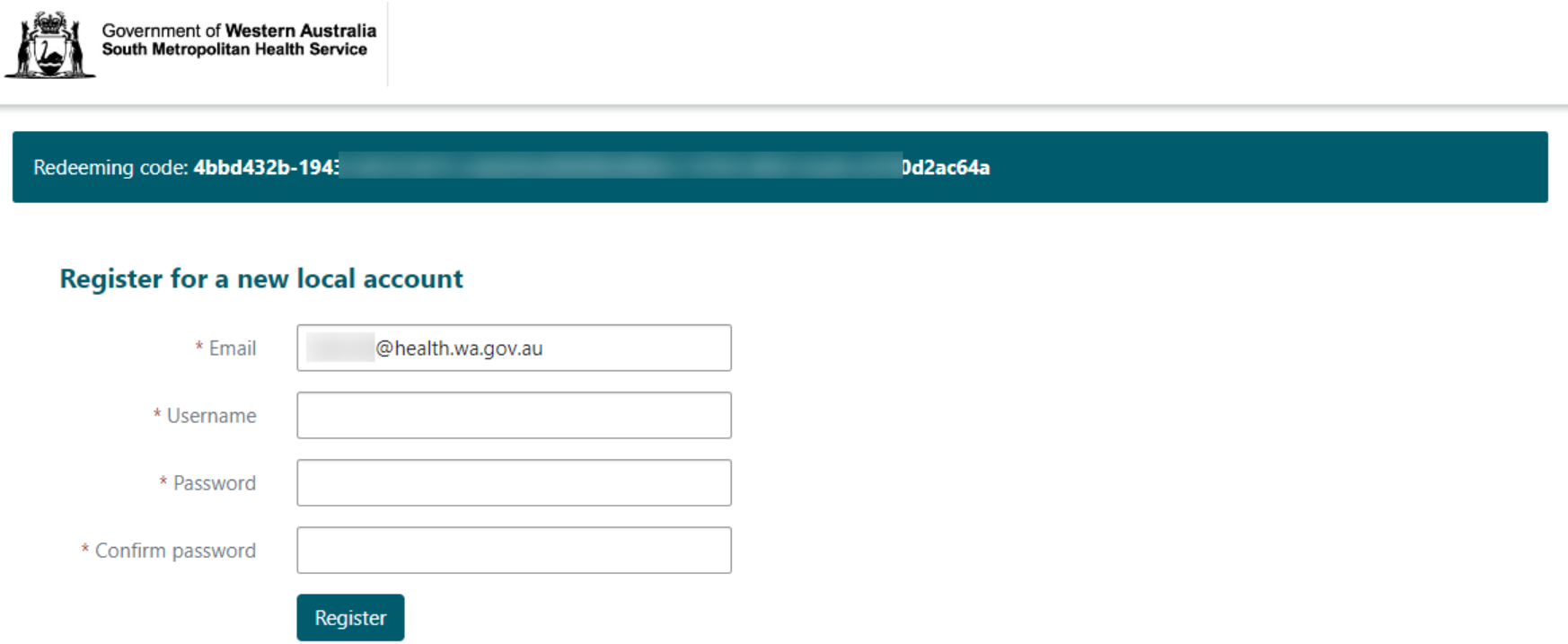
https://smhsonlineservices.powerappsportals.com/Register[redacted]

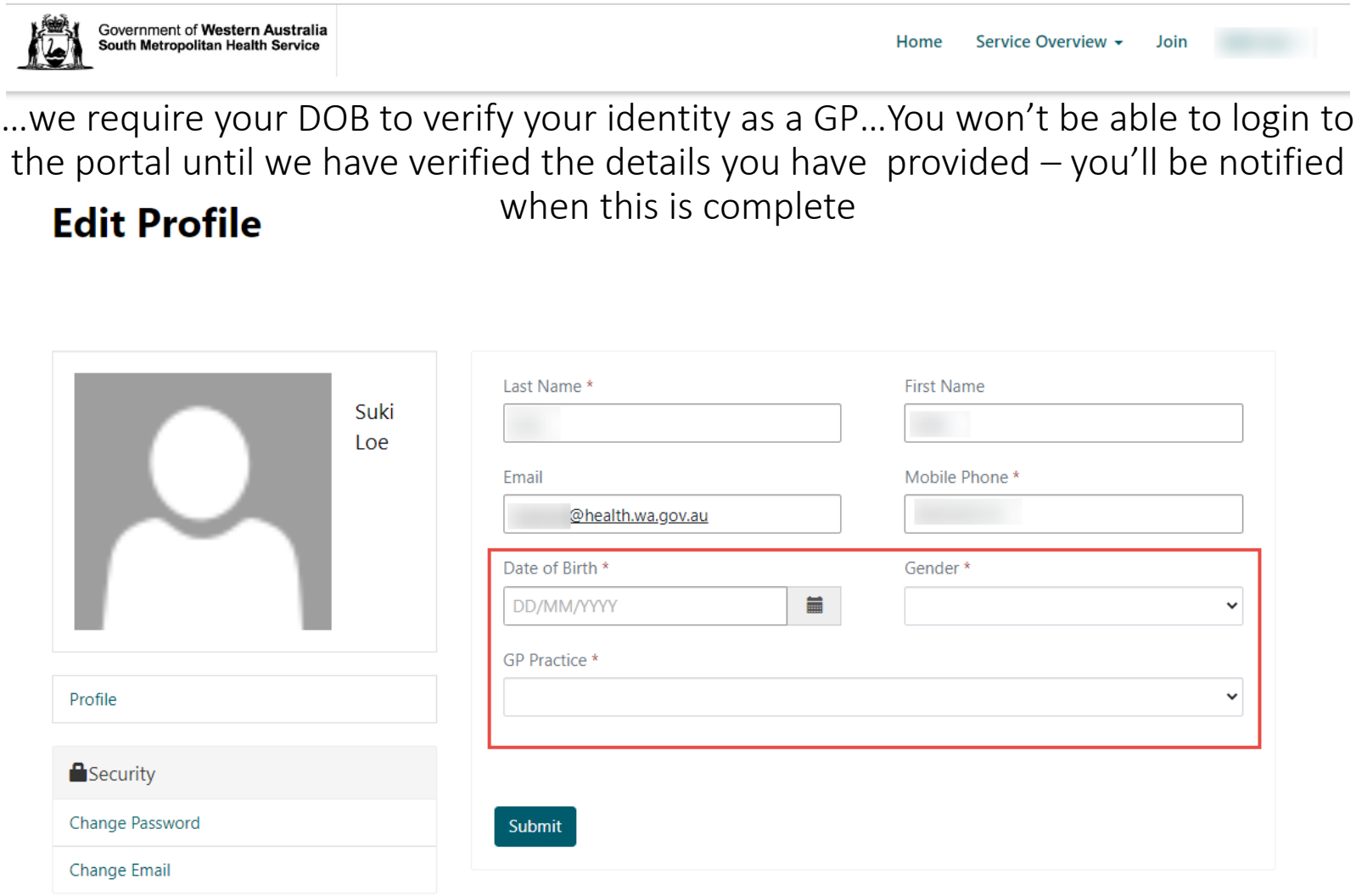
Complete registration process

Click “Continue” to Verify the Invitation Code….



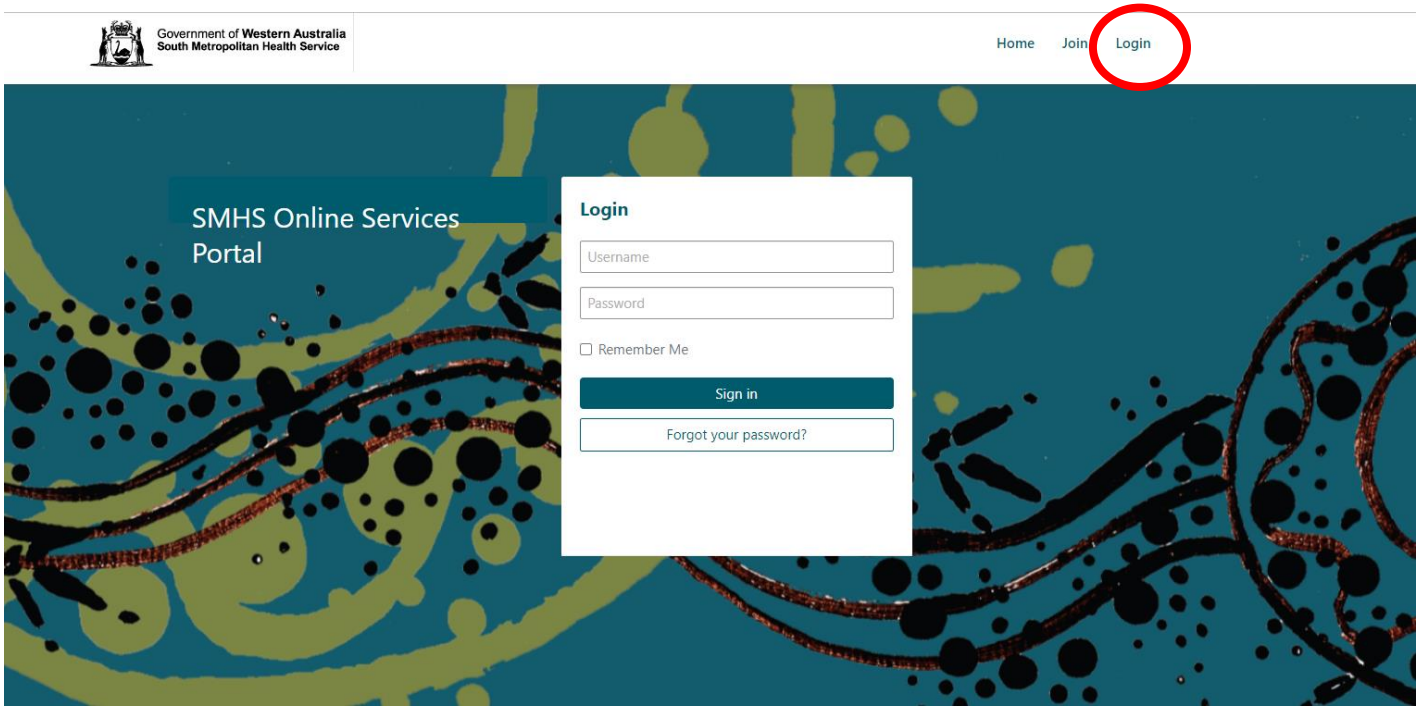
Set up your user name and password and then click “Register”



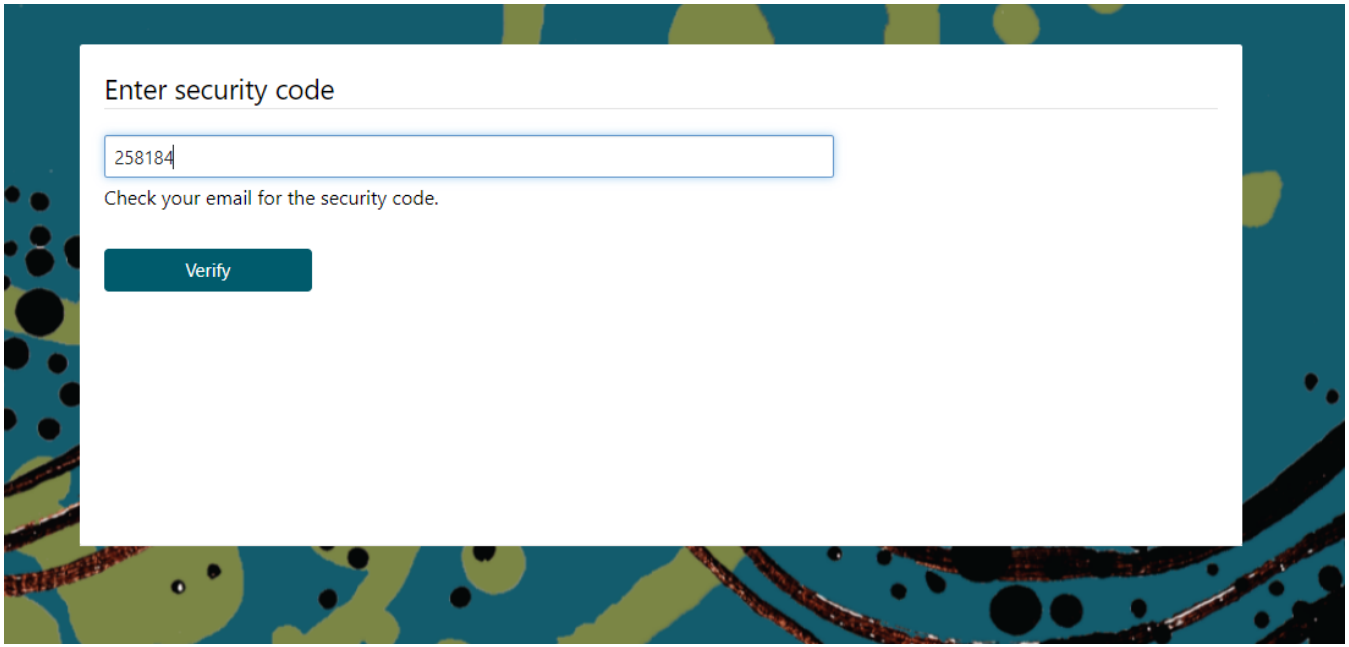


…we require your DOB to verify your identity as a GP…You won't be able to login to the portal until we have verified the details you have provided – you'll be notified when this is complete

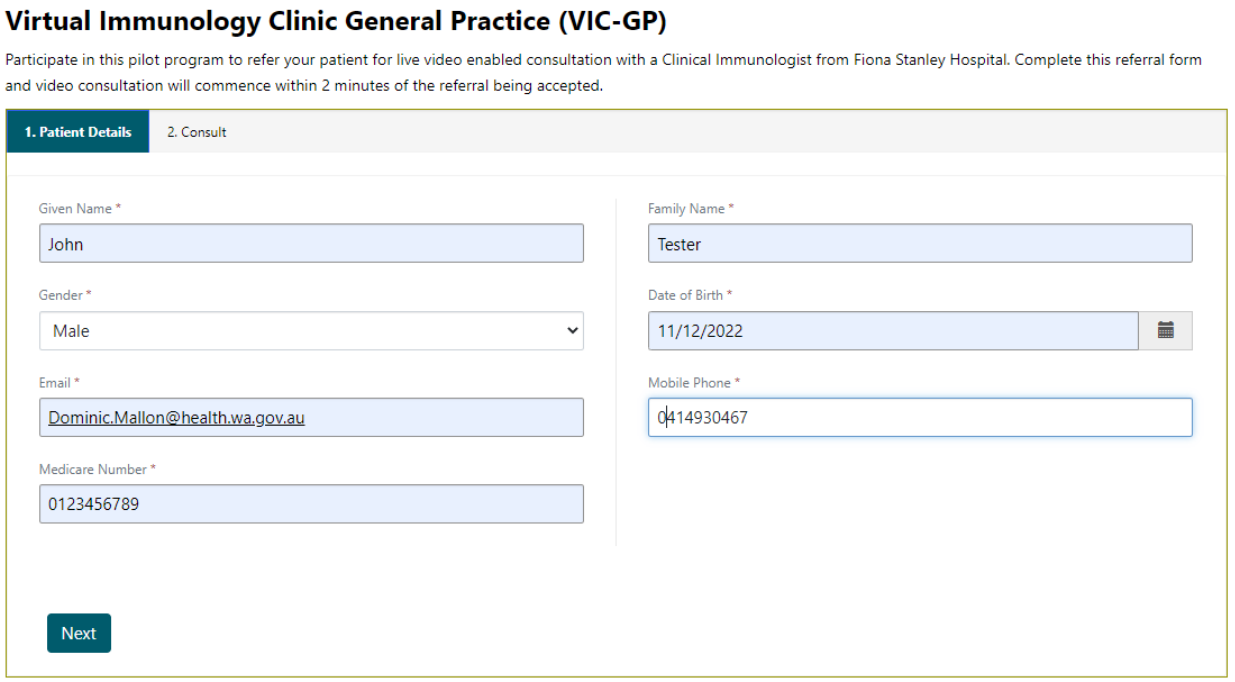
Once registered, you can refer a patient by logging in with the username and password you've created



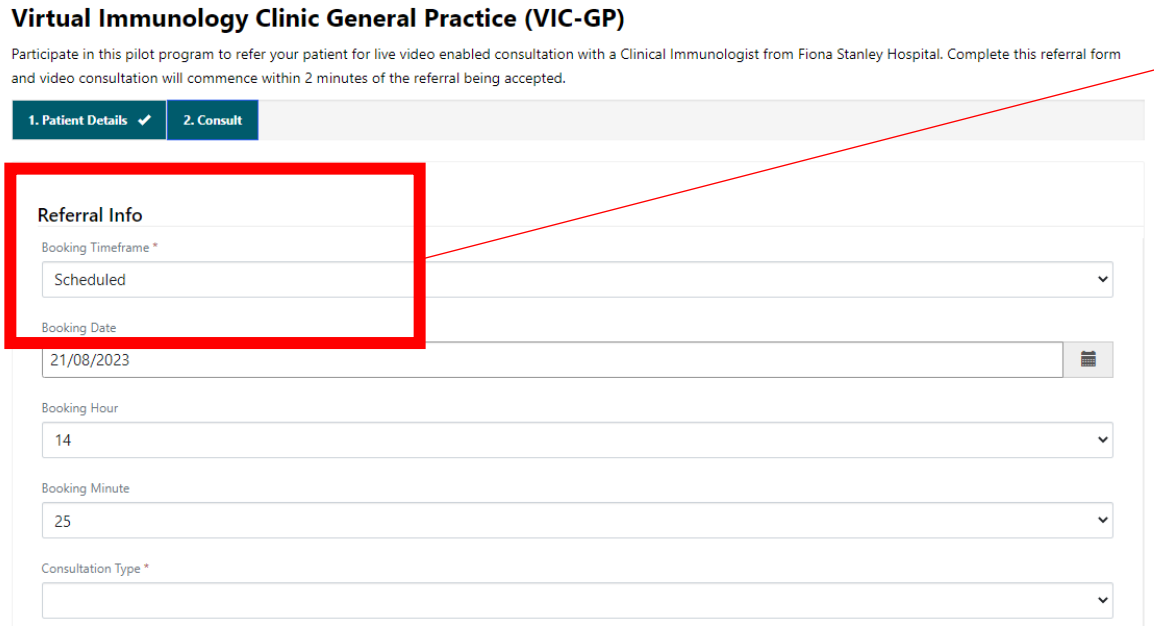
The system will email you a security code, that you need to enter….

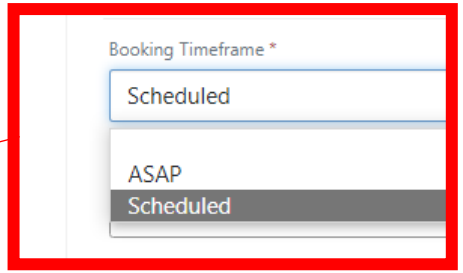


Once logged in, you will remain logged in for 8 hours (ie this step will not need to be repeated should you wish to refer other patients within that time)



Next Page…..

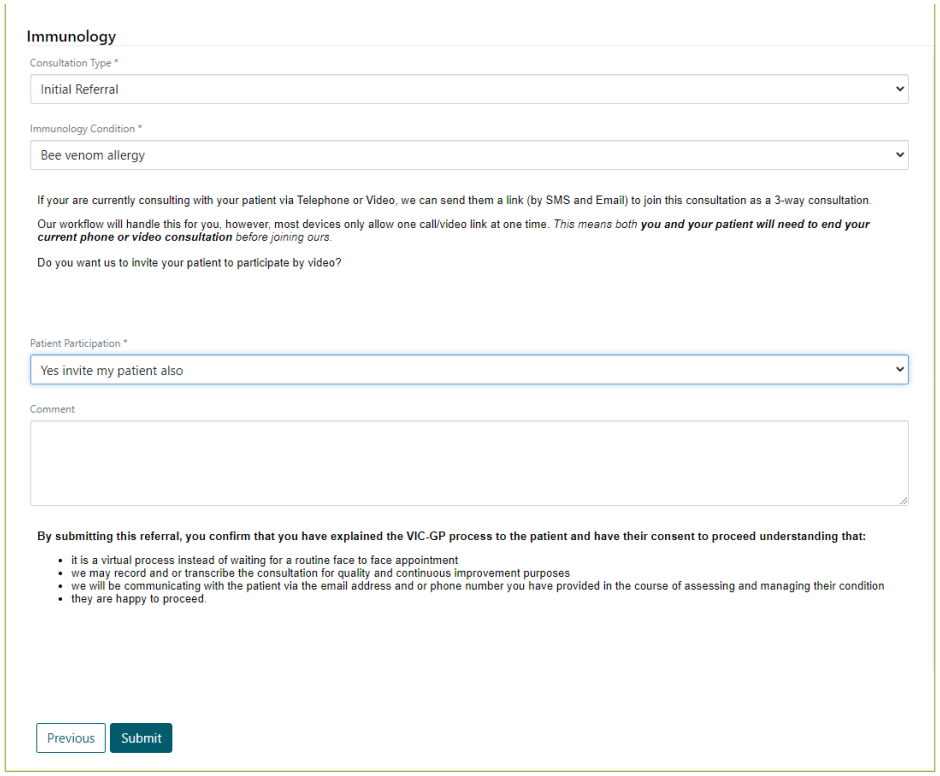




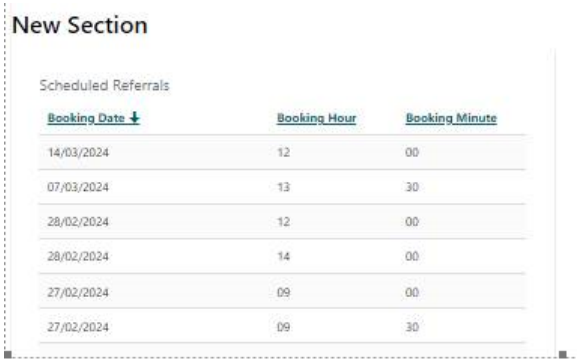
ASAP = Immediate / Real Time
Scheduled = Future Appointment

Note, if you use the “Immediate” Option, the video consultations occur in real time when the patient is in your office; so make sure the patient is with you when you submit the referral
If you use the “Scheduled” option, the system creates a Teams Meeting for the time and day you have selected

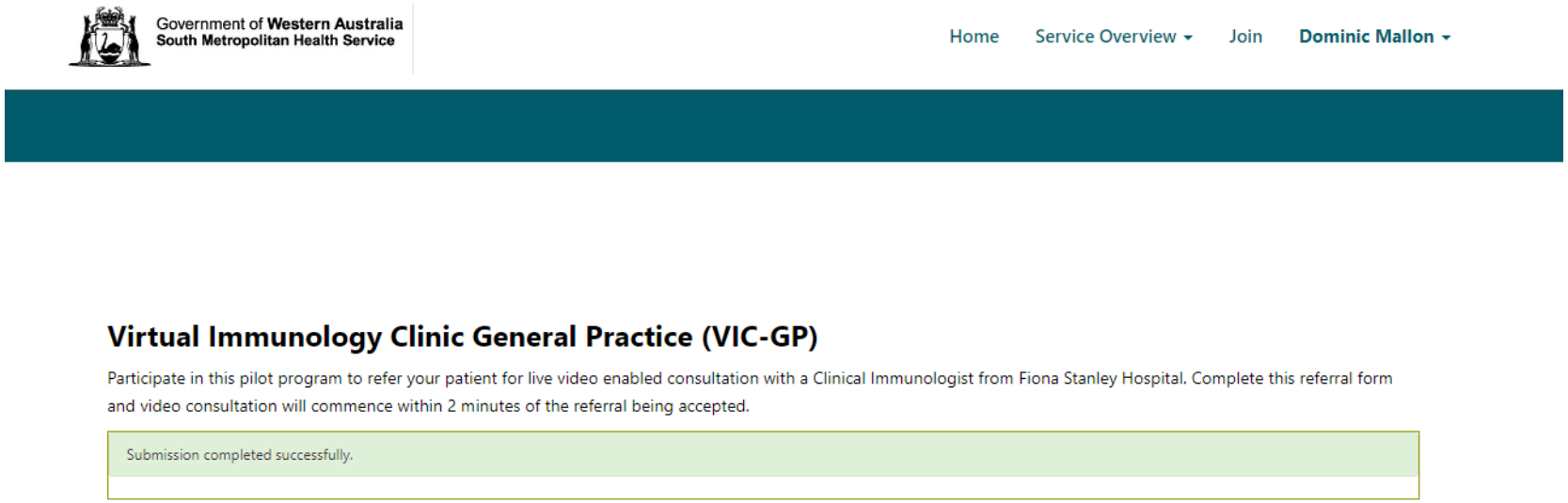
Further Down the Page……



…..there is now a “new section” with a list of existing referral dates and times – please avoid these dates and times when scheduling the appointment

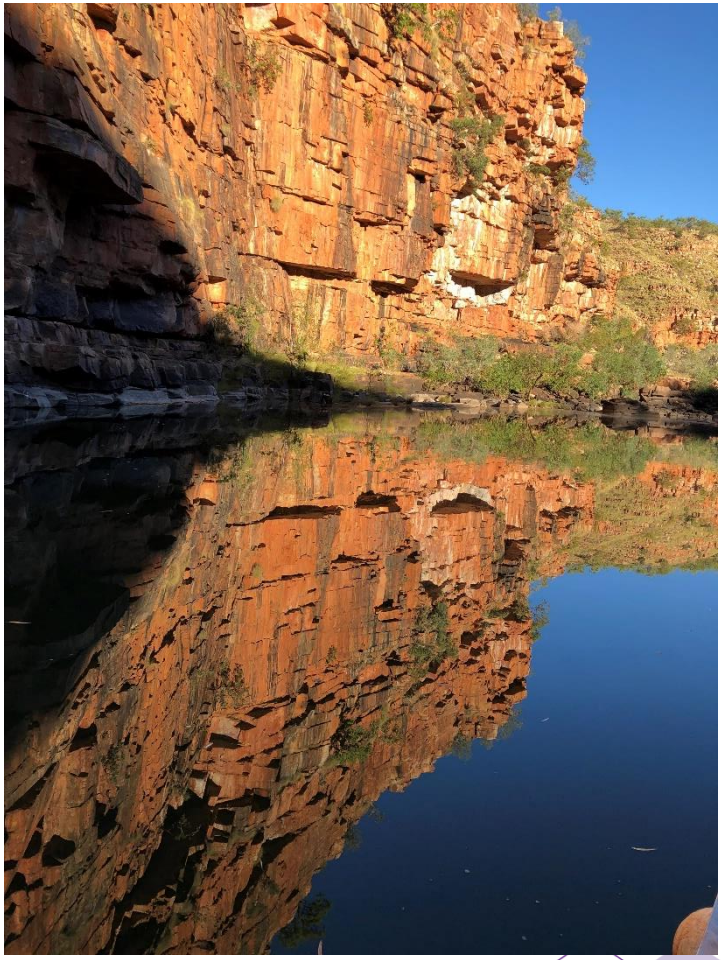


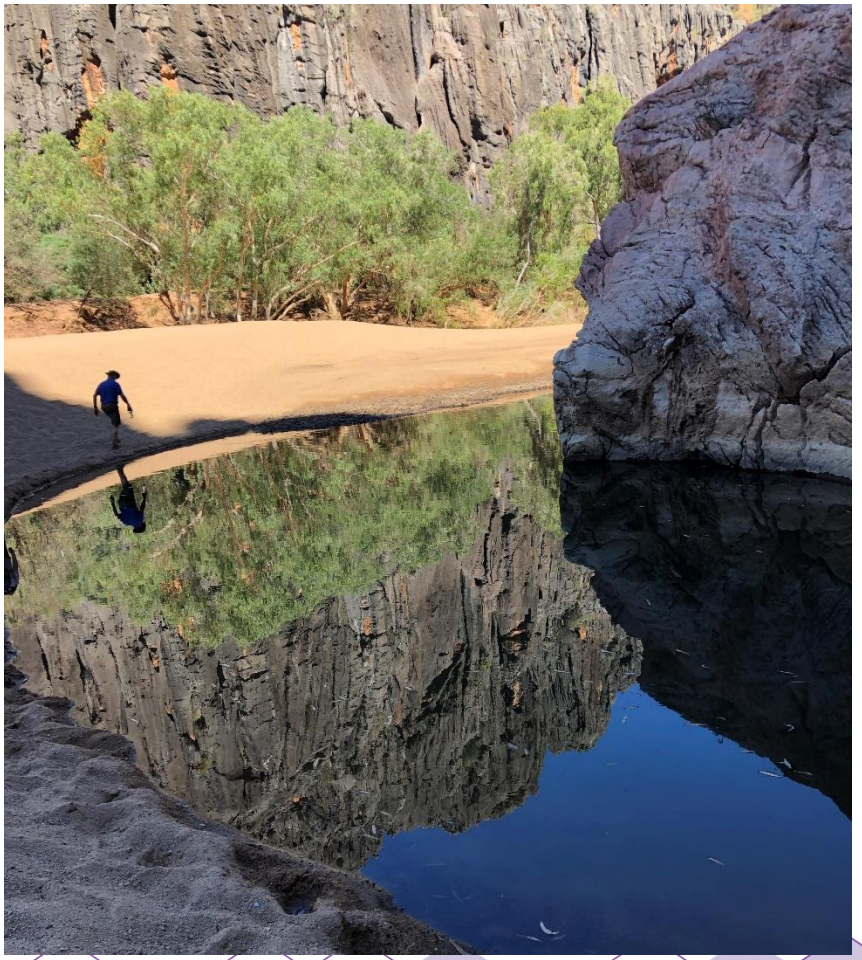
This step will send a message to me to accept the referral – For “ASAP” option a MS Teams link will be emailed to you and I will also join the teams meeting in real time. For “Scheduled” a Teams Meeting will be created for the requested date and Time



If an “ASAP” appointment is requested and if, for any reason I / another consultant is not available (uncommon), you will receive a message stating that, unless otherwise requested, we will contact your patient directly to commence the assessment process within one week

Discussion – Applicability of this Model of Care to the WA Rural Health Context

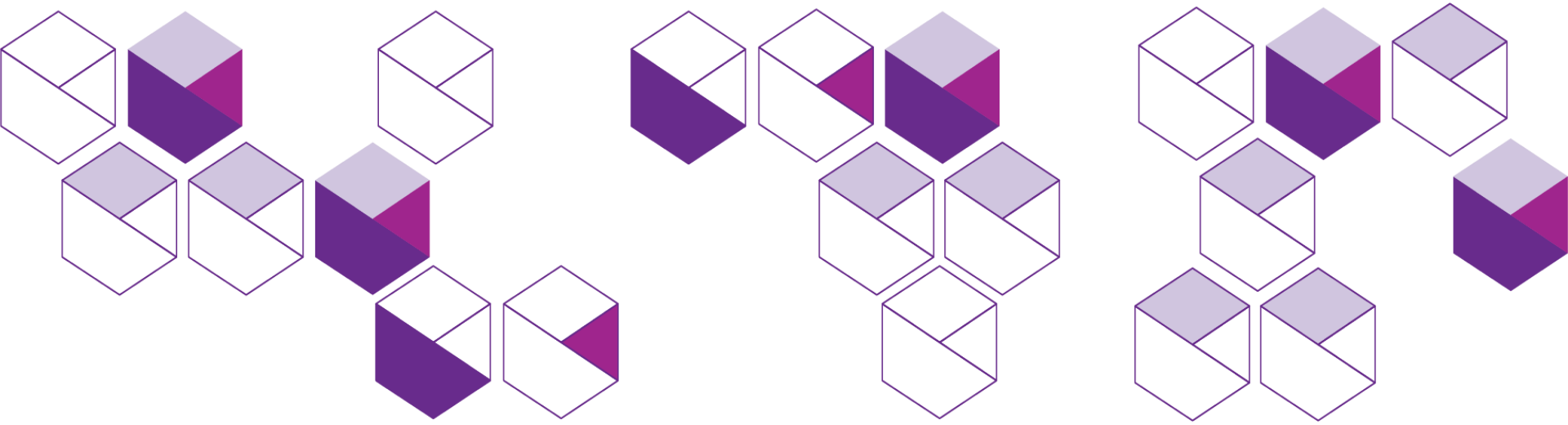




Government of Western Australia
South Metropolitan Health Service

Laboratory Testing to Investigate Allergic Symptoms

Dominic Mallon
Clinical Immunologist / Immunopathologist
Virtual Immunology Clinic for General Practice



Case 1 – AZ DOB 30/3/82

- PC: Urticaria
- HPI: > 6 weeks episodic urticaria triggered by showering, changes in temperature; resolve spontaneously within a few hours, no bruising
- More persistent and severe lately => oral H1 blockers – respond to 2 tablets daily
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- PMHx: Pericarditis Jan 2022 – colchicine + NSAIDs - settled

Question of Immunologist

- Relevance of total and allergen-specific IgE?
  - IgE = 320 kU/L (< 110)
  - Low to moderate RASTs to HDM and grasses

Case 1 Discussion

- Spontaneous vs allergic urticaria
- Inx I order for spontaneous urticaria:
  - FBP, ESR, CRP, IgE, TPO antibodies, Helicobacter pylori serology
  - Abnormal < 5% of the time.
  - (Additional tests for inducible (physical) urticaria
    - Exercise - cholinergic
    - Ice cube - cold
    - Application of water - aquagenic
    - Measured pressure application - pressure induced urticaria)

Case 2 – MA DOB 18/09/2007

- 14yo living on bush block in Dunsborough
- PC: Acute urticaria following a bee sting
- HPI: Some years ago generalised urticaria after bee sting to foot. Bee identified by mother, sting removed; associated with ?lightheadedness, headache, “fever” and feeling generally unwell. No other Sx of anaphylaxis.
- Attended ED at PMH Rxed antihistamines – no adrenaline.
- Rash settled over 24 hours
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- RAST bee venom 1.47ku/L (<0.35)
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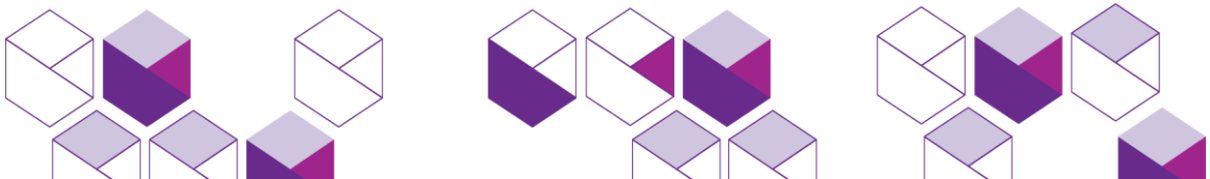
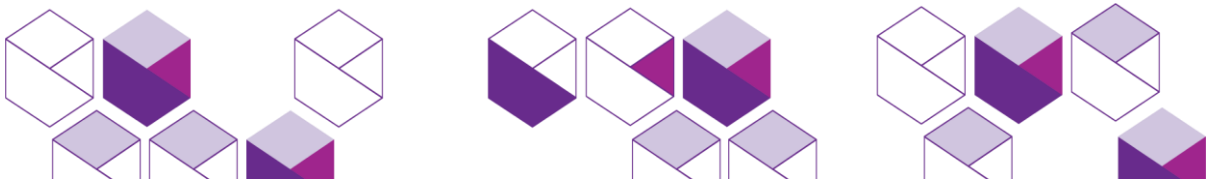


Case 2 discussion

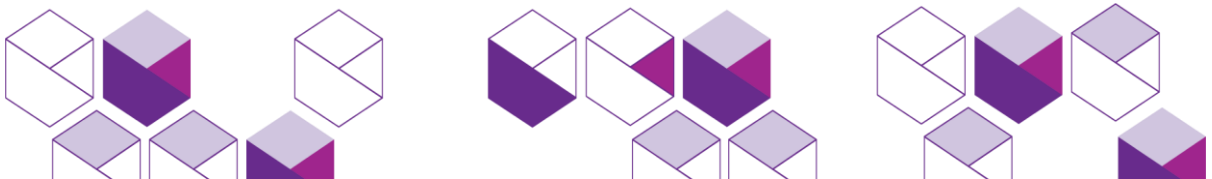
- History as a guide for specific IgE requests in acute urticaria – “if pt can’t tell you what did it, esp if recurrent, consider spontaneous urticaria…”
- Levels of specific IgE may not be that high (rare exposures)
    - Significant if positive in presence of consistent history
- Triggers for anaphylaxis:

1. Bee venom
2. Foods: Peanuts, Tree nuts, Cows milk, Egg, Fish, Shellfish
3. Drugs (in particular antibiotics such as penicillins and non-steroidal anti-inflammatory dugs.
4. Latex (note stone fruits and other fruits that cross react with latex eg. Avocado)



Case 2 Discussion – Inx in Anaphylaxis

- Specific IgE for triggering allergen
- Sensitivity may be affected by timing of test – maximal ~ 6 weeks post-exposure
- Consider Mast cell tryptase
  - At time of presentation – peaks ~ 4 hours
  - Baseline – allows determination of change from baseline, and screens for mastocytosis and hereditary alpha tryptasaemia.
- Some food-associated anaphylaxis does not follow typical (within 2 hours) time relationship, so if unexplained / trigger unclear
  - Consider measurement of specific IgE to alpha-gal (esp if history of tick bites) and Omega-5 gliadin (wheat associated exercise induced anaphylaxis)



Case 3 RW DOB 30/11/2008

- PC: Allergic Rhinoconjuctivitis - ? For desensitisation
- HPI: Long term perennial Sx (no significant seasonal exacerbation) – rhinorrhea, nasal blockage, sleep disturbance, snoring – multiple missed attendances at school. Refractory to INCS following nasal irrigation + antihistamines. No history of asthma, food allergy or eczema

Case 3 Inx

- Specific IgE
  - Grass mix 1.96kU/L
  - Animal, Mould mixes NEG
  - Anything missing?

Case 3 Discussion

- Limitations in our understanding of aerobiology in WA
- Specific IgE for aeroallergens
  - Perennial Sx: House dust, pets, mould, cockroach
  - Seasonal Sx; Grasses (Olive trees)
  - Specific triggers of Sx (animals, house dust, grasses)
  - Blood tests perform well in this setting (patients are regularly exposed) – skin tests may be required if blood test results not c/w history

Case 4 – DW 36yo ED Registrar

- PC - ? Penicillin allergy
- HPI: Remote history of periorbital swelling + mild rash following amoxycillin for RTI in Malaysia – nil penicillin since

Case 4 Discussion

- Lack of diagnostic value of allergen specific IgE and skin testing in clinical scenarios that present a low risk of penicillin allergy.

- Risk based de-labelling protocols are more effective in this scenario and enable ~ 90% of low risk patients with prior history of adverse reactions to penicillin to be delabelled

Utilise the assessment questions below AND tool overleaf to assess a patient's antibiotic allergy

Antibiotic allergy assessment questions

1. What is the name of the antibiotic you are allergic to?

2. Please describe the details of this reaction? *("assessment of type" - overleaf for suggestions)*

3. How many years ago did the reaction occur? *("assessment of timing")* _____

   More than 5 years ago? Yes ☐ No ☐

4. How long after having the first antibiotic dose did the reaction occur?
   ("assessment of timing")

5. How was this reaction managed? *("assessment of type and severity")*

6. Were you hospitalised as a result of this reaction? Yes ☐ No ☐

7. Which other antibiotics have you safely taken since the reaction?
   ("assessment of tolerance")

If more than one clinical manifestation is selected, default to the most severe phenotype and recommendation OR seek advice from AMS Team or Immunology Team.

Dermatological

Skin manifestation		Recommendation & Resultant allergy type	
Childhood exanthem (unspecified) *Mild rash with no severe features*		☐	Unlikely to be significant (non-severe)
Immediate diffuse rash ("itchy immediate rash") *<2 hours post dose*		☐	Immediate hypersensitivity (non-severe)
Diffuse rash or localised rash / swelling with no other symptoms *(non-immediate or unknown timing)*	>5 years ago or unknown	☐	Delayed hypersensitivity (non-severe)
	≤ 5 years ago	☐	Delayed hypersensitivity (non-severe)
Angioedema ("lip, facial or tongue swelling")		☐	Immediate hypersensitivity (severe)
Generalised swelling (outside of angioedema)		☐	Immediate hypersensitivity (severe)
Urticaria ("wheels and hives")		☐	Immediate hypersensitivity (severe)
Mucosal ulceration ("mouth, eye or genital ulcers")		☐	Delayed hypersensitivity (severe)
Pustular, blistering or desquamating rash ("skin shedding")		☐	Delayed hypersensitivity (severe)

Respiratory or Systemic

Clinical manifestation	Recommendation & Resultant allergy type	
Laryngeal involvement ("throat tightness" or "hoarse voice")	☐	Immediate hypersensitivity (severe)
Respiratory compromise ("shortness of breath")	☐	Immediate hypersensitivity (non-severe)
Fever ("high temperatur") *Not explained by infection*	☐	Delayed hypersensitivity (severe)
Anaphylaxis or unexplained collapse	☐	Immediate hypersensitivity (severe)

Haematological

Low platelets < 150 x 10^9/L or unknown	☐	Potential immune mediated (severe)
Low neutrophils < 1 x 10^9/L or unknown	☐	Potential immune mediated (severe)
Low haemoglobin < 100 g/L or unknown	☐	Potential immune mediated (severe)
Eosinophilia (>0.7 x 10^9/L or unknown)	☐	Delayed hypersensitivity (severe)

Unknown

Clinical manifestation	Recommendation & Resultant allergy type	
Unknown reaction ≤ 5 years ago	☐	Unknown (non-severe)
Unknown reaction > 5 years ago or family history of penicillin allergy only	☐	Unlikely to be significant (non-severe)

Renal

Severe renal injury, failure or AIN (>50% reduction in eGFR from baseline or absolute serum creatinine increase of >26.5µmol/L, or transplantation, or dialysis)	☐	Potential immune mediated (severe)
Mild renal impairement (Does not meet criteria in box above)	☐	Unlikely immune mediated (non-severe)

Liver

Severe liver injury, failure or DILI (≥5x upper limit of normal (ULN) for ALT or AST, or ≥3x ULN for ALT with ≥2x ULN for bilirubin, or ≥2x ULN for ALP, or transplant)	☐	Potential immune mediated (severe)
Mild hepatic enzyme derangement (Does not meet criteria in box above)	☐	Unlikely immune mediated (non-severe)

Gastrointestinal, Neurological or Infusion-related

Gastrointestinal symptoms ("nausea, vomiting, diarrhoea")	☐	Unlikely immune mediated (non-severe)
Mild neurological manifestation ("headache, depression, mood disorder")	☐	Unlikely immune mediated (non-severe)
Severe neurological manifestation ("seizures or psychosis")	☐	Unknown or unclear mechanism
Anaphylactoid/infusion reaction (e.g. red man syndrome)	☐	Unknown or unclear mechanism

Appropriate for direct de-labelling	☐ Low risk
Appropriate for supervised direct oral rechallenge	☐ Low risk
May be appropriate for skin testing followed by oral rechallenge	☐ Moderate risk
Appropriate for outpatient antibiotic allergy assessment +/- testing	☐ High risk

Produced by Centre for Antibiotic Allergy and Research; antibiotic.allergy@austin.org.au

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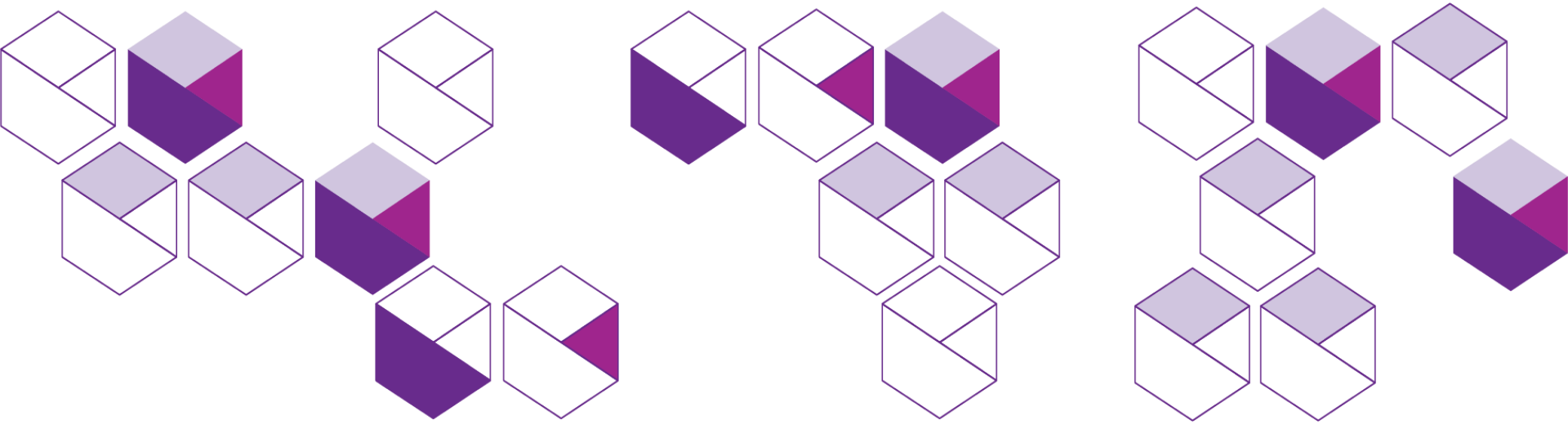

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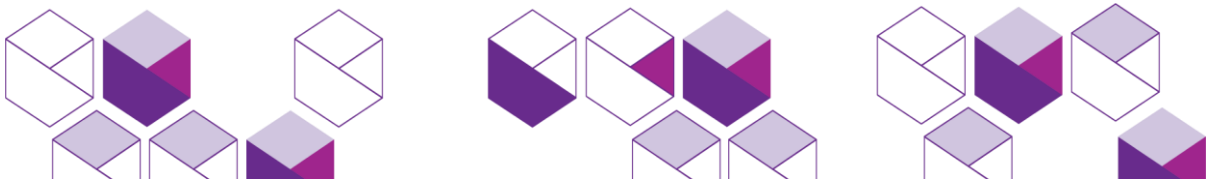

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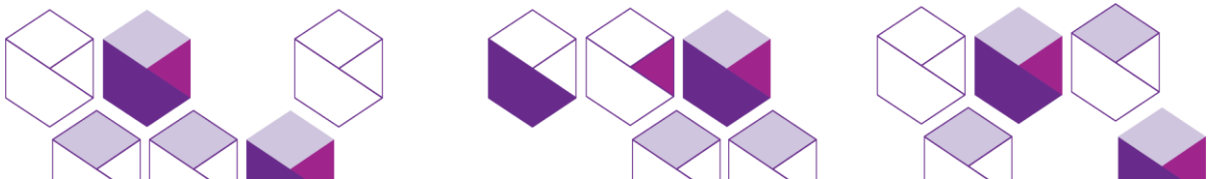
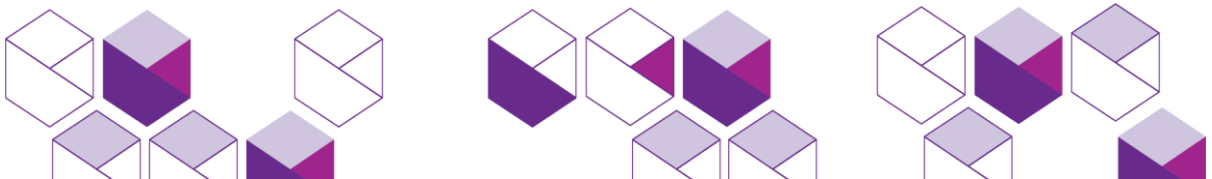
3. Drugs (in particular antibiotics such as penicillins and non-steroidal anti-inflammatory dugs.
4. Latex (note stone fruits and other fruits that cross react with latex eg. Avocado)



Case 2 Discussion – Inx in Anaphylaxis

- Specific IgE for triggering allergen
- Sensitivity may be affected by timing of test – maximal ~ 6 weeks post-exposure
- Consider Mast cell tryptase
  - At time of presentation – peaks ~ 4 hours
  - Baseline – allows determination of change from baseline, and screens for mastocytosis and hereditary alpha tryptasaemia.
- Some food-associated anaphylaxis does not follow typical (within 2 hours) time relationship, so if unexplained / trigger unclear
  - Consider measurement of specific IgE to alpha-gal (esp if history of tick bites) and Omega-5 gliadin (wheat associated exercise induced anaphylaxis)



Case 3 RW DOB 30/11/2008

- PC: Allergic Rhinoconjuctivitis - ? For desensitisation
- HPI: Long term perennial Sx (no significant seasonal exacerbation) – rhinorrhea, nasal blockage, sleep disturbance, snoring – multiple missed attendances at school. Refractory to INCS following nasal irrigation + antihistamines. No history of asthma, food allergy or eczema

Case 3 Inx

- Specific IgE
  - Grass mix 1.96kU/L
  - Animal, Mould mixes NEG
  - Anything missing?

Case 3 Discussion

- Limitations in our understanding of aerobiology in WA
- Specific IgE for aeroallergens
  - Perennial Sx: House dust, pets, mould, cockroach
  - Seasonal Sx; Grasses (Olive trees)
  - Specific triggers of Sx (animals, house dust, grasses)
  - Blood tests perform well in this setting (patients are regularly exposed) – skin tests may be required if blood test results not c/w history

Case 4 – DW 36yo ED Registrar

- PC - ? Penicillin allergy
- HPI: Remote history of periorbital swelling + mild rash following amoxycillin for RTI in Malaysia – nil penicillin since

Case 4 Discussion

- Lack of diagnostic value of allergen specific IgE and skin testing in clinical scenarios that present a low risk of penicillin allergy.

- Risk based de-labelling protocols are more effective in this scenario and enable ~ 90% of low risk patients with prior history of adverse reactions to penicillin to be delabelled

Utilise the assessment questions below AND tool overleaf to assess a patient's antibiotic allergy

Antibiotic allergy assessment questions

1. What is the name of the antibiotic you are allergic to?

2. Please describe the details of this reaction? *("assessment of type" - overleaf for suggestions)*

3. How many years ago did the reaction occur? *("assessment of timing")* _____

   More than 5 years ago? Yes ☐ No ☐

4. How long after having the first antibiotic dose did the reaction occur?
   ("assessment of timing")

5. How was this reaction managed? *("assessment of type and severity")*

6. Were you hospitalised as a result of this reaction? Yes ☐ No ☐

7. Which other antibiotics have you safely taken since the reaction?
   ("assessment of tolerance")

If more than one clinical manifestation is selected, default to the most severe phenotype and recommendation OR seek advice from AMS Team or Immunology Team.

Dermatological

Skin manifestation		Recommendation & Resultant allergy type	
Childhood exanthem (unspecified) *Mild rash with no severe features*		☐	Unlikely to be significant (non-severe)
Immediate diffuse rash ("itchy immediate rash") *<2 hours post dose*		☐	Immediate hypersensitivity (non-severe)
Diffuse rash or localised rash / swelling with no other symptoms *(non-immediate or unknown timing)*	>5 years ago or unknown	☐	Delayed hypersensitivity (non-severe)
	≤ 5 years ago	☐	Delayed hypersensitivity (non-severe)
Angioedema ("lip, facial or tongue swelling")		☐	Immediate hypersensitivity (severe)
Generalised swelling (outside of angioedema)		☐	Immediate hypersensitivity (severe)
Urticaria ("wheels and hives")		☐	Immediate hypersensitivity (severe)
Mucosal ulceration ("mouth, eye or genital ulcers")		☐	Delayed hypersensitivity (severe)
Pustular, blistering or desquamating rash ("skin shedding")		☐	Delayed hypersensitivity (severe)

Respiratory or Systemic

Clinical manifestation	Recommendation & Resultant allergy type	
Laryngeal involvement ("throat tightness" or "hoarse voice")	☐	Immediate hypersensitivity (severe)
Respiratory compromise ("shortness of breath")	☐	Immediate hypersensitivity (non-severe)
Fever ("high temperatur") *Not explained by infection*	☐	Delayed hypersensitivity (severe)
Anaphylaxis or unexplained collapse	☐	Immediate hypersensitivity (severe)

Haematological

Low platelets < 150 x 10^9/L or unknown	☐	Potential immune mediated (severe)
Low neutrophils < 1 x 10^9/L or unknown	☐	Potential immune mediated (severe)
Low haemoglobin < 100 g/L or unknown	☐	Potential immune mediated (severe)
Eosinophilia (>0.7 x 10^9/L or unknown)	☐	Delayed hypersensitivity (severe)

Unknown

Clinical manifestation	Recommendation & Resultant allergy type	
Unknown reaction ≤ 5 years ago	☐	Unknown (non-severe)
Unknown reaction > 5 years ago or family history of penicillin allergy only	☐	Unlikely to be significant (non-severe)

Renal

Severe renal injury, failure or AIN (>50% reduction in eGFR from baseline or absolute serum creatinine increase of >26.5µmol/L, or transplantation, or dialysis)	☐	Potential immune mediated (severe)
Mild renal impairement (Does not meet criteria in box above)	☐	Unlikely immune mediated (non-severe)

Liver

Severe liver injury, failure or DILI (≥5x upper limit of normal (ULN) for ALT or AST, or ≥3x ULN for ALT with ≥2x ULN for bilirubin, or ≥2x ULN for ALP, or transplant)	☐	Potential immune mediated (severe)
Mild hepatic enzyme derangement (Does not meet criteria in box above)	☐	Unlikely immune mediated (non-severe)

Gastrointestinal, Neurological or Infusion-related

Gastrointestinal symptoms ("nausea, vomiting, diarrhoea")	☐	Unlikely immune mediated (non-severe)
Mild neurological manifestation ("headache, depression, mood disorder")	☐	Unlikely immune mediated (non-severe)
Severe neurological manifestation ("seizures or psychosis")	☐	Unknown or unclear mechanism
Anaphylactoid/infusion reaction (e.g. red man syndrome)	☐	Unknown or unclear mechanism

Appropriate for direct de-labelling	☐ Low risk
Appropriate for supervised direct oral rechallenge	☐ Low risk
May be appropriate for skin testing followed by oral rechallenge	☐ Moderate risk
Appropriate for outpatient antibiotic allergy assessment +/- testing	☐ High risk

Produced by Centre for Antibiotic Allergy and Research; antibiotic.allergy@austin.org.au

Cow's Milk Protein Allergy (CMPA)

Dominic Mallon
Virtual Immunology Clinic for General Practice
Fiona Stanley Hospital

Case – CD DOB 23/03/21

- 11 months of age referred with ?CMPA and? Egg allergy
- 1st child – no FHx of allergic disease
- PMHx of Atopic Eczema at 5 months – Advantan and moisturiser (Moogoo / dermeze / Dermaveen)
- Had been tolerating cows milk formula
- Given chocolate – small amount into his mouth
    - Immediate facial erythema and urticaria + redness of his eyes
    - Rxed Claratyne – Sx settled within an hour
- Similar, milder facial reaction only after ingestion of boiled egg
- Cows milk and egg excluded form the diet

CD - Mx and Progress

- Egg ladder to reintroduce egg
- Dairy ladder to reintroduce cows milk
    - Tolerated baked forms of dairy
    - Cheese sticks (step 5) => choking / gagging; unusual cough; change in voice, sneezing; periorbital swelling and generalised urticaria
- Seen at PCH
    - Dxed likely anaphylaxis following cheese stick
    - SPT cows milk 9 x 6mm: Casein 4x3mm, Egg yolk, egg white, negative.
    - Advised to continue to ingest baked CMP
    - Adrenaline auto-injector + Action Plan

Adverse Reactions to Cows Milk

- Immune mediated – “Allergy”
  - IgE mediated – immediate onset (< 2hours), histaminergic symptoms; including anaphylaxis
  - Non-IgE mediated; hours to days; includes food protein enterocolitis syndrome
  - Potentially dangerous – avoid until advised / observed that the child has outgrown
- Non- Immune mediated – “Intolerance”
  - Eg Lactose intolerance; intolerance of Beta casomorphin following A1 beta casein metabolism (not A2 beta casein)
    - “A2 Milk” is better tolerated in predisposed individuals, but is not less allergenic
  - Discomforting but not dangerous

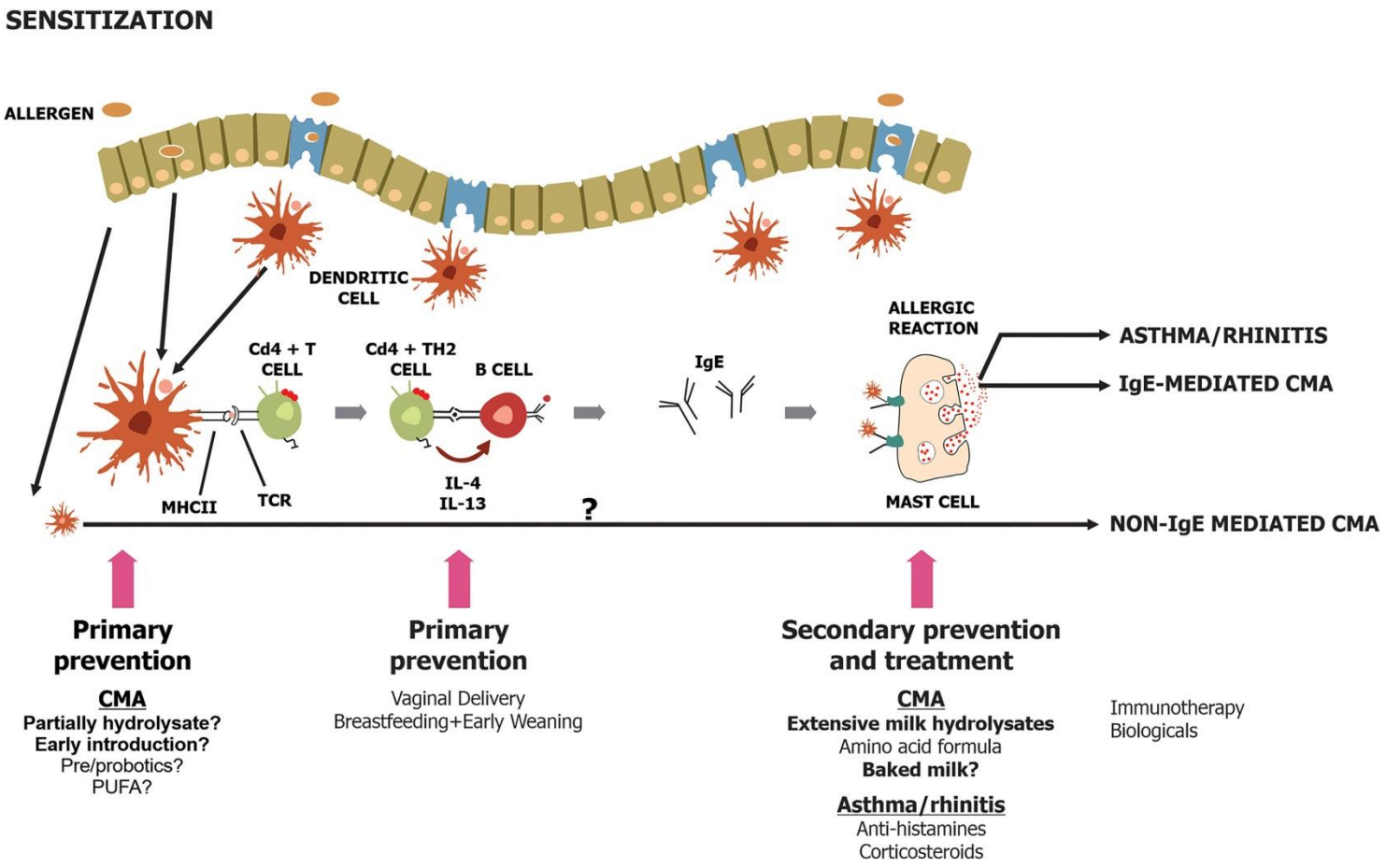
Epidemiology

- Most common food allergy in children
  - ~2% under 4yoa
  - 0.1 – 0.3% in adults
- 3rd most common cause of anaphylaxis in children
  - After peanuts and tree nuts

Pathogenesis

- Cow's milk proteins
  - Casein – alphaS1, alphaS2, beta, kappa-caseins
    - 80% of total protein
  - Whey – alpha-lactalbumin, beta-lactoglobulin, bovine lactoferrin, bovine serum albumin, bovine immunoglobulins
    - 20% of total protein
    - Heat and fermentation sensitive
      - » Baked milk and yoghurt better tolerated in patients with sensitisations primarily to whey proteins
- Sensitisation patterns are complex

Immunopathogenesis



Zepeda-Ortega B, et al. Front. Immunol 2021

Clinical Features

- Onset within days to weeks of CMP introduction
    - Allergy to proteins contained in breast milk is described
- IgE mediated
    - Onset within minutes to 2 hours
    - Variable, determined by route of exposure, degree of sensitisation and dose.
        - Eg in high dose ingestion, Sx typically follow the path of exposure – lips, mouth, oropharynx, GIT, skin, LRT, CVS, CNS

Symptoms and signs of anaphylaxis

Skin
Feeling of warmth, flushing (erythema), itching, urticaria, angioedema, and "hair standing on end" (pilor erection)
Oral
Itching or tingling of lips, tongue, or palate
Edema of lips, tongue, uvula, metallic taste
Respiratory
Nose - Itching, congestion, rhinorrhea, and sneezing
Laryngeal - Itching and "tightness" in the throat, dysphonia, hoarseness, stridor
Lower airways - Shortness of breath (dyspnea), chest tightness, cough, wheezing, and cyanosis
Gastrointestinal
Nausea, abdominal pain, vomiting, diarrhea, and dysphagia (difficulty swallowing)
Cardiovascular
Feeling of faintness or dizziness; syncope, altered mental status, chest pain, palpitations, tachycardia, bradycardia or other dysrhythmia, hypotension, tunnel vision, difficulty hearing, urinary or fecal incontinence, and cardiac arrest
Neurologic
Anxiety, apprehension, sense of impending doom, seizures, headache and confusion; young children may have sudden behavioral changes (cling, cry, become irritable, cease to play)
Ocular
Periorbital itching, erythema and edema, tearing, and conjunctival erythema
Other
Uterine cramps in women and girls

Original figure modified for this publication. Simons FER. Anaphylaxis. J Allergy Clin Immunol 2010; 125:S161. Table used with the permission of Elsevier Inc. All rights reserved.

Symptoms and signs of anaphylaxis in infants*

Anaphylaxis symptoms that infants cannot describe	Anaphylaxis signs that are potentially difficult to interpret in infants and why	Anaphylaxis signs in infants: Obvious but may be nonspecific
General		
Feeling of warmth, weakness, anxiety, apprehension, impending doom	Nonspecific behavioral changes, such as persistent crying, fussing, irritability, fright	
Skin/mucus membranes		
Itching of lips, tongue, palate, uvula, ears, throat, nose, eyes, and so forth; mouth-tingling or metallic taste	Flushing (may also occur with fever, hyperthermia, or crying spells)	Rapid onset of hives (potentially difficult to discern in infants with acute atopic dermatitis; scratching and excoriations, as such, will be absent in young infants); angioedema (face, tongue, oropharynx)
Respiratory		
Nasal congestion, throat tightness; chest tightness; shortness of breath	Hoarseness, dysphonia (common after a crying spell); drooling, increased secretions (common in infants)	Rapid onset of coughing, choking, stridor, wheezing, dyspnea, apnea, cyanosis
Gastrointestinal		
Dysphagia, nausea, abdominal pain/cramping	Spitting up/regurgitation (common after feeds), loose stools (normal in infants, especially if breastfed); colicky abdominal pain	Sudden, profuse vomiting
Cardiovascular		
Feeling faint, presyncope, dizziness, confusion, blurred vision, difficulty in hearing, palpitations	Hypotension; measured with an appropriate size blood pressure cuff, low systolic blood pressure for infants is defined as less than 70 mmHg from age 1 month to 1 year and less than (70 mmHg + [2 x age in years]) in the first and second years of life; tachycardia, defined as greater than 120 to 130 beats per minute from the third month to second year of life inclusive; loss of bowel and bladder control (ubiquitous in infants)	Weak pulse, arrhythmia, diaphoresis/sweating, pallor, collapse/unconsciousness
Central nervous system		
Headache	Drowsiness, somnolence (common in infants after feeds)	Rapid onset of unresponsiveness, lethargy, or hypotonia; seizures

* More than one body system involved.

From: Simons FER. Anaphylaxis in infants: Can recognition and management be improved? J Allergy Clin Immunol 2007; 120:537.

Presentation of cow's milk allergy

IgE mediated	Mixed IgE and non-IgE mediated	Non-IgE mediated
Anaphylaxis	Eosinophilic gastrointestinal disorders	Food protein-induced enterocolitis syndrome
Urticaria and angioedema	Atopic dermatitis	Food protein-induced proctitis/proctocolitis
Immediate oropharyngeal and gastrointestinal reactions		Food protein-induced enteropathy
Food-associated, exercise-induced anaphylaxis		Gastroesophageal reflux
		Colic
		Constipation
		Heiner syndrome (pulmonary hemosiderosis)

IgE: immunoglobulin E.

Food Protein-Induced Enterocolitis Syndrome (FPIES)

- Presents typically with severe vomiting, diarrhea, dehydration, lethargy +/- shock
  - 2-4 hours following ingestion of the offending food
  - Dx often delayed until the 2nd presentation
  - CMP is one of the common triggers, along with soy, rice, oat, egg, fish

Food Protein-Induced Proctitis / Proctocolitis

- Presents by 6 months of age
- Bloody streaked, mucousy loose stools in otherwise well infants
- May be breast or formula fed
- Cows milk and soy are the major allergens

Management of CMPA

- Risk Assessment
  - Mild, localised rash on consumption of large amount
    - » Cows milk ladder to safely introduce foods
  - Non-localised Sx, esp if triggered by small amount of dairy.
    - » Referral for baseline evaluation eg SPT, and education, including on
      - Avoidance
        - Complex – requires dietetic referral to assist with reading of food labels, cross-contamination, dairy substitutes and nutritional balance
        - Note Cross Reactivity – common with sheep and goats milk
      - Mx of adverse reactions - Red and Green Action Plans from ASCIA Action Plans, First Aid Plans, Treatment Plans and Checklists - Australasian Society of Clinical Immunology and Allergy (ASCIA)
      - Monitoring – clinical reactions; serial allergen specific IgE / SPT
      - Reintroduction via supervised challenges

Specialised formula and indications in cow's milk allergy (CMA)

Type of Allergy	First choice	Second choice (if first not tolerated)	Third choice (if second not tolerated)
Immediate (IgE mediated) CMA (not anaphylaxis)	• eHF (<6 months) or • Rice protein based formula*	AAF	
	• Soy formula** (>6 months) or • Rice protein based formula*	eHF	AAF
Anaphylaxis	• AAF or • Soy formula** (>6 months) or • Rice protein based formula*		
FPIES	• eHF (<6 months) or • Rice protein based formula*	AAF	
	• Soy formula (>6 months and already soy-tolerant/after medically supervised soy introduction), or • Rice protein based formula*	eHF	AAF
Non IgE mediated CMA (FPE, FPIAP)	• eHF (<6 months) or • Rice protein based formula*	AAF	
	• Soy formula** (>6 months and growing well), or • Rice protein based formula*	eHF	AAF
EoE	• AAF		

https://www.allergy.org.au/hp/papers/guide-for-milk-substitutes-cows-milk-allergy

Natural History

- Development of tolerance
  - Non-IgE faster than IgE-mediated
    - Majority of FPIES outgrown by 3yoa
    - 64% of IgE mediated allergy outgrown by 12yoa
      - Lower levels of sIgE, higher rates of decline in sIgE, absence of topic comorbidities predict earlier development of tolerance

Q&A / Discussion