

Digital INR Monitoring

A model of remote INR testing

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County Durham and Darlington NHS FT



Health *Call*

About NHS Health Call

NHS Health Call is a digital health partnership between County Durham and Darlington NHS Foundation Trust and Inhealthcare.

- County Durham and Darlington NHS Foundation Trust is one of the largest integrated care providers in England, serving a population of around 600,000 people.
- Inhealthcare is a digital health service provider. All our services are designed by NHS clinicians to meet the specific requirements of their local population.



Health *Call*

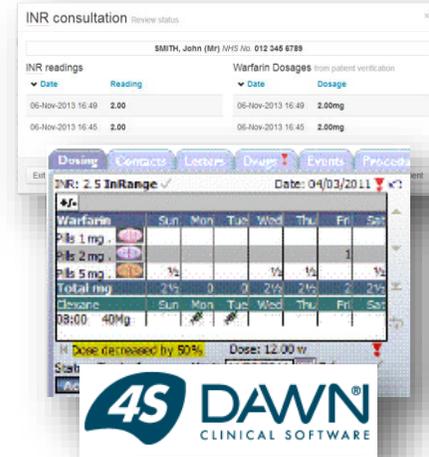
Health Call INR Self-Testing Service



Health *Call*



Using either an automated phone call or on-line submission, the patient provides their INR reading, current warfarin dose, and questions around bleeding and medication



The service can integrate directly with 4S-DAWN. This means that clinic staff can dose from within their existing system, or from the Inhealthcare portal if the clinic uses a different decision support system

Warfarin Clinic



The service then informs the patient of their warfarin dose and the date of their next INR test

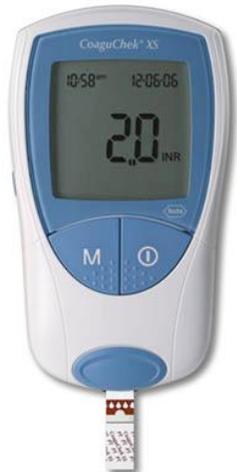


Patient follows new dosing regime and notes date of next test



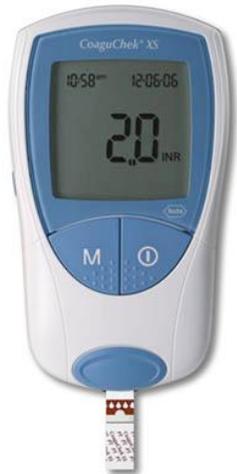
Patient self-tests INR at home on agreed date

By Phone: The patient answers questions using the phone keypad



Please enter both digits of the INR result using the star key on your keypad as the decimal point. When finished, press the hash key. For example, if your INR result is 2.5, please press 2 star 5, followed by hash.

On-Line: On the day of the INR test, the patient uses an online portal to submit their results

A smartphone displaying the inhealthcare online portal. The screen shows the following information:

inhealthcare

Patient name INNES, Jamie (Mr)
About task Please submit the below readings and complete the q
2015

1. INR READING
Please enter your INR reading

INR

2. WARFARIN DOSAGE
Please provide the warfarin dosage you are due to take today

Warfarin dosage mg

3. PLEASE PROVIDE ANSWERS TO THE QUESTIONS BELOW

Have you had any changes to any of your medication since your last INR reading? Yes No

Have you had any bleeding symptoms? Yes No

Have you missed any doses? Yes No

Findings from the evaluation of INR self-testing in County Durham

2011

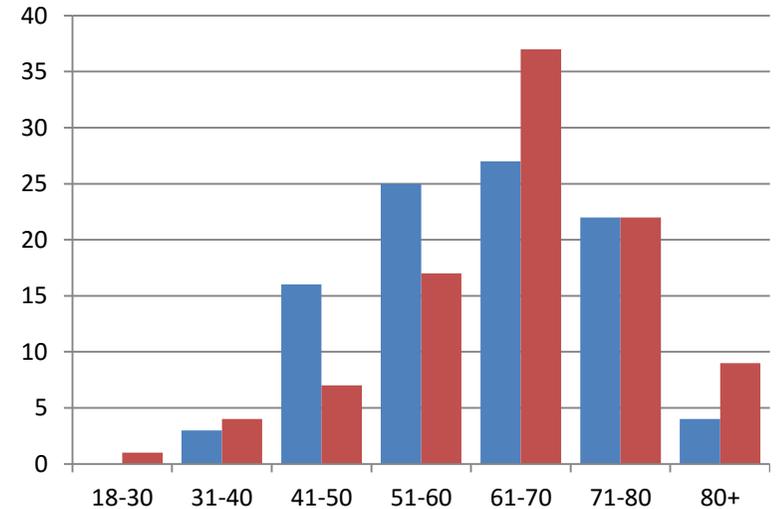


Health *Call*

The evaluation involved 200 patients across 2 cohorts

- Cohort 1 was hand-picked by staff with a narrow selection criteria, Cohort 2 was a group recruited using adverts in clinic
- Age was not a major obstacle when patients were given the choice to join the pilot
- The average TTR in both groups was similar, around 59%, which is a very low baseline but we recognise the effect of demand on quality of clinical results

	Cohort 1	Cohort 2
Number of patients	100	100
Recruitment Selection Criteria	Narrow Most were hand-picked by staff	Broad Most were recruited from ads
Average TTR 6 months before study	60.4%	59.0%
Average TTR 3 months before study	58.9%	59.0%



Patient ages across both cohorts

Average TTR in the 2 cohorts after the self-testing study started

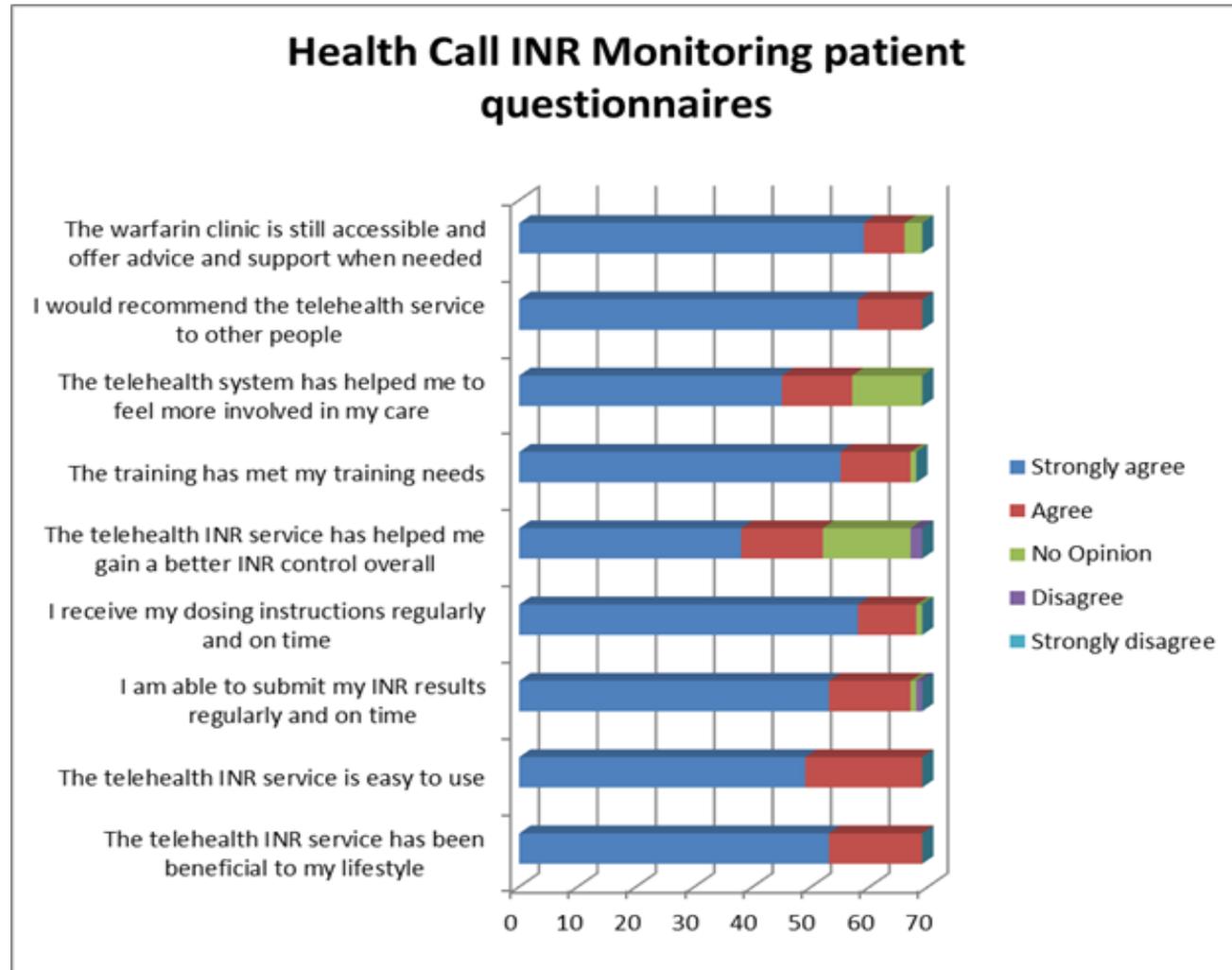
	Cohort 1	Cohort 2
Number of patients	100	100
Recruitment Selection Criteria	Narrow Most were hand-picked by staff	Broad Most were recruited from ads
TTR - 6 months before study	60.4%	59.0%
TTR - 3 months before study	58.9%	59.0%
TTR - 3 months after study	72.8%	71.0%
TTR - 6 months after study	74.4%	75.0%
TTR – 24 Months after study	75.6%	76.1%

Other interesting outcomes

- As clinic capacity improved the non-self-testers improved TTR by 3%;
- 20% of patients remained uncontrolled – could this be down to Warfarin sensitivity?;
- Of the 80% that did improve the average TTR improvement was 21%;

Patients are overwhelmingly supportive of the service

- Some patient responses on the perceived benefits of the service:
 - Reduced time attending clinics
 - Less impact on work disruption and money lost from taking holiday or no pay to attend clinic
 - Money saved from travel costs and parking
 - Able to test whilst working away from home or on holiday
 - Flexible around me



Average cost of an anti-coagulation patient to the NHS

	Outpatient	Satellite	Self-Testing	Home Care	NOAC
Clinic					
Staff	£101.75	£ 137.84	£28.70	£220.18	N/A
Consumables	£50.65	£ 52.65	£40.18	£47.45	N/A
Self-Testing	£ -	£ -	£132	£ -	N/A
Variable costs	£152.39	£190.48	£188.88	£333.68	N/A
CCG					
Adverse events	£106.65	£106.65	£54.39	Not estimated	Not estimated
Test consumables prescribing	£ -	£ -	£-		
Anticoagulant prescribing	£18.72	£18.72	£18.72	£18.72	£790
Total NHS Cost	£278	£316	£273.99	> £352	> £790

How does it work?

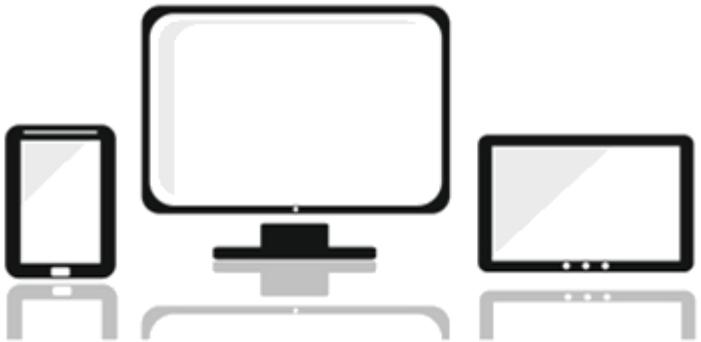
Patient Perspective

How Health Call works for patients using the on-line option



INR collection

Patient submitting their INR readings through an online portal.



Mr Jamie Innes (17-Dec-1988) - INR reading submission

1 minute ago at 3:50 PM

From support@inhealthcare.co.uk >

[More](#)

Patient Name: Innes, Jamie (Mr)

Date of Birth: 17-Dec-1988 (27y)

NHS number: 412 306 1087

Dear Mr Jamie Innes,

As part of the INR self-testing service delivered by Inhealthcare Demo we are contacting you to collect your INR reading.

Can you please take your INR reading using your self-testing device, then once available click on the link below to log in and answer the questionnaire. You have until 18-Jun-2016 03:50 to submit this information.

<https://sandpit-patient.inhealthcare.co.uk/>

If you require any assistance or are unable to take your INR reading please contact the Warfarin clinic on 01423 510 681.

Regards.

Warfarin clinic at County Durham and Darlington Foundation Trust

Health *Call*



Login with Inhealthcare

Username

Password

Access code

[Forgotten your password or access code?](#)

Filter results

INR Self Testing Service

ID	Created date	Description	Service code
V2-INR- WEB_149821	17-Jun- 2016 15:45	Please submit the below readings and complete the questionnaire before 03:50 on the 18-Jun-2016	View task →

Powered by

inhealthcare

Patient name INNES, Jamie (Mr)
Date of birth 17-Dec-1988
NHS number 412 308 1087
About task Please submit the below readings and complete the questionnaire before 03:50 on the 18-Jun-2016

INR READING

Please enter your INR reading

INR

WARFARIN DOSAGE

Please provide the warfarin dosage you are due to take today

Warfarin dosage

mg

PLEASE PROVIDE ANSWERS TO THE QUESTIONS BELOW

Have you had any changes to any of your medication since your last INR reading? Yes
 No

Have you had any bleeding symptoms? Yes
 No

Have you missed any doses? Yes
 No

[— View all tasks](#)

Patient name INNES, Jamie (Mr)
Date of birth 17-Dec-1988
NHS number 412 308 1087
About task Please submit the below readings and complete the questionnaire before 03:50 on the 18-Jun-2016

INR READING

Please enter your INR reading

INR

WARFARIN DOSAGE

Please provide the warfarin dosage you are due to take today

Warfarin dosage

mg

PLEASE PROVIDE ANSWERS TO THE QUESTIONS BELOW

Have you had any changes to any of your medication since your last INR reading? Yes
 No

Have you had any bleeding symptoms? Yes
 No

Have you missed any doses? Yes
 No

[← View all tasks](#)

Task completed successfully.

There are no more tasks to be completed.

Powered by

inhealth*care*

Dosage instructions

Patient receives their warfarin dosage instructions through an online portal.



Mr Jamie Innes (17-Dec-1988) - Warfarin dosage instructions

1 minute ago at 4:04 PM

From support@inhealthcare.co.uk >

[More](#)

Patient Name: Innes, Jamie (Mr)

Date of Birth: 17-Dec-1988 (27y)

NHS number: 412 306 1087

Dear Mr Jamie Innes,

As part of the INR self-testing service delivered by Inhealthcare Demo we are contacting you to provide you with your new warfarin dosage instructions.

To access your new warfarin dosage instructions and the date of your next INR test click on the link below to log in. Once you have read and understood the instructions click 'Submit'. You have until 18-Jun-2016 04:03 to confirm your new warfarin dosage.

<https://sandpit-patient.inhealthcare.co.uk/>

If you do not understand your new warfarin dosage instructions or are not able to complete the INR test at the next specified date please contact the Warfarin clinic on 01423 510 681.

Regards.

Warfarin clinic at County Durham and Darlington Foundation Trust

Health *Call*



Login with Inhealthcare

Username

Password

Access code

[Forgotten your password or access code?](#)

Filter results

INR Self Testing Service

ID	Created date	Description	Service code
V2-INR- WEB_149845	17-Jun- 2016 16:03	Please review the warfarin dosage regime and date of next INR reading provided below. Confirm that you have read and understood the below instructions before 04:03 on the 18-Jun-2016	View task →

Powered by

inhealthcare

Health *Call*

Patient name INNES, Jamie (Mr)
Date of birth 17-Dec-1988
NHS number 412 306 1087
About task Please review the warfarin dosage regime and date of next INR reading provided below.
Confirm that you have read and understood the below instructions before 04:03 on the 18-Jun-2016

WARFARIN DOSING REGIME

Dosage instructions issued: 17-Jun-2016

Your new warfarin dosage regime is a seven day regime.

Friday dosage (Day 1) 3.0mg
Saturday dosage (Day 2) 4.0mg
Sunday dosage (Day 3) 3.0mg
Monday dosage (Day 4) 4.0mg
Tuesday dosage (Day 5) 3.0mg
Wednesday dosage (Day 6) 4.0mg
Thursday dosage (Day 7) 3.0mg

You will receive an email confirming these details.

DATE OF YOUR NEXT INR READING

Your next INR reading is due on 15-Jul-2016 15:50.

CONFIRMATION

By clicking "Submit" you accept you have understood your new warfarin dosing regime and the date of your next INR reading.

[— View all tasks](#)

Submit

Task completed successfully.

There are no more tasks to be completed.

Powered by

inhealth*care*

Mr Jamie Innes (17-Dec-1988) - Warfarin dosage confirmation

3 minutes ago at 4:07 PM

From support@inhealthcare.co.uk >

[More](#)

Patient Name: Innes, Jamie (Mr)

Date of Birth: 17-Dec-1988 (27y)

NHS number: 412 306 1087

Dear Mr Jamie Innes,

Please find detailed below a confirmation of your new warfarin dosage instructions and the date of your next INR test.

Dosage instructions issued: 17-Jun-2016

Your new warfarin dosage regime is a seven day regime.

Friday dosage (Day 1) **3.0mg**

Saturday dosage (Day 2) **4.0mg**

Sunday dosage (Day 3) **3.0mg**

Monday dosage (Day 4) **4.0mg**

Tuesday dosage (Day 5) **3.0mg**

Wednesday dosage (Day 6) **4.0mg**

Thursday dosage (Day 7) **3.0mg**

Your next INR reading is due on **15-Jul-2016 15:50**.

Patient Perspective 2

How Health Call works for patients using the automated phone call option



Health *Call*

The patient self-tests their INR at home on specified date



Health *Call*

The patient receives a call at a pre-agreed time. We carry out some basic checks before starting.



1. Check that an answer machine or voice mail has not picked up the call.
2. Ask the person who answered the call to confirm that they are the patient.
3. Confirm that the patient is ready to provide their INR reading – if not, we call back in 30 minutes.
4. Confirm that the reading on the INR device is in its calibrated range (0.8 and 8.0)

The patient then enters the INR reading into the keypad



Please enter both digits of the INR result using the star key on your keypad as the decimal point. When finished, press the hash key. For example, if your INR result is 2.5, please press 2 star 5, followed by hash.

Thank you. The INR reading you entered is 2.0. If this is correct, please press 1. If this is not correct, please press 3.



The patient enters today's warfarin dose



Thank you for giving me your INR reading. I will now ask you about your warfarin dose. What dose of warfarin are you due to take today? Please enter today's warfarin dose in mg, using the star key on your key pad as the decimal point. When finished, press the hash key. For example, if your dose is 4.0mg, please press 4 star 0, followed by hash.

Thank you. The warfarin dose you entered is 3.0mg. If this is correct, please press 1. If this is not correct, please press 3.

Finally, we ask some general questions



Thank you for giving me today's Warfarin dose. I will now ask you some general questions.

Have you had any changes to your medication since your last INR reading?

Have you had any bleeding symptoms?

Have you missed any doses?

Then we say goodbye and provide next steps



Thank you John for giving me your INR reading and answering my questions.

If you gave your INR reading before 12 noon, you will receive your dosing instructions by phone before 5pm today. If you gave your INR reading after 12 noon, you will receive your dosing instructions by phone before 5pm on the next working day.

If you need to speak to someone in the Warfarin Clinic, please call us on 01234 567890. We are available Monday to Friday, 9am to 5pm.
Goodbye

Health *Call*

In the evening, the patient gets a 2nd phone call with their new dosing instructions



I will now provide you with your warfarin dosing instructions and details about your next INR test. Please make sure you have some paper and a pen to hand. It is important that you listen to all the instructions and do not hang up the telephone until the end of the call. Press any key when you are ready.

Your new warfarin dosing regime is the same dose every day. Your new dose is 2.0mg per day. I will now ask you to confirm by entering your new dose on the keypad, using the star key on your key pad as the decimal point. When finished, press the hash key.

Health Call

DATE OF INR TEST	[DD / MM / YY]
INR READING	<input type="text"/>
CURRENT WARFARIN DOSE	<input type="text"/>

WARFARIN DOSAGE (Please tick)		
SAME DOSAGE EVERY DAY	ALTERNATE DOSAGE	7 DAY DOSAGE
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
DAILY DOSAGE (MG)	DAY (PLEASE CIRCLE)	DATE
DAY 1	<input type="text"/> . <input type="text"/>	MTWTFSS (DD / MM / YY)

Health Call

The patient notes the date of their next INR test

WARFARIN DOSAGE (Please tick)

SAME DOSAGE EVERY DAY ALTERNATE DOSAGE 7 DAY DOSAGE

	DAILY DOSAGE (MG)	DAY (PLEASE CIRCLE)	DATE
DAY 1	<input type="text"/> * <input type="text"/>	M T W T F S S	(DD / MM / YY)
DAY 2	<input type="text"/> * <input type="text"/>	M T W T F S S	(DD / MM / YY)
DAY 3	<input type="text"/> * <input type="text"/>	M T W T F S S	(DD / MM / YY)
DAY 4	<input type="text"/> * <input type="text"/>	M T W T F S S	(DD / MM / YY)
DAY 5	<input type="text"/> * <input type="text"/>	M T W T F S S	(DD / MM / YY)
DAY 6	<input type="text"/> * <input type="text"/>	M T W T F S S	(DD / MM / YY)
DAY 7	<input type="text"/> * <input type="text"/>	M T W T F S S	(DD / MM / YY)

NEXT TEST DATE: (DD / MM / YY)
TIME: (HH / MM)



Thank you. Please take your next INR reading on Monday, the 11th of November. We will call at 15:18 to collect your INR reading. To confirm, please enter the day and the month of your next INR reading into your keypad using 2 digits for the day and 2 digits for the month. For example, 3rd of October would be 0310.

Thank you. If you need to speak to someone in the Warfarin Clinic, please call us on 01942 482630. We are available Monday to Friday, 9am to 5pm. Goodbye.

Clinic Perspective

How Health Call works for warfarin clinics that use 4S-DAWN



Health *Call*

Patient's INR reading is available immediately in DAWN for dosing

The screenshot displays the DAWN Clinical Framework 7.9 interface for patient 'Innes, Jamie'. The patient's INR reading is 2.2, which is 'In Range'. The target range for Atrial Fibrillation is 2.0 - 3.0 (2.5 Target). The current treatment plan is Warfarin 1 and 3mg Whole Tablets Weekly. The interface includes a dosing table for Warfarin (1 mg and 3 mg pills) and a 'Dose' field set to '(dose zero)'. A 'Warnings' section indicates 'Calc prevented: two previous doses needed'. A 'History' log shows a message: 'Patient had a change of medication' on 08/07/2015 23:17. The patient's contact information, including address and phone numbers, is also visible.

Once the dose has been calculated, it is sent to the patient by either email or automated phone call

Average dosing time per patient is approximately 30 seconds

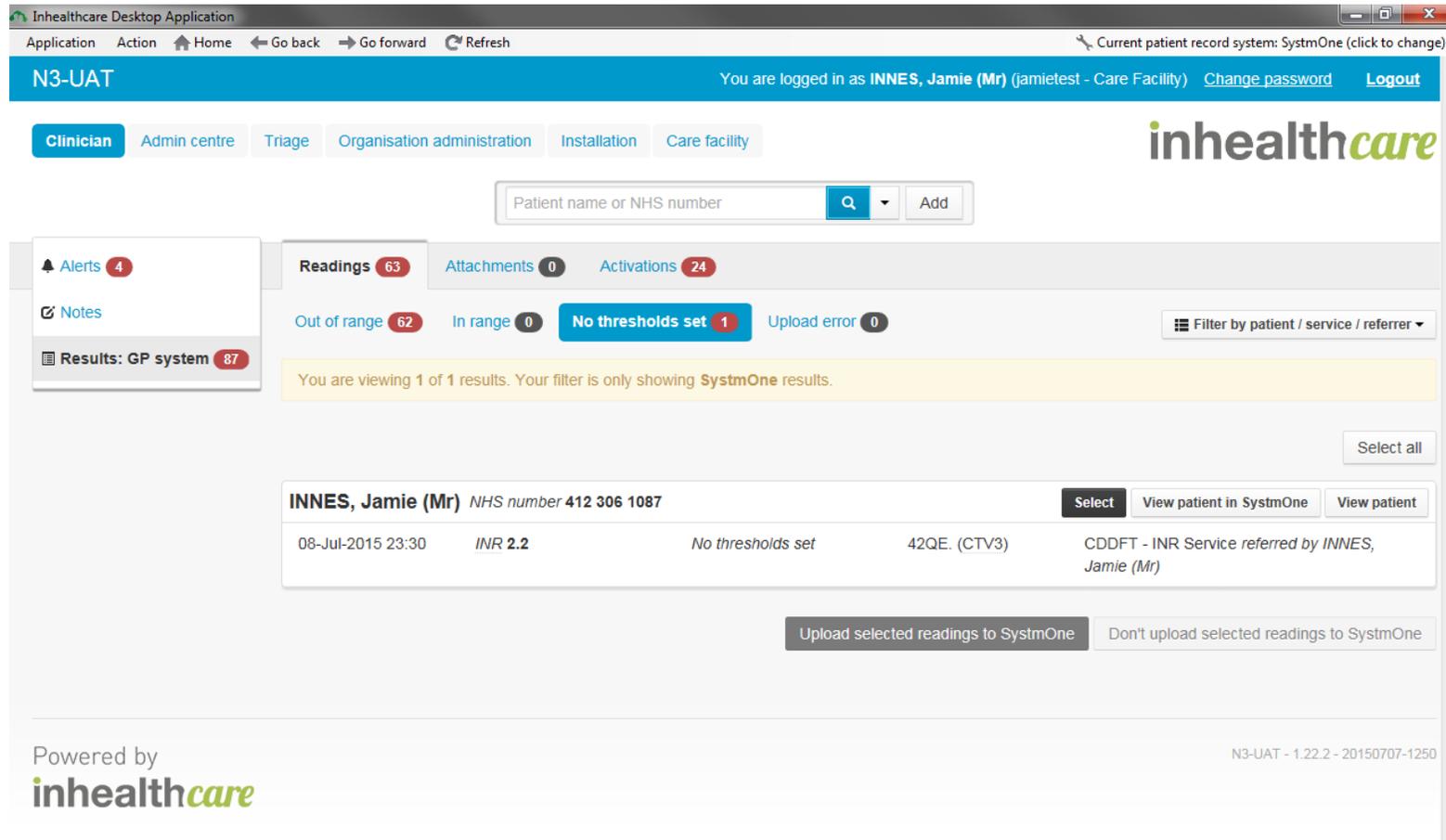
GP Perspective

How Health Call integrates with SystemOne and EMIS



Health *Call*

Message is sent to clinician informing them that a new patient reading is available



The screenshot shows the Inhealthcare Desktop Application interface. At the top, the user is logged in as INNES, Jamie (Mr) (jamietest - Care Facility). The main navigation bar includes 'Clinician', 'Admin centre', 'Triage', 'Organisation administration', 'Installation', and 'Care facility'. The 'Alerts' section shows 4 alerts, with a sub-section for 'Results: GP system' showing 37 results. The 'Readings' section shows 63 readings, with 62 out of range, 0 in range, 1 no thresholds set, and 0 upload errors. A filter dropdown is set to 'Filter by patient / service / referrer'. A yellow banner indicates 'You are viewing 1 of 1 results. Your filter is only showing SystemOne results.' The patient details for INNES, Jamie (Mr) (NHS number 412 306 1087) are displayed, along with a table of readings. The table shows a reading of INR 2.2 on 08-Jul-2015 23:30, with no thresholds set and a referral from CDDFT - INR Service. The interface also includes buttons for 'Select', 'View patient in SystemOne', and 'View patient', and options to 'Upload selected readings to SystemOne' or 'Don't upload selected readings to SystemOne'. The footer shows 'Powered by inhealthcare' and the version 'N3-UAT - 1.22.2 - 20150707-1250'.

Application Action Home Go back Go forward Refresh Current patient record system: SystmOne (click to change)

N3-UAT You are logged in as INNES, Jamie (Mr) (jamietest - Care Facility) Change password Logout

Clinician Admin centre Triage Organisation administration Installation Care facility

inhealthcare

Patient name or NHS number Add

Alerts 4

Notes

Results: GP system 37

Readings 63 Attachments 0 Activations 24

Out of range 62 In range 0 No thresholds set 1 Upload error 0

Filter by patient / service / referrer

You are viewing 1 of 1 results. Your filter is only showing SystemOne results.

Select all

INNES, Jamie (Mr) NHS number 412 306 1087 Select View patient in SystemOne View patient

08-Jul-2015 23:30	INR 2.2	No thresholds set	42QE. (CTV3)	CDDFT - INR Service referred by INNES, Jamie (Mr)
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Upload selected readings to SystemOne Don't upload selected readings to SystemOne

Powered by inhealthcare

N3-UAT - 1.22.2 - 20150707-1250

The clinician could be say a practice nurse at a GP practice, or a clinician in a community setting with access to SystmOne/EMIS

Health Call

Patient readings are reviewed and accepted/rejected

The image displays two screenshots of the inhealthcare desktop application interface, illustrating the process of reviewing and uploading patient readings.

Left Screenshot: The user is logged in as INNES, Jamie (Mr) (jamietest - Care Facility). The interface shows a search bar for patient name or NHS number. The main dashboard displays statistics: Alerts (4), Readings (63), Attachments (0), and Activations (24). Below these, it shows 'Out of range' (62), 'In range' (0), and 'No thresholds set' (1). A filter dropdown is set to 'Filter by patient / service / referrer'. A message states: 'You are viewing 1 of 1 results. Your filter is only showing SystemOne results.' A patient record for INNES, Jamie (Mr) with NHS number 412 306 1087 is visible, dated 08-Jul-2015 23:30. A 'Confirmation' dialog box is open, asking: 'Please confirm that you wish to upload the selected reading to SystemOne.' with 'Yes' and 'No' buttons.

Right Screenshot: The user is still logged in as INNES, Jamie (Mr). The dashboard statistics are updated: Alerts (4), Readings (62), Attachments (0), and Activations (24). The 'No thresholds set' count is now 0. The filter dropdown is set to 'Filter by patient / service / referrer'. A message states: 'You are viewing 0 of 0 results. Your filter is only showing SystemOne results.' Below this, a message says: 'There are no results for you to view.' A 'Summary' dialog box is open, displaying: '1 reading was successfully uploaded to SystemOne.' with an 'Exit' button.

The clinician may decide to inform the patient's GP if necessary

Health Call

Patient record in SystemOne or EMIS is updated

The screenshot shows the SystemOne patient record interface for Mr Jamie Innes. The window title is "SystemOne GP: Brian Marshall ('Other' Community Health Service) at United Telehealth Integration Test Environment - Patient Record". The patient's details are: Mr Jamie Innes 17 Dec 1988 (26 y) M, 51a, Chatsworth Place, Harrogate HG1 5HR, Home (preferred): 01423 510681 Mobile: 07843 665760, 412 306 1087 United Telehealth Integration Test Environment.

The interface includes a menu bar (Patient, Appointments, Reporting, Audit, Setup, Links, Clinical Tools, Workflow, User, System, Help) and a toolbar with various icons for search, task, discard, save, record, details, next, acute, IH Refe..., IH Resu..., IH CC, IH TLA, LONG, TLA-V..., DA TL..., DA CC..., CJ CC..., IH Refe..., IH Task..., IHDA, and INT1-CC. Below the toolbar are buttons for Start Consultation, Next Event, Event Details, Pathology, Drawing, Auto-Consultation, and Settings.

The main content area is divided into two panes: Clinical and Administrative. The Clinical pane is active, showing a "Quick Glance" section. The "Quick Glance" section includes:

- Appointments at this Location
- Common Measurements
- The Quick Glance template has no information to show. Double click here to record values.
- Drug Sensitivities & Allergies
- Outstanding Recalls
- Last 3 Consultations

The "Last 3 Consultations" section shows three entries:

- 26 May 2015 17:41... X770D Oxygen saturation at periphery
X770D Oxygen saturation at periphery (X770D): 87 % "Added by the Inhealthcare platform"
Done By Brian Marshall ('Other' Community Health Service) - Location: Surgery
- 26 May 2015 17:45... X773s Pulse rate
X773s Pulse rate (X773s): 76 bpm "Added by the Inhealthcare platform"
Done By Brian Marshall ('Other' Community Health Service) - Location: Surgery
- 08 Jul 2015 23:30... 42QE. International normalised ratio
42QE. International normalised ratio (42QE): 2.2 "Added by the Inhealthcare platform"
Done By Brian Marshall ('Other' Community Health Service) - Location: Surgery

The bottom status bar shows search features, a search input field, and a "Changed" indicator with the time 23:36.

Any Questions?

Thank You

For more information please visit nhshealthcall.co.uk/INR