



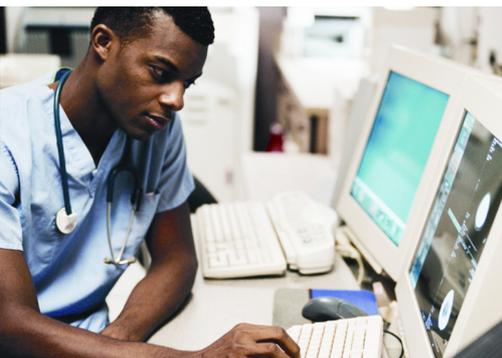
Boost quality of care and patient reassurance



Have patients rave about your clinic's service



Manage patients & their data without stress



Always have up-to-date patient information



Why Computers in Rheumatology

WHY COMPUTERS? PEOPLE MATTER

Where does YOUR time go?	1
It's fine – what's the problem?	3
Being human	4
The human vs the machine	5
A day in the life of a Rheumatology Nurse	6
Setting goals for a new way of working	8
A new day in the life of a Rheumatology Nurse	9

WHY COMPUTERS? A BLUEPRINT FOR A NEW SYSTEM

It's fine – what's the problem?	15
What you want to know about your service	16
The 5-step blueprint for a new system	17
1. Match software to your goals	17
2. Select your software	18
3. Construct a Business case	20
4. Prepare for the software	22
5. Put a project manager in charge	24

Why Computers in Rheumatology informs nurses, doctors and clinic managers about the role of software in providing quality of care, safety and productivity in rheumatology clinics. Part one explores daily clinical experience: common risks that face clinicians and patients, the respective strengths of people and computers and how the right software can reduce both workload and risk. Part two considers the clinic as a whole: systemic risks that can be avoided and essential data that should be available to every clinic manager. A 5-step blueprint provides a guide through the process of selecting and implementing software, with easy-to-use checklists, templates and guidance for each stage.

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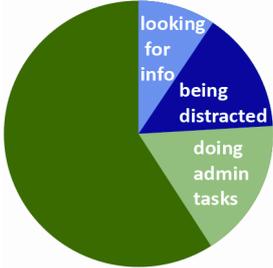
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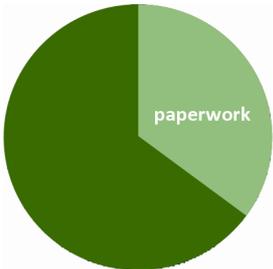
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save time :: more care

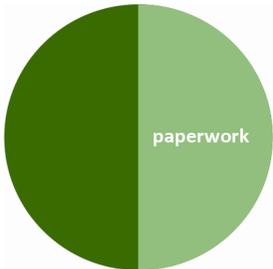
people matter



Healthcare professionals



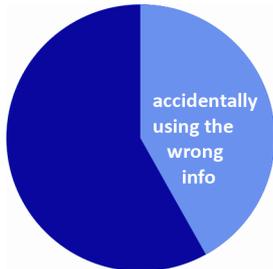
Physicians



Nurses

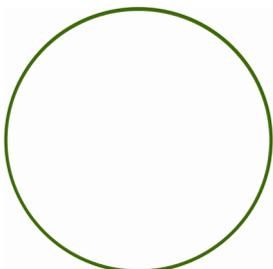


Managers



Managers and information

Where does YOUR time go?



why computers?

"Healthcare professionals lose 9% of their time looking for information, 15% of their time being disturbed and 17% of the time doing administrative tasks".
(Outpatient clinics: where is the delay?, HRH Patel et al J R Soc Med 2002;95:604-605)

"Physicians at some sites spend 35% of their time and nurses spend 50% of their time completing paperwork"
(Integration of Health Information Systems: The Highway to Health-Part 1", Drug Benefit Trends, November 1996).

"Managers spend up to 2 hours per day searching for information. 59% miss information that would be valuable to them. 42% of managers say they accidentally use the wrong information."
(Accenture Survey 2006)

It's fine - what's the problem?

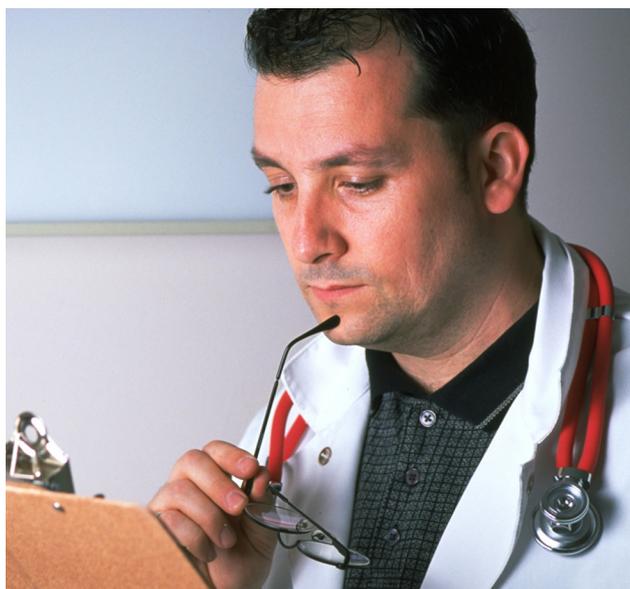
Incidents, mishaps and near-misses happen easily – here's a list of real-life examples to get you thinking. They're not in order of severity and the outcome isn't given here, but some are potential adverse events. How serious do you think each one is?

0

No problem

10

Potential
adverse event



☛ The wrong file was pulled for a patient and they were given the wrong treatment.

☛ A patient's file was missing and essential treatment was delayed.

☛ A patient had two duplicate files and the file pulled didn't have their latest information.

☛ The patient's information was copied incorrectly off their old file.

☛ A patient had an out-of-line result, but nobody noticed.

☛ Changes in medical conditions have not been passed on to the clinic, where such a change would affect the dosage.

☛ A patient's next clinic visit wasn't organised.

☛ An unstable patient did not attend the clinic because he was inadvertently omitted from the transport/ambulance list and therefore not collected.

☛ A patient missed their appointment and a new appointment letter wasn't sent.

Which ones do you think were potential adverse events?

How would you stop this from happening?

why computers?

Being human

Human error rates are 3/1000 for making mistakes, 1/100 for forgetting things and 1/10 for not checking. These increase in certain conditions.

Error-inducing condition	Risk
Unfamiliarity with task	x17
Time shortage	x11
Inadequate checking	x3
Disturbed sleep patterns	x1.6

Three groups of factors contribute to incidents: intrinsic error tendencies, error-inducing conditions and the environment. The formal list of Generic Incident Cause Classification includes...

- inadequate information processing / decision making
- inadequate physical and mental attributes
- resource overload / pressure / haste
- inadequate communication / instruction
- low motivation / co-operation
- personal stress / illness / tiredness / medication
- busy / unorganised situation

But you're well-trained, hard-working, motivated and organised – right? So here's the human list:

- You have a bad cold from your colleague who insisted on soldiering on – and making mistakes. You sensibly keep your germs at home and call in sick. They're understaffed.
- After a long time single, you've just met someone amazing and all your blood has turned to champagne. You're concentrating on work... but you're still buzzing!
- One of your parents fell and hurt themselves – suddenly you're worried about their future. Can they still live alone? What are their finances like? What can you do?
- You're moving house – you're excited, but boxes are stacked high in echoing rooms and you can't find *anything*. Tonight you'll stay up late again unpacking.
- Last night, your child was sick – you were up three times in the night and now you're operating on coffee alone. You think you might be coming down with it, too.
- Your best friend's engaged! Last night you toasted their future with them and had a brilliant evening. But how on earth did you keep that up as a student? Ow!
- You and your partner have been having a difficult patch. You talked everything through yesterday, but couldn't resolve it. Where's this going? How do you fix it?
- You spent the weekend at a wedding on the opposite side of the country – wonderful, special, fun and now you need another weekend to recover.

Humans fall in love, have parents, move house, look after children, get engaged, work through relationship issues, get married – and catch colds. We like being human. (Except for the colds.)

How do we stay human *and* do a perfect job?

Humans are also good at spending time with family and friends, going swimming or jogging, making great food, relaxing and expanding their businesses.



Nudge for best practice

Cass Sunstein, a legal scholar, and Richard Thaler, an economist, coined the "nudge" system. Most systems assume people make sensible choices, consider the long-term and do what's right.

Most people don't. Nudge theory recognises that we're human – we like the status quo not change, we're madly optimistic (it'll be *fine!*), we *don't* want to work harder and be more disciplined, and

The human vs the machine

What machines are good at

- **Keeping unique files**, even when patients' names are the same or they've switched clinic, with prominent unique information
- **Keeping files in one place**, no matter who used them last
- **Preventing duplicate files** from being created – even if the original was last seen by your predecessor ten years ago
- **Copying information perfectly** – every time, every number, every dot
- **Noticing important correlations** in a split second – and results outside a set parameter
- **Sending crucial information** to the right people – instantly, automatically – by sending automated emails, printing out letters, or creating a telephone list
- **Prompting people** for the next step – the next appointment, the next test
- **Keeping track of key dates** – and issuing reminders
- **Storing multiple people's diaries**
- **Making lists** of patients to be seen and patients that should have been seen but weren't
- **Creating and printing standard letters** with the right information in the right places and never accidentally saving over the template – in less than a second
- **Gathering and interpreting information** – how many patients, what medication, what percentages, non-attenders, success rates – and matching it to targets
- **Remembering everything** – no matter how much there is
- **Having exactly the same level of efficiency every day, every month, every season**

How many of the incidents, mishaps and near-misses would machines prevent?

What humans are good at

- **Making complex decisions**, especially when the information isn't complete or is contradictory
- **Seeing the bigger picture** and knowing when the automated suggestion is the wrong one
- **Eliciting information from patients**, especially those who don't like to "make a fuss"
- **Understanding** the effect of outside circumstances
- **Communicating** flexibly and responsively

To make the most of humans *and* machines, putting in data **MUST** be...

- **easy**, intuitive, quick
- **on-the-spot**: running alongside treatment, not building up extra work
- **limited to the appropriate amount**: enough to be useful, not so much that the system isn't useful

we really *won't* remember everything. So why have a system that pretends we're not human?

Nudging is a new style of "choice architecture" – the best choice is the *default* choice. For example, savings. Jo saves up and puts money in

a savings account each month. Nicky has a standing order into a savings account. If Jo doesn't have enough, it's easy to deposit less. If Nicky's a bit short that month, the standing order *can* be cancelled... but probably won't be. Who'll save more?



Is your best practice the default? Or does your best practice require some extra effort? Start nudging. Capture your best-practice defaults in the computer system.

why computers?

A day in the life of a Rheumatology Nurse

The story of Maggie Marshall, Rheumatology Nurse



Maggie is a 45-year-old Rheumatology Nurse who leads a busy working life. She has been running rheumatology-based clinics at the Regent Health System for the last five years and keeps a record of her patients using patient notes combined with the Health System's Patient Information Software.

When she first joined the hospital she found the software side of her job intimidating. With limited computer knowledge, the idea of keeping an electronic record of her patients was a daunting prospect! She's more used to it now, but she knows any mistakes can have safety implications.

Throughout her time at the Regent Healthcare system, she's come across several hassles which slow her down and make her work less efficient.

Here are just a few of the hassles Maggie deals with:

☹ Awkward paper patient records

The current system relies on flowsheets and notes. When the patients arrive, their information needs to be located. All the flow sheets are usually spread out around various physicians' desks and drawers, making it very time-consuming!



Maggie knows it's both quicker and safer to have this information stored on computer – but she thinks the computer packages aren't user-friendly. It's not straightforward to find all the different information on one patient and clicking between different screens is confusing and laborious. Struggling to use a system which isn't clear would add time onto her general tasks. And at least the paper does what she tells it to! She's sure there must be an easier, more efficient computer system for her and her colleagues, which would be quick, easy to use and have good, friendly telephone support when they hit a problem.

☹️ Struggling to detecting trends

Maggie finds that a few of her patients have rising and falling result patterns. This makes it complicated to detect a possible problem before it arises. It's time-consuming to find these out of the results from the lab reports or from accessing the lab system computer.

How I detect trends

Note-taking: how best?

☹️ Muddy notes system

Because she handles her patients on a face-to-face basis, she often finds out small pieces of information about the patient during each visit. She would like to record this in an orderly way, so that any notes can be viewed easily. This would help her to decide the appropriate course of action for each patient.

How I do non-attenders

☹️ Handling non-attenders

At the end of each clinic, Maggie has to reschedule the patients who didn't attend – either by phoning them or by sending a letter.

It isn't easy to identify these patients immediately, so she spends more time than she wants to sorting out the paperwork and making phone calls to patients.

why computers?

Setting goals for a new way of working

Maggie's goals

Maggie believes that improvement comes by making better judgements in individual patient cases. When she's unsure about a decision, she asks her consultant to review it after a clinic. Her work can be both busy and frantic – there aren't enough hours in the day to get everything done. She'd welcome any way of making some of her tasks more efficient, so that she has a little more free time to spend with her patients.

Maggie's goals for improving her working day are as follows:

- Get through her large workload
- Be both safe and consistent
- Meet deadlines
- Catch exceptions
- Get home in time for dinner with her family!

What are your goals for you and your clinic?

- Handle non-attendance efficiently
- Eliminate the time required to look for notes

- Produce letters / e-mails / faxes automatically
- Eliminate unnecessary paper records

- Identify patients not monitored
- Shorten the time to act when response to treatment is poor
- Review dosage records

Rate these end goals in order of importance for YOU.

- Reduce clinical risk
- Prevent incidents
- Increase clinic capacity
- Reduce administration costs
- Reduce drug costs
- Improve patient care
- Facilitate audit and research

Now try matching them up to the process goals around the edge.

- More time for each patient
- More efficient communication

- Access to data on patients in your care
- Review reasons for failed therapy
- Collate information on successfully-treated patients

- Identify side-effects early
- Act when patients are not monitored
- Demonstrate adherence to relevant guidelines

- Avoid losing important information
- Quickly identify abnormal trends
- Reduce human error in reviewing numerical results

How would you achieve these goals in your clinic?

A new day in the life of a Rheumatology Nurse

Maggie Marshall's typical day since using DAWN: a user-friendly software package backed with good support



Move between clinics easily

Previously, Maggie struggled to access her patient data in some clinics. To her delight, the new software package is web-based, so she can access it directly from each clinic location.

• Eliminate unnecessary paper records

Get clinic lists

With DAWN, Maggie can use a *list view* to show all the patients she is expecting, in appointment order.

The screenshot shows the 'Attendance for tests' section of the DAWN software. It includes a filter sidebar on the left and a main table of patient appointments. The filter sidebar has dropdowns for 'With' (Unfiltered), 'All' (All patients), 'All risk classes', 'All diagnoses', 'Between' (01/05/2009 to 31/05/2009), 'All types', and 'All roles'. The main table has columns for Time, Appointment, Hospital No, NHS No, Last name, First Name, Therapy, and Interval. The table shows 6 records found for 'Ochill Clinic 1 (Outpatient Service)' between 01/05/2009 and 31/05/2009.

Time	Appointment	Hospital No	NHS No	Last name	First Name	Therapy	Interval
	01/05/2009	654567		Pattern	Pat	Salazopyrin: long-term ...	30
09:00	08/05/2009	987654	566-636-6636	Green	Benny	Continue monitoring: Continue...	90
09:00	14/05/2009	EE23452345		Maloney	Sonny	Continue monitoring: Continue...	90
	18/05/2009	82453712		Middleton	Ruby	Gold+Etanercept: Assessment...	14
	18/05/2009	9876543		Penne	Bonny	Salazopyrin: initial mo...	14
09:00	19/05/2009	58476236478		Harry	Deborah	Penicillamine: monitoring...	30

The default list shows all patients with tests scheduled for any clinic running today. Today she selects the Moorside clinic from the drop-down list, so only Moorside patients are displayed.

Get the right file quickly

The first patient at Moorside, Hedley Stephenson, arrives in the clinic. Maggie used to make sure she could get into the old system before she invited patients into the clinic room. She needed to make sure that she could find the correct patient record, with no difficulties.

• Eliminate the time required to look for notes

Now, she feels more confident and in control of the system, so Hedley is brought into the room immediately. If a patient arrives who isn't in Maggie's Moorside clinic list, it's easy to search for that patient using several options – name, date of birth, address, etc – and add the patient to the Moorside Clinic list.

Maggie clicks on Hedley's name in the list to display his record in *patient view*. The first time she saw the new software's *patient view* screen, she thought it looked complicated. But within a few hours of using it, she'd got to grips with where everything was – and realised the massive advantages. She loves it that everything is in one place. She doesn't have to hunt around for information or find her way through a

why computers?

- Access to data on patients in your care

succession of screens. She never ends up stuck and wondering how to get out of a screen or get back to where she started!

Stephenson Hedley 01/07/1938 H6725631 57 Woodman Cottages Colliery Row, Tow Law

Risk class: High Risk
Pref. clinic: Ochill Clinic 1 (Outpatient Serv)
Phone: 54-1212345 - home
Trt. plan: RH: 11/01/2009 active

Age: 70
Start date: 11/01/2009
Duration: Indefinite
Diagnosis: Oligoarthritis
Risks: alcoholic
Therapy: Rheumatology - Continue monitoring
Reference range: Male over 70

Interventions: Letters | Drugs | Events | Procedures | Reviews | Reminders | Groups | Documents | Owners | Account

Therapy: Continue monitoring, Phase: Continue
Date: 08/05/2009 Type: Blood tests

Test	Value	Status
WBC	1.6	✓
ALT	15.4 U/L	✓
Bilirubins (total)	4.3	✓
Platelet count	343.0	✓
Haematocrit	38.2	✓
Haemoglobin	11.70	✓
Mean Corpuscular Volume	99	✓
Monocyte count	0.8	✓
GGT	11	▲

Graph | History | Personal | Treatment plans | Ad Hoc Questionnaires | Test Results | Interface Warnings

RH: Rheumatology active
Start date: 11/01/2009
Duration: Indefinite
Diagnosis: Oligoarthritis -
TherapyTemplate: Continue monitoring

stopped
Start date: 28/12/2008
Duration: Treatment stopped - Stopped at: 16/05/2008 15:56

The patient photograph is a good quick check that she has the right record. If the patient is new or (as sometimes happens) doesn't look like their photograph, their name is displayed in large letters at the top of the screen, along with their hospital number, date of birth and address.

Stephenson Hedley 01/07/1938 H6725631 57 Woodman Cottages Colliery Row, Tow Law

This is handy because the patient can easily confirm their date of birth and address, but seldom remembers their hospital number.

Spot out-of-line results immediately

When Maggie has so many results to review, DAWN helps by showing patients with flagged results. Results are flagged according to the Rheumatologist's limits and the flagging is much easier to follow than searching hundreds of laboratory reports. Hovering over the symbols reminds Maggie of the local protocol to follow.

- Quickly identify abnormal trends

Therapy: Adalimumab, Phase: monitoring 2-weekly
Phase time: 60 wk/100 w
Date: 23/03/2009 Type: Blood tests

Test	Value	Status
ESR	22.0	✓
ALT	12.0 U/L	▲ -50%
Platelet count	777.0	✓
Alkaline phosphatase	143.0	▲ -41.4%
Creatinine (serum)	88.00	✓
CRP	6	▲ +42.2%
Systolic blood pressure	159	✓
Diastolic blood pressure	103	▲>>

Refer to primary care physician for BP management

Read treatment history in a glance

As well as seeing a quick summary, Maggie can tell immediately how Hedley's treatment has varied: she glances swiftly at his *treatment history* in the bottom right section of the screen.

active	
Start date	04/03/2009
Duration	Indefinite
Diagnosis	Inflammatory arthritis -
TherapyTemplate	Salazopyrin
stopped	
Start date	17/09/2008
Duration	Treatment stopped - Stopped at: 24/02/2009 10:57
Diagnosis	Inflammatory arthritis -
TherapyTemplate	Continue monitoring
Notes	Plan to monitor for at least 3 months off therapy
Cessation Reason	increase in disease activity

- Reduce human error in reviewing numerical results

Greater access to notes

In the bottom section of the patient screen, Maggie reads *quick notes* from other health care professionals. Most of these record telephone conversations or correspondence with the patient or their family doctor between ordinary clinic visits. They appear in descending order, with the most recent at the top. The date, time and author are automatically filled in. Any notes added since the patient's last clinic visit are highlighted in yellow.

Area Hospital - Dowson Heather	26/08/2008 11:20	▲
R shoulder pain after lifting ladder		
Area Hospital - Dowson Heather	23/04/2008 12:58	
Bonny phoned reception to say they she forgot to go to get her blood taken		

- More efficient communication

Maggie sees that Hedley spoke to her colleague last Friday and asked for a copy of the new drug pamphlet which the service now distributes. Maggie keeps several copies in her bag, so she fishes one out and gives it to Hedley.

Make quick notes to standard questions

As part of the visit, Maggie asks Hedley the standard questions that she asks all patients: has he had any change to his medication or symptoms, any nausea, pain, or headaches. He answers "No" to all of these. Maggie quickly types "qn". This automatically expands to show all the questions, each with an answer of "No", when she saves the note. The code for "quick no" is easy to remember, because she set it herself!

Any change to medication?	N
Any change in symptoms?	N
Any nausea / pain?	N
Any headaches?	N

- Avoid losing important information

why computers?

- More time for each patient

Before she used DAWN, Maggie used to only record the details in her system if a patient answered “Yes” to a question. She just didn’t have time to type everything out. Coded comments, with the date, time and author added automatically, have made the process so quick and easy that she now records everything. If the patient answers “Yes” to any question, she uses a different coded comment (“.q”) to insert the questions. She’s defined other coded comments for standard answers. She can spend less time writing and more time talking to the patient – without losing important information.

Complete questionnaires efficiently

- Shorten the time to act when response to treatment is poor

Previously, all patient questionnaires were kept on paper and not recorded on the database. This meant paper sheets could get lost and weren’t easily accessible to be analysed or to print out for the patient. With DAWN, even picture-based questionnaires can be kept on the database. Maggie can quickly see their responses to previous questionnaires and she can monitor the scores.

Questionnaire (Jurnu Mark (01/01/1955))

EntryDate: 23/04/2008

ESR: 22.0

Patient global score (0: worst - 100: best): 88

Swollen Joints: Number 3

Tender Joints: Number 2

DAS 28 Result: 3.61

Make appointments

- Eliminate unnecessary paper records

DAWN suggests a two-month interval to Hedley’s next test, but Maggie wants to see him again in a month’s time to do some tests. She simply clicks the *calendar control* and clicks back one month – no need to flip through everyone’s diaries at reception.

Next: 09/10/2006

< October > < 2006 > X

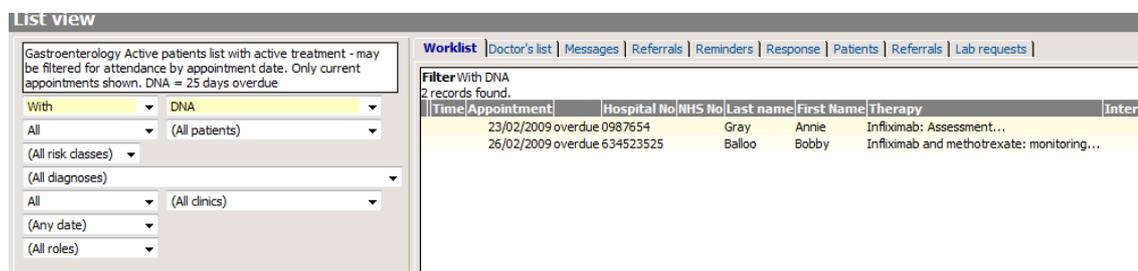
Sun	Mon	Tue	Wed	Thu	Fri	Sat
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31	1	2	3	4

calendar control

Handle non-attenders

When Maggie finishes the clinic, she needs to sort out her non-attending patients. In the new system this is easy. When a patient hasn't attended clinic, they can be automatically placed onto a *message center phone list*. If their preferred method of contact is by phone, Maggie can work down this list to phone them:

- Handle non-attenders efficiently



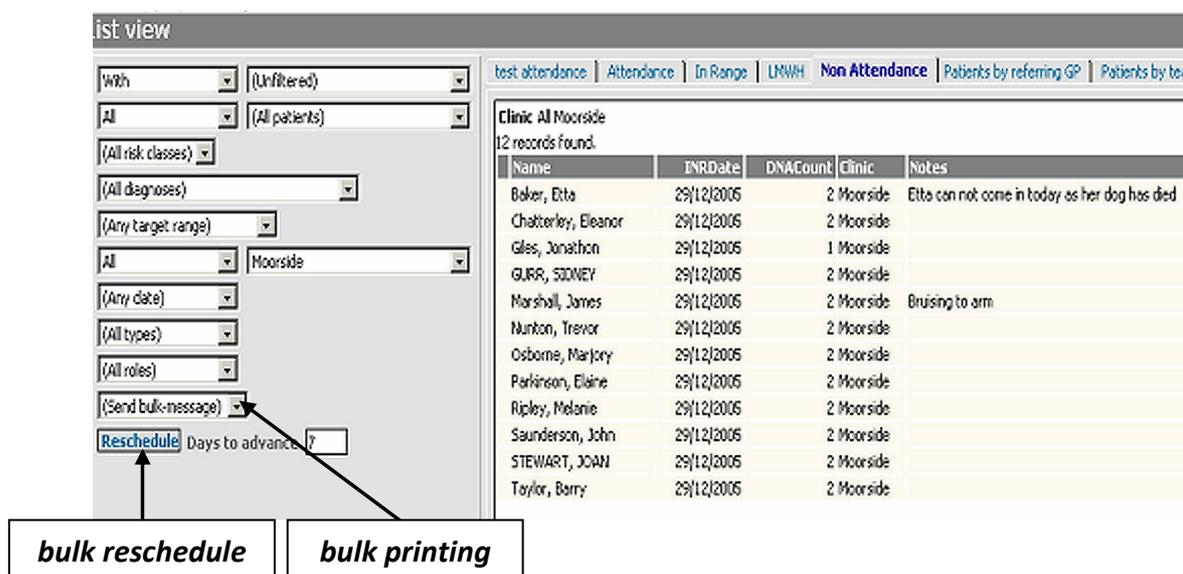
- Identify patients not monitored

If the patients can't be contacted, this can be logged on the system and they stay on the list for Maggie to call at a later date.

- Act when patients are not monitored

For patients who prefer to be contacted by mail, Maggie can bring up the *non-attendance list view* and bulk-print all letters at once. All tabs and columns in the list view can easily be customised, so Maggie can see all of the information she needs. This saves a lot of time.

- Produce letters / e-mails / faxes automatically



DAWN has significantly reduced the amount of preparation and post-clinic work Maggie has to do for what she sees as 'the computer's benefit'. She also feels the computer is now supporting her, rather than fighting her. As a result, she feels she is now spending the majority of her time dealing with patients and therapy issues, not computer issues, which makes her much happier.

- More time for each patient

why computers?

Maggie also feels confident in her use of DAWN and as a result, her patients are very well controlled. She has been able to adjust DAWN easily to fit around her desired workflow, which has made her working day both easier and shorter. These are only a few of the DAWN features that Maggie likes.

Provide information for research, audits and meeting guidelines

Not only is Maggie's day easier and more efficient, not only are her patients getting more time and better care, but by doing this she's collecting essential data for the clinic and for researchers. Here's some typical information that clinic manager, consultants, physicians, or researchers may want:

- How many of my rheumatoid arthritis patients are on methotrexate?
- Do any of my patients need their cardiovascular risk factors assessed? (BSR & BHRP guideline, 2009)
- How many patients are assigned to each specialist nurse?
- What proportion of patients with recent-onset active RA, have CRP and joint scores recorded monthly? (NICE Guideline 79)
- What proportion of my patients have had an annual review including HAQ in the past 12 months? (NICE Guideline 79)
- How many patients failed to get their blood test last month?
- Have the number of tests requested from pathology risen this year?

• Collate information on successfully-treated patients

• Review reasons for failed therapy

• Demonstrate adherence to relevant guidelines



a blueprint for a new system

It's fine - what's the problem?

Try rating your clinic's quality of care and safety¹: tick all the boxes that are *true*, then check your total.

Identifying patients at risk

- We use a checklist to ensure each patient's details and previous history are well documented.
- We can easily identify patients at risk and make sure they're regularly reassessed.
- Any changes in medication, lifestyle and circumstances are included in each patient's records.
- Communication within the department is timely, accurate and complete.

/4

Day-to-day therapy management

- We ensure that each patients is contacted with their treatment information and appointments, either at the clinic, by telephone, or by post.
- We can easily identify patients who've had an out-of-line test result, who've failed to attend, who haven't been given a future appointment, or who are due to stop their treatment.
- On each patient visit, we check whether the patient is taking their medication correctly, has any side-effects or new symptoms, is taking any interacting medication and ensure they tell us about any changes without assuming we already know.
- Each patient undergoes their clinical review annually or at the appropriate interval.

/4

Change in patient status / treatment

- Changes in each patient's treatment is communicated to the patient and to other physicians, nursing staff and departments who need to know.
- Each patient's problems, concerns, events and issues are entered into the patient's records and can be passed to the relevant physician.
- Patients on temporary suspension aren't lost from the system.
- We ensure that patients who should have their therapy terminated do so.

/4

Administering treatment

- We have a consistent standard for adjusting medication and interval setting, so each patient is seen at the optimum interval.
- We prevent handwritten errors when preparing medication instructions and test dates.
- We have checks to ensure that recording of patient and treatment details is correct.
- All incidents, errors and near-misses are fully documented and brought to the attention of a senior member of staff.

/4

Computer system

- We check our system regularly for viruses and prevent anyone interfering with the software.
- Our system is protected from power failures and power surges.
- Our data is routinely backed up, the back-ups are safe and the tapes are renewed regularly.
- Staff have the necessary level of access only and when they leave, it's removed.

/4

Clinical overview

- We know exactly how many patients we have and what treatments they're on.
- We can easily track the cost of patient treatment.
- We know if we're meeting NICE guidelines and government targets.
- We know if we're meeting Care Quality Commission and National Patient Safety Agency standards.
- We have regular internal audits.

/5

Total: 25

1: Checklists compiled by 4S Information Systems from: • Goldhaber SZ. *Malpractice Claims Related to PE and DVT*. Forum. 1994;15: 5. (Harvard Medical Institution Inc.) • Bates D. *Anticoagulants: Errors in Their Use and Claims*. Forum. 1994; 15: 5. • Goldhaber SZ. *Outpatient Monitoring of Anticoagulation*. Forum. 1994; 15: 5. • Farrell-Vinay P. *Software Quality Assurance*. 1992. • Kletz T. *Computer Control and Human Error*. 1995. • Wells G. *Hazard Identification and Risk Assessment* 1996

why computers?

What you want to know about your service

What do you want to know about your clinic? How easily could you find out?

The charts and tables are from a UK Rheumatology clinic (adjusted to protect privacy). Their data was drawn from DAWN; the picture graphs were generated using Tableau: www.4s-dawn.com/Tableau/.

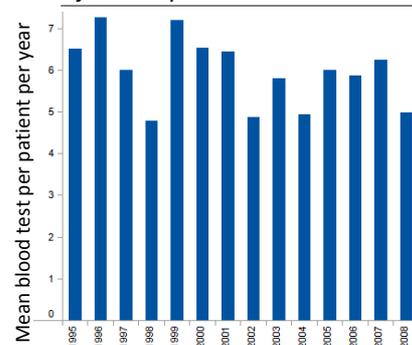
The Great Western Hospital case study (p17) is adapted from that hospital's poster².

The right software can provide quality of care and safety checklists, record patient data accurately and fully, identify and flag up risks, ensure good communication between health care professionals, keep your data safe and secure and give you clinic-overview data.

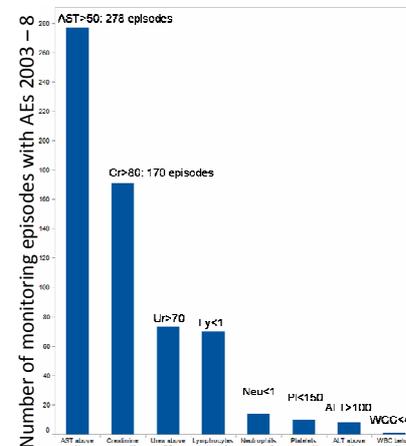
2: An innovative approach to monitoring patients on DMARDs leading to improved patient safety. Dept of Rheumatology, The Great Western Hospital, Swindon, Wiltshire. Elizabeth Price, MD FRCP et al.

RESEARCH CHARTS extracted from DAWN software

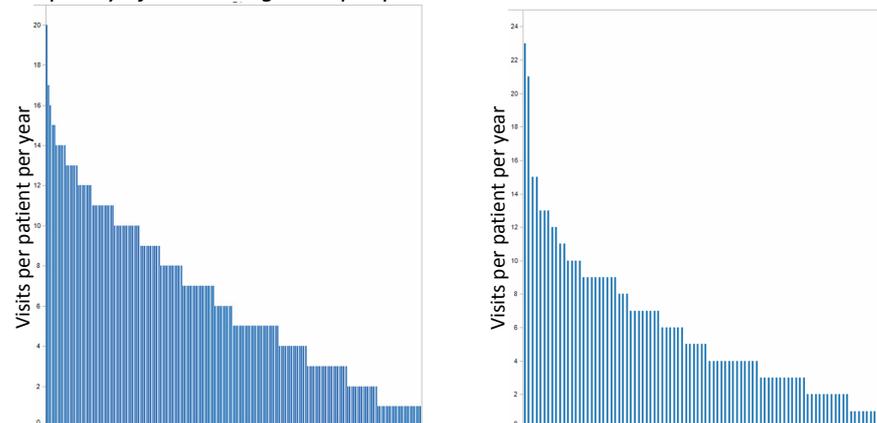
How often are patients monitored?



MTX monitoring: The "Top 8" abnormal blood tests



Frequency of monitoring visits per patient: 2003 v 2007



CLINIC TABLES extracted from DAWN software

All patients monitored 1995 – 2009

Current Status

	RA	Other	Total
Active monitoring	1020	500	1520
Inactive / discharged	1920	1120	3040
Suspended	2390	1370	3760
Grand Total	5330	2990	8320

What happens when an abnormal test is detected?

	AST > 50	CR > 80	Ly < 1.0	Neu < 1.5	Plat < 150
Abnormalities	96	28	12	3	1
Actions					
Watch & wait	78	27	12	3	1
Repeat test	12	1			
Stop drug	6				

RA patient monitoring episodes 2003 – 2007

	Patients	Visits	Pts with Trends	Visits with Trends	Trends	Trends / visit
2003	2250	10240	390	1574	2660	1.69
2004	2460	10490	1060	3376	5740	1.7
2005	2700	12060	1260	5286	8880	1.68
2006	2920	12770	1300	5763	9740	1.69
2007	3150	13960	1290	5938	10510	1.77
Total		59500		21937	37530	1.71

a blueprint for a new system

The 5-step blueprint for a new system

1. Match software to your goals
2. Select your software
3. Construct a business case
4. Prepare for the software
5. Put a project manager in charge

1. Match software to your goals

Use these 5 essential goals to draw up a shortlist of good software.

<i>Your goal</i>	<i>The software</i>	_____	_____	<i>Dawn</i>
Reliable	Error-free & mistake-proofed for safe operating	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Easy to use	All information in one place, helpful error messages	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Tried & tested	Well-established, not the latest software wonder	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Quick service	Responsive to enquiries, know their product well	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Friendly	Approachable staff, don't make you feel stupid	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Training	A variety of support materials and manuals	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Customisable	Can be adapted to suit your workflow	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Next: Select your software

CASE STUDY: Dept of Rheumatology, Great Western Hospital, Swindon, Wiltshire – BSR 2006

Monitoring patients with rheumatic diseases is increasingly complex: many patients use combinations of DMARDS and more are using biological agents. Potential adverse events required more vigilant systems. Local review identified flaws in our current practice, including:

- We couldn't detect patients not attending blood tests
- We couldn't detect deteriorating trends in results
- Local GPs were unhappy about being responsible for DMARD monitoring

In response, we have developed a hospital-based monitoring service using a commercial database supplier (DAWN). They worked in conjunction with our Hospital IT department and our pathology department to develop an integrated database whose workflow echoes our daily clinical routine.

The new service is run by a team of Specialist Nurses who co-ordinate the system. This has led to an improved service, increased safety and a more streamlined approach to these patients.

Positive Outcomes

- Blood results are available within 24 hours, so prompt action can be taken as needed, eg identify severe pancytopenia and initiate rescue treatment in hours .
- Patients not complying with blood monitoring know that repeat prescriptions may be withheld. We have not had to refuse treatment, but 5 patients have had warning letters.
- We improved our ability to see last blood result and blood result trends before issuing further prescriptions.

why computers?

2. Select your software

Look at your requirements

Make your own checklist based on the following points. Then, check if the company meets your needs.

Consider your current requirements

Capacity: how many patients do you have, how many users *at the same time?*

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
--------------------------	--------------------------	--------------------------

What data do you need to store?

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
--------------------------	--------------------------	--------------------------

What kind of workflows do you have?

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
--------------------------	--------------------------	--------------------------

What outputs do you need – eg. letters / emails / phone lists?

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
--------------------------	--------------------------	--------------------------

Security: do you need complex passwords? restricted access?

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
--------------------------	--------------------------	--------------------------

Will your requirements change in the future?

Capacity: how many patients might you have?

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
--------------------------	--------------------------	--------------------------

What additional / new treatments might you have?

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
--------------------------	--------------------------	--------------------------

Will you need to interface with other systems?

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
--------------------------	--------------------------	--------------------------

Other questions to ask the software company

This list will help you get the information you need about the system. If something's unclear to you, don't be afraid to ask. After all, you want a helpful, responsive company. Consider this their first test!

Will the software be easy to install and set up?

Installation: how is it installed? who will install it?

Configuration: how is it configured? who will configure it?

Data migration: how will you get your data into the new system?

Are the suppliers and the software reliable?

What is their expected down-time? Is that acceptable?

Can the supplier give references? What do they say?

a blueprint for a new system

Is the software supported?

Does the supplier offer support? What are their hours / response times?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are there support resources? eg. manuals, troubleshooting guides	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Will you be able to solve problems yourself?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Will your IT department support the server and organise backups?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

In the future, is switching away from the chosen software easy and possible?

Will the database be accessible?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Is the database type compatible with other systems?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

How much does it cost?

Initial cost of the software license	£ _____	£ _____	£ _____
Is training included (if required)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Recurring costs	£ _____	£ _____	£ _____
Costs from other suppliers	£ _____	£ _____	£ _____
Internal costs	£ _____	£ _____	£ _____

Check for yourself

The only way to get a feel for a new system is to try it out. Ask the company if they have a demo version you can try out. Try using it *yourself* – not just watching them do things.

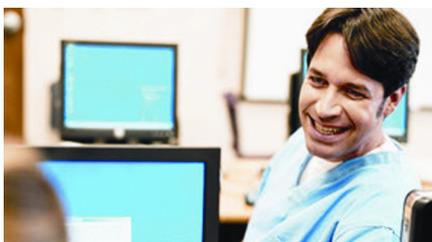
How easy is it to use? Try out a demo!

Are screens easy to read?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Is the next step intuitive?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

And finally...

Do you have the resources to introduce this software system?

IT resources	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Finance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Staff time to implement the system	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



Once you've chosen a system, you need to construct a business case for it.
Use a template to help you.

Next: Construct a business case

why computers?

3. Construct a Business case

Prepare a written case for approval by Management and Finance, using a proven template.

PROJECT OUTLINE	
<p>An increasing number of patients are receiving Disease Modifying Anti-Rheumatic Drugs (DMARDs) and biologic agents which, due to their known toxicity, require patients to have regular monitoring for side-effects and response to treatment. Patients on these drugs are required to be monitored using blood tests under the license for these drugs and as a good practice imperative recommended by the National Society for Rheumatology. Software is required to effectively monitor whether patients have attended for blood monitoring and whether their therapy needs review in light of abnormal findings. The only alternative method is manual filing, which is more labour-intensive and less mistake-proof.</p> <p>PROPOSAL: to introduce a new software system to maintain and enhance the current clinical service. The reduction in the administrative burden of current systems will enable nurse time to be freed and nurse-led clinics will increase the capacity for patient care.</p> <p>The ability to share information with GPs via the new software will improve communication with primary care and facilitate some trials on shared care for stable patients.</p>	
Current arrangements	<ul style="list-style-type: none">• <i>Detail whether you use paper records or another electronic system at present.</i>• <i>Include estimates of the number of staff involved.</i>• <i>Estimate the number of manual steps such as searching a laboratory database for results, highlighting results to a Consultant and generating letters.</i>• <i>List known causes of error, such as missing notes.</i>
Drivers for change - Regulatory requirements / service priorities to be addressed by the new software	<ul style="list-style-type: none">• <i>clinical governance issues: ensuring adequate monitoring and enabling prompt action to prevent adverse clinical outcomes</i>• <i>introduce efficiency statistics / savings: for example, currently the number of patients on each therapy is not known</i>

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<p>Please highlight any other benefits / operational issues to be delivered by the new software</p>	<ul style="list-style-type: none"> • service review • support medical audit and research • optional PCT access to patient care data • save physician time in reviewing all results • reduce administrative workload • research 																																													
<p>Clinical / corporate risk assessment of investment not progressing</p> <table border="1" data-bbox="114 611 815 954"> <thead> <tr> <th>Severity</th> <th>Definition</th> </tr> </thead> <tbody> <tr> <td>Catastrophic</td> <td>Potential for Multiple deaths/incapacitating events</td> </tr> <tr> <td>Critical</td> <td>Potential Single Death/Single incapacitating events</td> </tr> <tr> <td>Marginal</td> <td>Potential for incapacitating events</td> </tr> <tr> <td>Negligible</td> <td>Little or no potential for incapacitating events</td> </tr> </tbody> </table> <table border="1" data-bbox="114 994 815 1305"> <thead> <tr> <th>Likelihood</th> <th>Definition</th> </tr> </thead> <tbody> <tr> <td>Likely</td> <td>Happened before or something similar before</td> </tr> <tr> <td>Possible</td> <td>It has not happened before but COULD</td> </tr> <tr> <td>Unlikely</td> <td>It could happen in exceptional circumstances</td> </tr> <tr> <td>Very Unlikely</td> <td>No suggestion that harm will occur at all</td> </tr> </tbody> </table> <table border="1" data-bbox="114 1346 815 1624"> <thead> <tr> <th>Risk</th> <th>Negligible</th> <th>Marginal</th> <th>Critical</th> <th>Catastrophic</th> </tr> </thead> <tbody> <tr> <td>Likely</td> <td>B</td> <td>B</td> <td>A</td> <td>A</td> </tr> <tr> <td>Possible</td> <td>C</td> <td>B</td> <td>B</td> <td>A</td> </tr> <tr> <td>Unlikely</td> <td>C</td> <td>B</td> <td>B</td> <td>B</td> </tr> <tr> <td>Very Unlikely</td> <td>C</td> <td>C</td> <td>C</td> <td>C</td> </tr> </tbody> </table>	Severity	Definition	Catastrophic	Potential for Multiple deaths/incapacitating events	Critical	Potential Single Death/Single incapacitating events	Marginal	Potential for incapacitating events	Negligible	Little or no potential for incapacitating events	Likelihood	Definition	Likely	Happened before or something similar before	Possible	It has not happened before but COULD	Unlikely	It could happen in exceptional circumstances	Very Unlikely	No suggestion that harm will occur at all	Risk	Negligible	Marginal	Critical	Catastrophic	Likely	B	B	A	A	Possible	C	B	B	A	Unlikely	C	B	B	B	Very Unlikely	C	C	C	C	<ul style="list-style-type: none"> • potential increase in morbidity / mortality in this expanding patient group <p><i>For each task and routine, consider what lapses can occur and rank them on likelihood and severity – see tables. Take appropriate action according to the grid of risk.</i></p> <p>Risk = Severity x Likelihood</p> <p>Actions</p> <ul style="list-style-type: none"> • A: Unacceptable – redesign systems • B: Introduce new software / enhance current provision of service • C: Acceptable – do nothing <p>Risk reduction <i>Relative estimates³</i></p> <ul style="list-style-type: none"> • Competent human only: 1 • Competent human + software: 1:1.3 • Competent human + software + independent checks: 1:1600 <p><i>Software thus reduces the risks by approx 33%. If this is implemented in conjunction with a system of independent checks, risks are massively reduced.</i></p> <p><small>3: Impact of Human Error upon Patients Receiving Anticoagulation Drug Therapy. 4S Information Systems RMC Risk Management. September 2008.</small></p>
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<p>Costs</p>	<p><i>Refer back to costs from 2. Select your software.</i></p> <ul style="list-style-type: none"> • 1) Capital costs • 2) Recurring costs <p><i>Also include any project management, interfacing and hardware costs.</i></p>																																													

Next: Prepare for the software

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4. Prepare for the software

Your preparation will pay off when you start using the computer system. The data you need to collect is fairly simple and might already be recorded in your existing protocols and systems. It's a good idea to collate this data and get your clinical team and pathology colleagues to check for accuracy before installing your new software. If possible, get input from the whole team. Firstly, other people may be aware of things which aren't part of your day-to-day work. Secondly, being involved in the development gives people a sense of ownership of the new system: this makes training and take-up much easier.

Monitoring protocols

Which blood tests are routinely monitored for each type of therapy? For example...

Test	How often?	Therapies?
Gold	monthly	FBC, U&E, LFT, CRP
Azathioprine + Sulfasalazine	2-weekly, then monthly, then 6-monthly	FBC, U&E, LFT

List all the protocols applicable to your patients OR extract a list from your existing systems.

Test	How often	Therapies

Action limits

Which results need to trigger an alert for you?

Test	Result	Alert if...	Also if...
ALT	U/L	Alert greater than 80U/L	Alert rise greater than 25%
Neutrophils	109 /L	Alert less than 109 /L	

List all the tests and key results for your patients, and the action limits for each OR extract a list from your existing systems.

Test	Result	Alert if

Diagnoses

Diagnoses may fall into groups which would be useful in reviewing the effects of treatment.

List all the diagnoses to be recorded for your patients OR extract a list from your existing systems.

Diagnosis groups

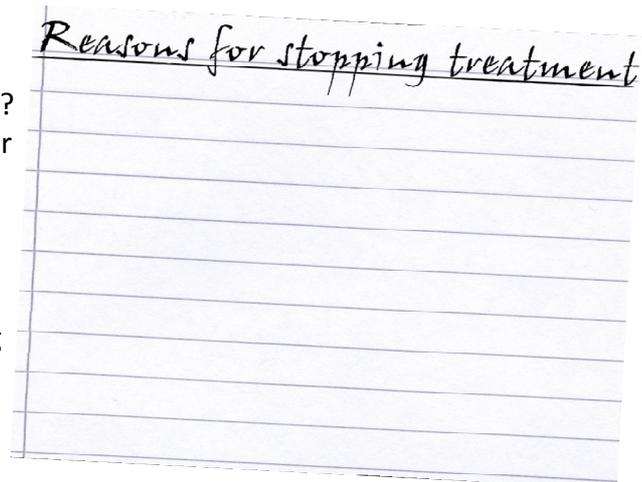
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Cessation reasons

How do you classify reasons for stopping treatment? These may be useful for audit of patient responses. For example...

- poor compliance
- rash
- abnormal liver function test

You may be able to extract this data from an existing system.



Patient pathways

What are your patient-care steps? Who handles them? How? Look at this New Patient pathway:

Step	Responsible	Interfacing requirements	Printing –manual	Automatic printing
patient registered in DAWN	Secretary	PAS interface will update PID		
referral letter scanned and stored in DAWN	Secretary			
assign treatment plan	Secretary			
appointment made in DAWN	Secretary			letter to patient
consultation	Doctor			
notes added to DAWN	Doctor / Nurse			
drug history, wt, BP, ... recorded in DAWN	Secretary			
other tests / procedures ordered	Doctor			
check patient registered with Pathology for Rheumatology result interface	Secretary	outgoing interface to Pathology		
blood tests ordered	Doctor		lab request form	
blood results received		lab interface incoming to DAWN		
flagged results reviewed	Nurse / Doctor			
flagged results referred to colleague	Nurse / Doctor			
letter text added to DAWN via dictaphone	Secretary			
close visit record, adjust treatment plan and make next appointment	Secretary			letter to patient, GP
copy of notes or appointment for paper notes	Secretary			Summary for notes

Draw up best-practice pathways for your clinic: you want the system to support your best practice.

<i>Step</i>	<i>Responsible</i>	<i>Requirements</i>	<i>Printing</i>

Next: Put a project manager in charge

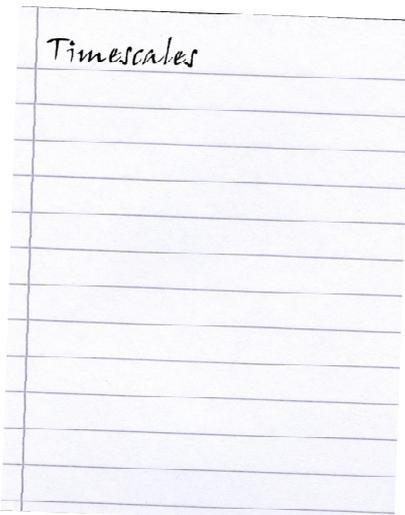
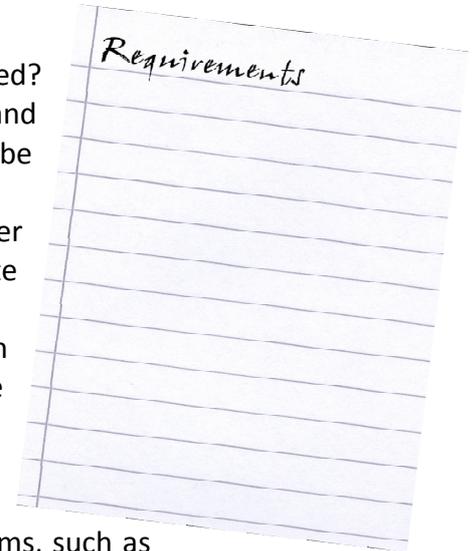
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5. Put a project manager in charge

To make sure the new system is installed smoothly, without delays, you should appoint a Project Manager. These checklists will help them control the process.

Establish the requirements for using the new software

- IT requirements:* What hardware and system software do you need? How much time will installation / support take? Do you need live and test databases on separate servers? *Note:* the software supplier may be able to run the installation and provide support directly.
- System administrator:* Appoint an IT administrator to administer passwords, oversee routine monitoring of interfaces and co-ordinate upgrades or changes to the system.
- Lead user / trainer:* Appoint someone to develop local policy and train new users. Use a train-the-trainers approach to develop in-house capability.
- Pathology:* Are you able to provide an electronic results interface? Do you need to agree any changes to testing protocols?
- Interfacing:* Does the system need to work with other existing systems, such as your Patient Administration System?



Plan your timescales

- Tasks before installation:* Collect data, appoint IT support / a system administrator, arrange access for the software supplier.
- Tasks after installation:* acceptance-testing (your software supplier may give you suggested testing protocols) and training.
- Trial data conversion:* If data will be imported from existing systems, the software supplier may provide a trial so you can test if the data has been copied to the new system accurately.
- Go-Live date:* Schedule a Go-Live date and disable the previous system on that day.
- Extra time:* Schedule time to load or check patient data when you start treatment plans using the new software.

Control the process

- Training:* Monitor the training – do staff feel confident using it?
- Co-ordinate the effort:* Testing the interface requires input from more than one software supplier.
- Patient safety is paramount:* Check the accuracy of data when it has been moved onto the new system.
- Minimise the pain involved in change:* Use your process map before and after the new software. Are there any gaps? Is extra resource needed in the short-term to make the change easier?
- Think of all the exceptions that can occur.*
- Plan independent checks to further reduce risk.*



better care more easily

Contact DAWN to arrange an internet demonstration of DAWN Software or to ask any questions about using DAWN in your clinic

Phone 015395 63091

Email sales@4s-dawn.com

Visit www.4s-dawn.com

4S DAWN Clinical Software Telephone: 44(0)15395 63091
4S Information Systems Ltd Facsimile: 44(0)15395 62475
4 The Square, Milnthorpe Cumbria, LA7 7QJ
Email: sales@4s-dawn.com Website: <http://www.4s-dawn.com>

ABOUT THE COMPANY

4S was founded in 1984 and has been involved in medical applications since start-up. Currently, we have 16 staff members and over 300 clients in 15 countries worldwide. An estimated 500,000 patients are managed using our software.



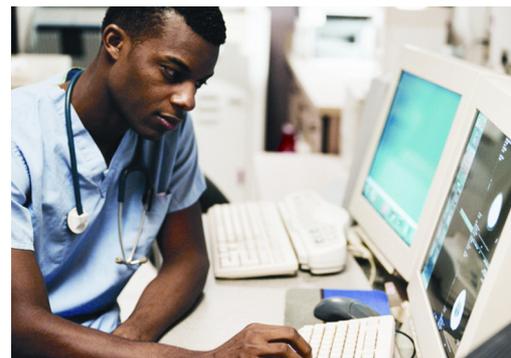
Boost quality of care and patient reassurance



Have patients rave about your clinic's service



Manage patients & their data without stress



Always have up-to-date patient information



with the company that really cares

