

# Development of a clinician-driven portable electronic patient record on an Acute Pain Management Service

Elizabeth G. VanDenKerkhof RN DrPH, Assistant Professor  
School of Nursing & Dept of Anesthesiology  
Queen's University  
*ev5@post.queensu.ca*

Rosemary A. Wilson RN MN ACNP CON(C) PhD(student)  
CNS/NP Acute Pain Management  
Kingston General Hospital, Assistant Professor School of Nursing  
Queen's University  
*wilsonr1@kgh.kari.net*  
Kingston, Ontario, Canada



# Queen's University Anesthesiology Informatics Laboratory {QUAIL}

- David Goldstein – Medical
- Michael Rimmer – Technical
- Rosemary Wilson – Nursing
- Elizabeth VanDenKerkhof – Research



# Background

## *Information technology in health care*

- improve and expand clinical, research, and administrative information systems
- Ready access to patient information (e.g. lab, pharmacy)
- outcomes monitoring
- facilitate evidence-based clinical decision making
- timely continuous
  - quality improvement and safety monitoring
  - Research
  - Administrative
  - policy initiatives

# Background

## ***Wireless technology & hand-held computers***

- widely used in other industries
- developed for the management of health information
- data access & capture at the point of care

# Background

## *Advantages of point of care tools*

- relatively low cost
- portability and unobtrusiveness
- ease of data sharing

# Background

## *Disadvantages of point of care tools*

- portability – loss & theft
- ease of data sharing – confidentiality
- barriers to adoption

# Objectives

1. Describe what is meant by portable computing;
2. To identify components of a needs assessment;
3. Identify the possible roles for portable computing in nursing and interdisciplinary documentation;
4. Describe the challenges and successes in developing an electronic documentation system;
5. Outline the process and cost of implementing and supporting an electronic charting system in the clinical setting;
6. Discuss the clinical and research value of such a system; and,
7. Present preliminary data.

# Portable Computing Is....

- Portable computers
  - PDA, Tablet, laptop
- Connectivity
  - synchronize
  - wireless
- Improving point-of-care access to:
  - Relevant patient information
  - Accurate documentation
  - Communication with health care team members



# The Investigation Phase!

- Needs assessment in the broader arena
- Feasibility research
- Garnering input

# Needs Assessment: Main findings

- 92 questions
- Mailed questionnaire
- Program / Acute Pain Directors of academic hospitals
- 2000/01

**Acute Pain Management Services Have Progressed, Albeit Insufficiently in Canadian Academic Hospitals.** Can J Anaesth, 2004; 51(3):231-235

**A Survey of Directors of Canadian Academic Acute Pain Services: The Nursing Team Members Role.**

Can J Anaesth. 2002;49(6):579-82

# Needs Assessment: Main findings

- $RR = 50/62 = 81\%$
- $45/50 = 90\%$  had Acute Pain Service
- 60 % have data collection tools
- 29% (n=13) have ongoing database
- 29% (n=4) computerized data collection
- 16% (n=2) assistance with data management

# Canadian Collaborative Acute Pain Initiative (CCAPI)

**Meeting Proceedings:  
Recommendations for  
Improved Acute Pain  
Services. Pain Research  
and Management,  
2004;9(3):123-130.**



# Canadian Collaborative Acute Pain Initiative (CCAPI)

- National initiative
- Inter-professional acute pain health care providers
- Goal - improve acute pain management through discussion and consensus
- Strategic areas related to the treatment of acute pain:
  - the definition of pain,
  - the epidemiology of pain
  - the concept of an “ideal” acute pain management service
  - education
  - therapeutic options
  - symptom management
  - research and safety

# The QUAIL solution for our Acute Pain Management Service

- Interdisciplinary consultation team
- Wireless infrastructure
- Clinician-driven software
- Funding:
  - Canadian Foundation for Innovation
  - Ontario Innovative Trust
  - Queen's University
  - Kingston General Hospital

**A Model for Real Time Information at the Patient's Side Using  
Portable Computers on an Acute Pain Service (New Media). Can  
J Anaesth 2002;49(7):749-54**

# Acute Pain Management Service - Model

**A Model for Real Time Information at the Patient's Side Using Portable Computers on an Acute Pain Service (New Media).**

(Can J Anaesth  
2002;49(7):749-54)



# Acute Pain Service - Pilot

**Using a Personal  
Digital Assistant  
Enhances Gathering  
of Patient Data on  
an Acute Pain  
Service: a Pilot  
Study.**

(Can J Anaesth  
2003;50(4):368-75.





# Acute Pain Service Pilot

## Main findings

- 1 resident
- Before / after design
- 100 assessments per arm (paper, PDA)
- Palm
- Batch mode
- Outcome measures
  - Time
  - Frequency / content

# APMS Pilot - Main findings

### Numeric Rating Scale

Montague, Lady 0064645

**Rest**

0	1	2	3	4	5	6	7	8	9	10
---	---	---	---	---	---	---	---	---	---	----

**Active**

0	1	2	3	4	5	6	7	8	9	10
---	---	---	---	---	---	---	---	---	---	----

PPI   Hx NRS   Done

Detailed Assessment

### SIDE EFFECTS 1

Montague, Lady 0064645

<b>Nausea</b>		<b>Pruritus</b>
<input type="checkbox"/> 1 None		<input type="checkbox"/> 1
<input type="checkbox"/> 2 Mild -No Treatment		<input type="checkbox"/> 2
<input type="checkbox"/> 3 Mod - Treatment Req'd And Successful		<input type="checkbox"/> 3
<input type="checkbox"/> 4 Severe - Treatment Not Working		<input type="checkbox"/> 4

Assessment Menu

Hx N&P   Next

### SIDE EFFECTS 2

Montague, Lady 0064645

Vomiting	<input checked="" type="checkbox"/> Y	<input type="checkbox"/> N
Respiratory Rate < 8	<input checked="" type="checkbox"/> Y	<input type="checkbox"/> N
Chest Tube	<input checked="" type="checkbox"/> Y	<input type="checkbox"/> N
BM Different	<input checked="" type="checkbox"/> Y	<input type="checkbox"/> N
Headache	<input checked="" type="checkbox"/> Y	<input type="checkbox"/> N
Hypotension	<input checked="" type="checkbox"/> Y	<input type="checkbox"/> N
Insomnia	<input checked="" type="checkbox"/> Y	<input type="checkbox"/> N
Disoriented	<input checked="" type="checkbox"/> Y	<input type="checkbox"/> N

Assessment Menu

Back   Next

# APMS Pilot - Main findings

- PDA ~ 1 minute faster than paper
- Amount of data collection not different
- Resident quickly adapted to PDA
- Guided assessment

# APMS – RCT

**Evaluation of handheld computers compared to pen and paper for documentation on an acute pain service. Acute Pain, 2004;6(3-4):115-121.**



# Acute Pain Service – RCT

- 4 physicians
- 40 patients per arm
- Randomized controlled trial
- iPAC
- Batch mode
- Outcome measures:
  - Time
  - Content
  - Time-and-motion



# APMS – RCT

## Main findings - Time

	PDA+ (n=35)	Paper (n=39)		
Time Frame	Median (25%, 75%)	Median (25%, 75%)	Z statistic	P value*
Assessment only	2.8 (2.0, 4.3)	2.7 (2.1, 4.5)	-0.34	0.74
<b>Total encounter time+</b>	<b>6.1 (4.5, 8.5)</b>	<b>4.6 (3.4, 6.6)</b>	-2.28	0.00

\*Mann-Whitney Test, 2-tail; +Personal Digital Assistant; ++assessment & recording.

# APMS – RCT

## Main findings - Content

- 65% vs. 44% reported pain scores
- 100% vs. 33% reported presence/ absence of nausea
- 100% vs. 55% pruritus
- 21% vs. 4% hypotension

**Numeric Rating Scale**

Montague, Lady 0064645

**Rest**

0	1	2	3	4	5	6	7	8	9	10
---	---	---	---	---	---	---	---	---	---	----

**Active**

0	1	2	3	4	5	6	7	8	9	10
---	---	---	---	---	---	---	---	---	---	----

PPI Hx NRS Done

Detailed Assessment

**SIDE EFFECTS 1**

Montague, Lady 0064645

**Nausea** **Pruritus**

1	None	1
2	Mild - No Treatment	2
3	Mod - Treatment Req'd And Successful	3
4	Severe - Treatment Not Working	4

Assessment Menu

Hx N&P Next

**SIDE EFFECTS 2**

Montague, Lady 0064645

Vomiting	Y	N
Respiratory Rate < 8	Y	N
Chest Tube	Y	N
BM Different	Y	N
Headache	Y	N
Hypotension	Y	N
Insomnia	Y	N
Disoriented	Y	N

Assessment Menu

Back Next

# Acute Pain Service – RCT

## Main findings – owner status

### *Impact of Previous PDA experience:*

- No difference in documentation time on PDA
- Non-users
  - shorter time on paper vs. PDA
  - less content on both paper and PDA compared to PDA owners



# Acute Pain Service – RCT

## Main findings – use patterns

### *PDA Use Patterns:*

- used during assessment – 20%
- used post assessment – 100%
- additional orders written in chart – 39%
- additional assessment written in chart - 30%

# Acute Pain Service – RCT

## Main findings – general comments

### *Clinician comments:*

- Useful as data collection tool
- Not useful to guide assessment
- Perceived negative impact on clinician / patient encounter

# Acute Pain Service Patient Perceptions Study

**Patients' attitudes and perceptions regarding the use of portable computers at the bedside: A qualitative assessment.** *Journal of Healthcare Quality*, accepted August 2005.



# Acute Pain Service: Patient Perceptions Study

## *Patients' response:*

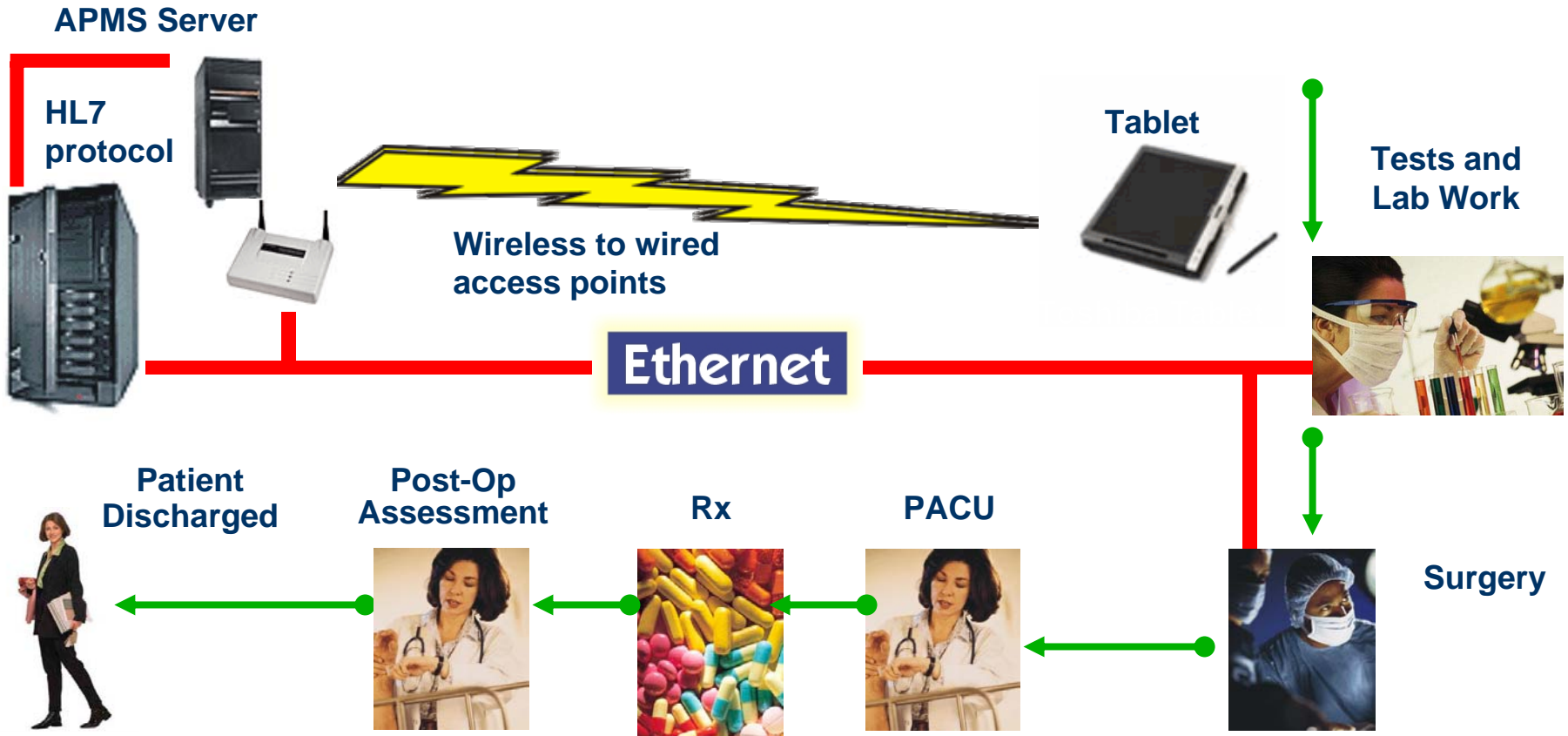
- no impact on the clinician-patient relationship
- some not even aware of device
- valuable tool – efficient, reliable and accurate documentation.

# Where are we now?

- Tablet computer
- APMS Software Version 4.0
- Implemented into routine care
- Assessment & order documentation
- Lab, pharmacy, imaging at bedside
- print record



# Acute Pain Portable System



# QUAIL Acute Pain Version 4

## Welcome Screen

The screenshot shows a Microsoft Internet Explorer browser window displaying the QUAIL USG Program Select page. The browser's address bar shows the URL <https://apms/qusg/ProgramSelect.aspx>. The page title is "QUAIL USG: Program Select".

On the left side, there is a navigation menu with the following options:

- Options (with an expand/collapse arrow)
- Admin
- Anonymous Patients
- Real Patients
- Logout (with a back arrow)

The main content area features two large, dark blue, pill-shaped buttons:

- Pre-Admission Services
- Acute Pain ver 4.0

In the bottom right corner of the main content area, there is a grayscale image of two hands clasped together, with a caduceus symbol overlaid on the hands.

At the bottom of the page, the following text is displayed:

Copyright 2003 QUAIL/Computer Solutions and Services Inc.  
For comments, questions, bugs, contact W/ Aaron Visser (613) 540-6666 x 3979  
**Pager: (613) 548-9599**

The Windows taskbar at the bottom shows the Start button, several application icons, and the system tray with the time 12:40.

# Acute Pain Version 4 Patient List

QUAIL Acute Pain ver 4.0 - Microsoft Internet Explorer

**acute PAiN**

Patient List Follow Up Patients OR Schedule Security Activity

QUAIL PRE-ADMISSIONS

QUAIL PRE-OP

QUAIL POST-OP

ACUTE PAIN V4.0

LOGOUT

ADD PATIENT

PRINT MANAGER

PRINT PATIENT LIST

REPORT ISSUE

BILLING DISCHARGE SUMMARY

BILLING REPORT (N/A)

RESEARCH

STUDIES ADMIN

MODALITY ADMIN

SETREATMENT ADMIN

SHOW ISSUES

[22 Patients] All Patients

Name	Surgery	POD	Med	Lab	Modality	Visited
FakeLast, FakeFirst	C1-c2 laminectomy & removal intra or extradural tumor	0			»PCA-IV	
FakeLast, FakeFirst	Gastrectomy partial	1			»CEA »Acetaminophen	<input checked="" type="checkbox"/>
FakeLast, FakeFirst	Transabdominal repair of colovaginal fistula	2			»CEA	<input checked="" type="checkbox"/>
FakeLast, FakeFirst	Gastrectomy proximal abdominal	1			»CEA »Acetaminophen	<input checked="" type="checkbox"/>
FakeLast, FakeFirst		0			»PCA-IV »APMS Standard ...	<input checked="" type="checkbox"/>
FakeLast, FakeFirst	Repair aneurysm abdominal aortic	2			»CEA »APMS Standard ...	<input checked="" type="checkbox"/>
FakeLast, FakeFirst		0			»PCA-IV »APMS Standard ...	<input checked="" type="checkbox"/>
FakeLast, FakeFirst	Reduction closed hip	3			»PCA-IV »APMS Standard ...	<input checked="" type="checkbox"/>
FakeLast, FakeFirst	Whipple procedure	4			»CEA »APMS Standard ...	<input checked="" type="checkbox"/>
FakeLast, FakeFirst	Esophagectome transhiatal	4			»CEA	<input checked="" type="checkbox"/>
FakeLast, FakeFirst	Arthroplasty knee revision rt. & synovectomy	0			»PCA-IV »APMS Standard ... »Femoral	<input checked="" type="checkbox"/>
FakeLast, FakeFirst		3			»PCA-IV »APMS Standard ...	<input checked="" type="checkbox"/>
FakeLast, FakeFirst	Laparotomy oophorectomy unilateral lt.	1			»PCA-IV »APMS Standard ...	<input checked="" type="checkbox"/>
FakeLast, FakeFirst	Removal lt. ovarian remnant	1			»PCEA »APMS Standard ...	<input checked="" type="checkbox"/>
FakeLast, FakeFirst		0			»PCA-IV »Acetaminophen	
FakeLast, FakeFirst					»Spinal »Femoral	
FakeLast, FakeFirst	Arthroplasty knee cemented bilateral	4			»PCA-IV »Acetaminophen »Neuropathic Pa...	<input checked="" type="checkbox"/>
FakeLast, FakeFirst	Computer enhanced osteotomy distal radius rt. with icbg	1			»PCA-IV »APMS Standard ...	<input checked="" type="checkbox"/>
FakeLast, FakeFirst	Arthroplasty hip thompson rt.	1			»PCA-IV »APMS Standard ... »CEA	<input checked="" type="checkbox"/>

KGH

[Link to On-Call Schedule](#) [Rosemary Wilson Contact Info](#) [Daily OR Manager Contact Info](#)



# Adding Patients

QUAIL Acute Pain ver 4.0 -- Web Page Dialog

Patient Add Utility

SEARCH FOR PATIENT [Enter MRN/CRNUM in the field below]

0840054 Search for Patient

QUAIL Acute Pain ver 4.0 -- Web Page Dialog

Patient Add Utility

SEARCH FOR PATIENT [Enter MRN/CRNUM in the field below]

0840054 Reset Search

APPLICATION MESSAGE

Previous Visits **ORSOS** Consult

**Orsos Information**

Procedure	Date
<input checked="" type="checkbox"/> Arthroplasty knee cemented bilateral	2005 Jul 8 10

QUAIL Acute Pain ver 4.0 -- Web Page Dialog

Patient Add Utility

SEARCH FOR PATIENT [Enter MRN/CRNUM in the field below]

0840054 Reset Search

APPLICATION MESSAGE

**PATIENT INFORMATION**

Patient: FakeLast, FakeFirst  
CR Number: 0840054  
Room: SDAC  
Gender: F  
Age: 37

Previous Visits ORSOS Consult **Modality** S.E. Treatment Study Seamo Notes

Add Note Undo

Modality Type	Modality Item	Count	ReOrder	Drug Name	Side
Opioid Analgesia	<input checked="" type="checkbox"/> PCA-IV	1		Morphine	
	<input type="checkbox"/> Other				
Central Block	<input type="checkbox"/> PCEA				
	<input type="checkbox"/> CEA				
	<input type="checkbox"/> Spinal				
Peripheral Block (Single Shot)	<input type="checkbox"/> Cervical				
	<input type="checkbox"/> Interscalene				
	<input type="checkbox"/> Axillary				
	<input type="checkbox"/> Femoral				
	<input type="checkbox"/> Paravertebral				
	<input type="checkbox"/> Sciatic Anterior				
	<input type="checkbox"/> Sciatic Posterior				
<input type="checkbox"/> Iliohypogastric					

Cancel Add Patient

# Assessment Screen

QUAIL Acute Pain ver 4.0 - Microsoft Internet Explorer

**acute PAIN**

Unknown, Unknown      1234567      POD110 Non-Seamo

Patient List   Summary   Modality   S.E. Treatment   **Assessments**   Drug Usage   Plan   Notable Events   Consult   Study   Notes   Billing (N/A)

Add Note

- No Side Effects Observed
- Rest Pain Score
- Active Pain Score
- Nausea
- Vomiting
- Pruritus
- Sedation
- Sensory Block [Inadequate]
  - None
  - Adequate
  - Inadequate
  - One Sided
- Motor Block
- Orientation
- Heartburn
- Respiratory Depression
- Headache (Post Dural Puncture)
- Headache (Other)
- Insomnia
- Hypotension
- Urinary Retention
- Ambulatory
- Physio
- PD Status
- Catheter Length

QUAIL    [Link to On-Call Schedule](#)   [Rosemary Wilson Contact Info](#)   [Daily OR Manager Contact Info](#)

Start | | [Inbox - Micros...](#) | [Pain Managem...](#) | [Microsoft Pow...](#) | [QUAIL Acute ...](#) | [Unavailable \[Q...](#) | | 12:31



# Narrative Components

The screenshot displays the 'acute PAiN' web application interface. At the top, the patient information is shown as 'Unknown, Unknown' with ID '1234567' and 'POD110 Non-Seamo'. A navigation menu includes 'Patient List', 'Summary', 'Modality', 'S.E. Treatment', 'Assessments', 'Drug Usage', 'Plan', 'Notable Events', 'Consult', 'Study', 'Notes', and 'Billing (N/A)'. The 'Notes' section is active, with an 'Add' button. A dialog box titled 'QUAIL Post-Op Pain: Add Note' is open, containing the following fields:

- Note Parameters**
- Section:** Plan
- Report:**  *Notice: Notes only get reported if visit is performed.*
- Note:** Have made attending service aware that imaging has been ordered. Nursing staff monitoring neurovitals q2h. Will reassess in 1 hour.

Buttons for 'Cancel' and 'Save' are at the bottom of the dialog. The status bar at the bottom of the application shows links for 'Link to On-Call Schedule', 'Rosemary Wilson Contact Info', and 'Daily OR Manager Contact Info'. The Windows taskbar at the very bottom shows the Start button and several open applications, including 'Inbox - Micros...', 'Pain Managem...', 'Microsoft Pow...', 'QUAIL Acute ...', and 'Unavailable [Q...'. The system clock shows 12:34.

# Plan Screen

QUAIL Acute Pain ver 4.0 - Microsoft Internet Explorer

**acute PAIN**

Unknown, Unknown      1234567      POD110 Non-Seamo

Patient List   Summary   Modality   S.E. Treatment   Assessments   Drug Usage   **Plan**   Notable Events   Consult   Study   Notes   Billing (N/A)

Add Note

- Add benzodiazepine
- Add chronic opioid dosing
- Add delerium tremens prophylaxis
- Adjust PCA-IV settings
- Adjust PCEA settings
- Catheter removed tip intact
- Change modality with signature
- Change solution to
- Continue as is
- Discontinue service
- Epidural bolus of
  - Pump Solution
  - Opioid
  - Bupivacaine 2.5 mg/mL
  - Bupivacaine 5 mg/mL
  - Lidocaine CO2
- Hold AM heparin
- Hold heparin for two hours
- Impressions
- Infusion Off At 06:00
- Naloxone Given
- Orders for PO analgesia written
- Patient not using patient-controlled function effectively

KGH      [Link to On-Call Schedule](#)   [Rosemary Wilson Contact Info](#)   [Daily OR Manager Contact Info](#)

Start | | [Inbox - Micros...](#) | [Pain Managem...](#) | [Microsoft Pow...](#) | [QUAIL Acute ...](#) | [Unavailable \[Q...](#) | | 12:31

# Individual Patient Summary Screen

QUAIL Acute Pain ver 4.0 - Microsoft Internet Explorer

**acute PAIN**

Unknown, Unknown      1234567      POD110 Non-Seamo

Patient List **Summary** Modality S.E. Treatment Assessments Drug Usage Plan Notable Events Consult Study Notes Billing (N/A)

**PREVIOUS VISITS [Click Visit for discharge summary]**

Type	Pain Add	Pain Discharge	Description
Consult	2005 Sep 06 15:02	2005 Sep 06 15:09	Not Available
Consult	2005 Jul 15 08:30	2005 Aug 17 12:42	Acute Pain [Test patient Jul 15 2005]

**Consult**

Palliative May 27 2005 10:05AM Note: 80 male with mets to back. Palliative care too!

**Study**

Create Study assignment

**Modality Order**

Central Block/CEA (Hydromorphone [x2])  
Co-Analgesia/Acetaminophen (Acetaminophen)

**Side Effect Treatment**

Antiemetics-Prochlorperazine Dose:5 Freq:q6h Route:IV PRN:Yes  
Antiemetics-Dimenhydrinate Dose:25 Freq:q6h Route:IV PRN:Yes  
Sedation-Lorazepam Dose:0.5 Freq:q12h Route:PO PRN:Yes  
Antipruritics-Naloxone Dose:40 Freq:q1h Route:IV PRN:Yes  
Antiemetics-Ondansetron Dose:4 Freq:q8h Route:IV PRN:Yes

**Assessments**

	May 27, 2005 11:29	May 27, 2005 11:41	May 27, 2005 11:59	May 27, 2005 12:10
Rest Pain Score	1	-	-	-
Nausea	-	-	-	None
Vomiting	RX required	-	-	-
Pruritus	RX required	-	-	-
Sedation	-	-	-	Wide awake Drowsy Dozing Intermittently Mostly sleepy No Treatment RX required

KGH      [Link to On-Call Schedule](#)      [Rosemary Wilson Contact Info](#)      [Daily OR Manager Contact Info](#)

Start | [Icons] | [Taskbar] | [System Tray] 12:30

# Addressing the requirement for paper-based documentation

**QUAIL Acute Pain ver 4.0 - Microsoft Internet Explorer**

**acute PAIN**

Patient: 69Y F C1067-1 POD2 SEAMO Transabdominal repair of colovaginal fistula

Navigation: Patient List | **Summary** | Modality | S.E. Treatment | Assessments | Drug Usage | Plan | Notable Events | Consult | Study | Notes | Billing (N/A)

Left Sidebar Menu:

- QUAIL PRE-ADMISSIONS
- QUAIL PRE-OP
- QUAIL POST-OP
- ACUTE PAIN v4.0
- LOGOUT
- DAILY ASSESSMENT REPORT
- ADD TO PM
- REMOVE FROM PM
- DISCONTINUE
- REPORT ISSUE
- PATIENT SUMMARY
- SEAMO
- LABS
- PHARMACY
- ECG

Assessments Table:

Assessment	Jul 07, 2005 08:48	Jul 08, 2005 09:26		
Prochlorperazine Dose:5 Freq:q6h Route:IV PRN:Yes	0	0	-	-
Ondansetron Dose:4 Freq:q8h Route:IV PRN:Yes	0	0	-	-
Diphenhydramine Dose:25 Freq:q4h Route:IV PRN:Yes	None	None	-	-
SEAMO	None	None	-	-
LABS	Wide awake	Wide awake	-	-
PHARMACY	Adequate	Adequate	-	-
ECG	None	None	-	-
	Normal x3	Normal x3	-	-
	-	None	-	-
	Foley	Foley	-	-
	None	Walking	-	-
	None	None	-	-
	NPO	FF	-	-
	Clean/Intact	Clean/Intact	-	-

Usage Since Last Assessment Table:

Usage	Jul 07, 2005 08:48	Jul 08, 2005 09:26		
	-	-	-	-

**QUAIL Acute Pain ver 4.0 -- Web Page Dialog**

**Patient Reports**

Select a PAIN visit to report on: 2005 Jul 08 09:26

Report Generation

Patient Location: C1067-1

Print Location: Connell 10

Buttons: Preview Report | Generate Report to Ward Printer

OK

Footer: KGH | [Link to On-Call Schedule](#) | [Rosemary Wilson Contact Info](#) | [Daily OR Manager Contact Info](#)

# Generating 'on-the-spot' Data

QUAIL Acute Pain ver 4.0 - Microsoft Internet Explorer

**acute PAiN**

Patient List Follow Up Patients OR Schedule Security Activity

QUAIL PRE-ADMISSIONS  
ACUTE PAIN V4.0

[16 Patients] All Patients

Name	Surgery	POD	Med	Lab	Modality	Visited
FakeLast, FakeFirst	Prostatectomy radical	1	●		»PCA-IV »APMS Standard ...	☑
FakeLast, FakeFirst	Repair diaphragmatic hernia nissan open	5			»CEA	☑
FakeLa					»A-IV »moral »etaminophen »MS Standard ...	☑
FakeLa					»A-IV »ravertebral »A-IV »etaminophen	☑
FakeLa					»A-IV »etaminophen	☑
FakeLa					»A-IV »etaminophen	☑
FakeLa					»A-IV »MS Standard ...	☑
FakeLa					»A-IV »etaminophen	☑
FakeLa					»A-IV »etaminophen	☑
FakeLast, FakeFirst	Arthroplasty shoulder rt. - cooperand resurfacing	1			»PCA-IV »Acetaminophen	☑
FakeLast, FakeFirst		6	●		»PCA-IV »APMS Standard ...	☑
FakeLast, FakeFirst		3		●	»CEA »Acetaminophen	☑
FakeLast, FakeFirst	Repair chest wall pectus carinatum	1			»CEA »APMS Standard ...	☑

QUAIL Acute Pain ver 4.0 -- Web Page Dialog

Statistics

Select Statistic Type

Select-

Use Ordinals (where available)

Statistic Generation

Generate XLS

OK

PCCC

Link to On-Call Schedule Rosemary Wilson Contact Info Daily OR Manager Contact Info

Start | Inbox - Microsoft O... | Pain Management N... | Microsoft PowerPoi... | QUAIL Acute Pain... | 12:18





# Achieving Clinician-Driven Modifications

QUAIL Acute Pain ver 4.0 - Microsoft Internet Explorer

**acute PAIN**

Patient List Follow Up Patients OR Schedule Security Activity

QUAIL PRE-ADMISSIONS

ACUTE PAIN v4.0 [16 Patients] All Patients

Name	Surgery	POD	Med	Lab	Modality	Visited
FakeLast, FakeFirst	Prostatectomy radical	1	●		»PCA-IV »APMS Standard ...	<input checked="" type="checkbox"/>
FakeLast, FakeFirst	Repair diaphragmatic hernia nissan open	5			»CEA	<input checked="" type="checkbox"/>
FakeLast, FakeFirst	Arthroplasty shoulder rt. - cooperand resurfacing	1			»PCA-IV »Acetaminophen	<input checked="" type="checkbox"/>
FakeLast, FakeFirst		6	●		»PCA-IV »APMS Standard ...	<input checked="" type="checkbox"/>
FakeLast, FakeFirst		3		●	»CEA »Acetaminophen	<input checked="" type="checkbox"/>
FakeLast, FakeFirst	Repair chest wall pectus carinatum	1			»CEA »APMS Standard ...	<input checked="" type="checkbox"/>

ADD PATIENT

PRINT MANAGER

PRINT PATIENT LIST

REPORT ISSUE

BILLING DISCHARGE SI

BILLING REPORT (N/A)

RESEARCH

STUDIES ADMIN

MODALITY ADMIN

SETREATMENT ADMIN

SHOW ISSUES

KGH

Link to On-Call Schedule Rosemary Wilson Contact Info Daily OR Manager Contact Info

QUAIL Acute Pain ver 4.0 -- Web Page Dialog

Issue Reporting: Add

Issue Information

Type: -Select-

Narrative: -Select-

- Future Feature Request
- Internet connectivity problem
- Printing problem
- General Problem

Cancel Save

Start | Inbox - Microsoft O... | Pain Management N... | Microsoft PowerPoi... | QUAIL Acute Pain... | 12:19

# acute PAIN

- QUAIL PRE-ADMISSION
- ACUTE PAIN V4.0
- LOGOUT
- ADD PATIENT
- PRINT MANAGER
- PRINT PATIENT LIST
- REPORT ISSUE
- BILLING DISCHARGE S
- BILLING REPORT (N/A
- RESEARCH
- STUDIES ADMIN
- MODALITY ADMIN
- SETREATMENT ADMIN
- SHOW ISSUES

**Issue Reporting**

Reported Issues -Select-      Printing problem

ID	Status	Type	Date/Time	User	Narrative
136	Reported	Printing problem	2005 Sep 08 12:51	Goldstein, David	Can not print to PACU printer ITS number P785 for patient assessments done in PACU.
132	Reported	Printing problem	2005 Sep 06 12:16	Corrigan, Joe	Printing patients from the patient list script via Print Manager results in blank reports
119	Reported	Printing problem	2005 Aug 09 16:06	Goldstein, David	James Jackson also not showing visited once recorded
109	Reported	Printing problem	2005 Jul 08 15:07	Safakish, Ramin	If patient has been discontinued and we want to look up his APMS histories how can we do so with out re entering him to APMS and misrepresenting a new admission?
104	Reported	Printing problem	2005 Jul 07 12:37	Goldstein, David	When patients are in the PACU and we want to print an assessment it is difficult because the PCS does not show they are there. Can we have a print pick list so we can do so?
100	Reported	Printing problem	2005 Jul 05 16:11	Goldstein, David	Sometime when printing it seems to not register. If you repeat the request it works???
89	Reported	Printing problem	2005 Jun 09 08:41	Wilson, Rosemary	Hi guys can't print in CVRI on patient LB got this error message error! Error.aspx?ErrorMessage= Cast from type 'DBNull' to type 'String' is not valid.[FN:LoadPastReports ... 10000]
88	Reported	Printing problem	2005 Jun 08 10:35	Wilson, Rosemary	trying to print on bawden..pt JQ got this message error! Error.aspx?ErrorMessage= Cast from type 'DBNull' to type 'String' is not valid. [FN:LoadPastReports ... 10000]
86	Reported	Printing problem	2005 Jun 05 10:47	Goldstein, David	Frequent attempts to print in NCCU. ITS Number P837
84	Reported	Printing problem	2005 Jun 04 15:26	Goldstein, David	Error.aspx?ErrorMessage= Cast from type 'DBNull' to type 'String' is not valid. [FN:LoadPastReports ... 10000] Aaron unable to print in CVRI Printer ITS # 10 40 93 83

OK

- Visited**

  - 
  - 
  - 
  - 
  - 
  - 
  - 
  - 
  - 
  - 
  -

[Link to On-Call Schedule](#)   
 [Rosemary Wilson Contact Info](#)   
 [Daily OR Manager Contact Info](#)

# Monitoring System Usage

The screenshot displays the 'acute PAIN' web application interface. The top navigation bar includes 'Patient List', 'Follow Up Patients', 'OR Schedule', and 'Security Activity' (which is highlighted in red). The main content area is divided into two sections: 'Unaddressed critical activities' and 'User Activities'.

**Unaddressed critical activities**

User	Date	IP	Error Status	Form
babcoq1	2005 Sep 06 10:39	10.40.69.177	New	Procedure 'Web_PostOp_EndReview_1' expects parameter '@PatientID', which was not supplied.
	2005 Sep 06 10:39	10.40.69.177	New	Access to https://apms/Acute Pain 4.0/Main.aspx denied.
bondd	2005 Jul 26 10:57	10.40.92.127	New	Access to https://apms/Acute Pain 4.0/Security_Activity.aspx denied.

**User Activities** Time Period: 30 Minutes

User	Date	IP	Status	Form
goldsted	2005 Sep 14 12:14	10.40.92.129		PatientList.aspx
	2005 Sep 14 12:13	10.40.92.129		SETreatment.aspx
	2005 Sep 14 12:13	10.40.92.129		ModalityOrder.aspx
	2005 Sep 14 12:12	10.40.92.129		Consult.aspx
	2005 Sep 14 12:11	10.40.92.129		PatientList.aspx
	2005 Sep 14 12:11	10.40.92.129		Main_NonPatient.aspx
	2005 Sep 14 12:11	10.40.92.129		load.aspx
	2005 Sep 14 12:11	10.40.92.129		load.aspx
wilsonr1				

The bottom of the application features a footer with the text 'HDH' and three links: 'Link to On-Call Schedule', 'Rosemary Wilson Contact Info', and 'Daily OR Manager Contact Info'. The Windows taskbar at the bottom shows the Start button, several application icons, and the system tray with the time 12:23.

# Portable Computing & Nursing Documentation

## **New funding**

The Change Foundation Grant for Nursing  
Innovation \$100,000

*Development and Implementation of an  
Electronic Nurse-Sensitive  
Documentation System*

Project participants: S Hall, RA Wilson, EG  
VanDenKerkhof, T Kent-Hillis, D  
Goldstein, E Rivoire, P MacAulay, A Gay

# But what about the cost?

- Partnerships with funding agencies and industry
- Building bridges that advance clinical and research activity
- Exploring relationships with existing systems

# Clinical & Research Value

Identify the clinical and research value of such a system

- Feedback, workflow description, locate colleagues!
- Audit / knowledge transfer
- Barriers to adoption
- Comprehensive information at bedside
- Outcomes monitoring
- Large databases – population level research

# APMS Follow Up: Pilot Study

- postoperative pain, medication use, health care utilization, and health-related quality of life (HRQOL)
- 4-week follow up
- Merge clinically captured data with web-based follow up data;

**Pain, health-related quality of life, and health-care utilization after inpatient surgery: A pilot study.** Pain Research and Management, accepted Sept 2005



# APMS Follow Up: Pilot Study Results

- 88 participants completed the follow-up questionnaires
- Average active pain intensity (0-10):
  - Postop - 3.9
  - During 4 weeks - 3.7
- all reported significantly impaired HRQOL at 4 weeks
- 36 were still taking pain medications
- 15 visited an emergency room

# Preliminary Data – July 15 – Sept 9

	<i>Mean (sd)</i>	<i>Median</i>
LOS	2.2 (1.9)	2.0
Age	59 (18)	61
Pain intensity (0-10)		
–Rest	1.4 (1.7)	1.0
–Active	3.5 (2.5)	3.0

# Preliminary Data – July 15 – Sept 9

	<i>Frequency</i>	<i>Percent</i>
Number of patients	307	100
Females	152	49.5
Nausea requiring Rx	48	15.6
Vomiting req. Rx	15	5.0
Pruritus	13	4.3
Sedation	11	3.6
Respiratory depression	4	1.4
Hypotension req Rx	1	0.3

# Discussion

## Benefits:

- Instant access to patient info across multi-site institutions and during consults
  - nurse/MD/pharmacy etc
- ↓ repetition of data capture
- Less likely for loss of information
- Secondary questions (drill down)
- Part of comprehensive electronic record

# Conclusion

Reviewed factors involved in the development, implementation and adoption of a portable electronic patient record in an acute care setting

# References

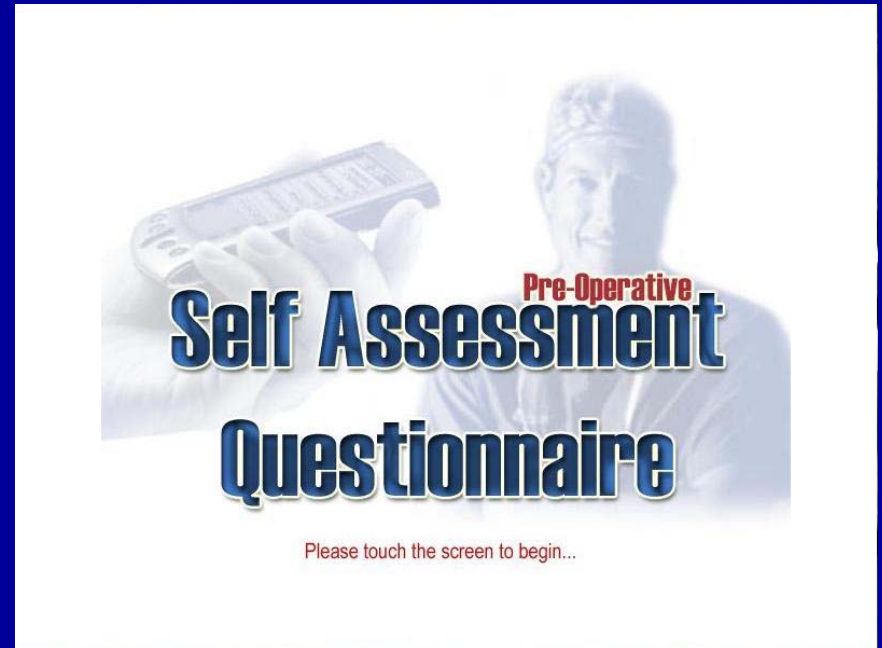
1. Dagnone, V. A., Wilson, R., Goldstein DH, Rimmer, M., & VanDenKerkhof, E. G. (2004). Patients' attitudes and perceptions regarding the use of portable computers at the bedside: A qualitative assessment. *Journal of Healthcare Quality*, accepted August 2005
2. Goldstein, D. H., VanDenKerkhof, E. G., & Rimmer, M. J. (2002). A model for real time information at the patient's side using portable computers on an acute pain service (new media). *Can J Anaesth*, 49, 749-754.
3. Goldstein, D. H., Ellis, J., Brown, R., Wilson, R., Penning, J., Chisom, K. et al. (2004). Meeting proceedings: Recommendations for improved acute pain services: Canadian collaborative acute pain initiative. *Pain Res Manag.*, 9, 123-130.
4. Goldstein, D. H., VanDenKerkhof, E. G., & Blaine, W. C. (2004). Acute pain management services have progressed, albeit insufficiently in Canadian academic hospitals. *Canadian Journal of Anesthesia*, 51, 231-235.
5. Patey G, Stewart I, Goldstein DH, **VanDenKerkhof EG**, Rimmer MJ, Van Dijk JP, Dudgeon DJ. *A Model for Real Time Information for the Management of Patient Care at the Bed-Side Using Handheld Computers on an Palliative Care Service*. *Canadian Journal of Palliative Care*, accepted with revisions, August 2005.
6. VanDenKerkhof, E. G., Goldstein, D. H., & Wilson, R. (2002). A Survey of directors of Canadian academic acute pain management services: The nursing team members role. *Can.J.Anaesth.*, 49, 579-582.
7. VanDenKerkhof, E. G., Goldstein DH, Rimmer, M. J., Tod, D. A., & Kwan Lee, H. (2004). Evaluation of hand-held computers compared to pen and paper for documentation on an acute pain service. *Acute Pain*, 6, 115-121.
8. VanDenKerkhof, E. G., Hopman, W. M., Towheed, T. E., Wilson, R. A., Murdoch, J., Rimmer, M. J. et al. (2005). Pain, health-related quality of life, and health-care utilization after inpatient surgery: A pilot study. *Pain Research & Management*, Accepted Sept. 2005.
9. VanDenKerkhof, E. G., Goldstein, D. H., Lane, J., Rimmer, M. J., & Van Dijk, J. P. (2003). Using a personal digital assistant enhances gathering of patient data on an acute pain management service: a pilot study. *Can J Anaesth*, 50, 368-375.
10. VanDenKerkhof, E. G., Goldstein, D. H., Blaine, W. C., & Rimmer, M. J. A comparison of paper with electronic patient-completed questionnaires in a pre-operative clinic. *Anesthesia & Analgesia*, (in press).
11. VanDenKerkhof, E. G., Goldstein, D. H., & Rimmer, M. J. (2003). Containing a new infection with new technology: a Web-based response to SARS. *Canadian Medical Association Journal*, 168, 1259-1262.

# Other Applications

# Pre-op patient self assessment - RCT

A comparison of paper  
with electronic patient-  
completed  
questionnaires in a pre-  
operative clinic.

(Anesthesia &  
Analgesia, in press,  
Oct 2005)





DRAFT



**KGH Pre-Admission Service  
ANAESTHETIC QUESTIONNAIRE**

**INSTRUCTIONS:**

*Please forward to Pre-Admission Services at HDH*

**\*COMPLETE BOTH SIDES OF FORM \***

Date of Surgery/Procedure: \_\_\_\_\_ Height \_\_\_\_\_ Weight \_\_\_\_\_ BMI \_\_\_\_\_

- |   | YES                      | NO                       |
|---|--------------------------|--------------------------|
| 1. Have you ever had a problem with anaesthesia OTHER than nausea and vomiting? ....  | <input type="checkbox"/> | <input type="checkbox"/> |
| <i>Comments:</i> _____  |                          |                          |
| 2. Have you or anyone related to you ever had a problem with anaesthesia (i.e. unusual temperature changes, breathing problems)?..... | <input type="checkbox"/> | <input type="checkbox"/> |
| <i>Comments:</i> _____  |                          |                          |
| 3. Do you have asthma? .....  | <input type="checkbox"/> | <input type="checkbox"/> |
| <i>Comments:</i> _____  |                          |                          |
| 4. Do you have a cold?.....   | <input type="checkbox"/> | <input type="checkbox"/> |
| <i>Comments:</i> _____  |                          |                          |
| 5. a) Do you smoke?.....  | <input type="checkbox"/> | <input type="checkbox"/> |
| b) How much? _____  |                          |                          |
| <i>Comments:</i> _____  |                          |                          |
| 6. Do you have trouble breathing? .....   | <input type="checkbox"/> | <input type="checkbox"/> |
| <i>Comments:</i> _____  |                          |                          |
| 7. Do you get short of breath when you walk up one flight of stairs? .....  | <input type="checkbox"/> | <input type="checkbox"/> |

**QUESTION: 1**

**Have you ever had a problem with anesthesia OTHER than nausea and vomiting?**

**YES**

**NO**

**Comment**

< **BACK**

**NEXT** >

# Pre-op patient self assessment - RCT


- 360 patients in pre op clinic
- 4 arms – paper, PDA, Tablet, Kiosk
- Outcome – time, content
- Patient preference and satisfaction questionnaire

# Pre-op patient self assessment - Results

- 94% agreement b/w paper and study questionnaire
- Faster documentation on kiosk, tablet, paper, PDA (137 – 189 seconds)
- For future documentation:
  - computer arms preferred computer
  - paper arm preferred paper

# SARS e-Screening – Leveraging Expertise

Containing a New  
Infection With New  
Technology: a Web-  
Based Response to  
SARS  
(Commentary).  
(CMAJ 2003;168(10),  
1259-62)

  
**SARS e-Screening**

Interviewee: Visser, Aaron (KGH) Interviewer: Visser, Aaron (KGH)  
Last Screening: 2003 Apr 14 08:55 at KGH

**SECTION A: If YES, quarantine applies. Notify Public Health.**

Have you had unprotected contact with a person with SARS in the last 10 days? **NO**  
OR  
Have you been to a hospital closed due to SARS?

**SECTION B:**

Have you been to China, Hong Kong, Vietnam, Singapore or Taiwan in the last 10 days? **NO**

**SECTION C: Are you experiencing any of the following symptoms?**

Myalgia (muscle aches)  
OR  
Malaise (severe fatigue or unwell)  
OR  
Severe headache (worse than normal) **YES**  
OR  
Cough (onset within 7 days)  
OR  
Shortness of Breath (worse than what is normal for you)

**SECTION D: Please record the temperature NOW.**

37  deg C Is the temperature at OR above 38 deg C ? **NO**

**Conditions for Failure**

IF 2 OR MORE OF SECTION B, C, or D ARE ANSWERED "YES", THEN THE PERSON FAILS THE SCREENING TOOL AND MEDICAL EVALUATION IS REQUIRED **PASS**