

Analysis of Calgary Zone Electronic GCD Orders 01 December 2008 – 31 December 2014.

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Background

- **November 25, 2008:** the “Advance Care Planning: Goals of Care Designation (Adult)” policy was launched in Calgary Zone.
- **Goal of the policy:** to standardize approach that assists clinicians and patients in discussing and defining the goals of care.
- After testing in Calgary zone, the policy is **implemented province-wide.**

(AHS Chart Audit Report, 2014)

Background

- AHS policy HCS-38: ACP-GCD is a “communication tool”. From patient’s wishes to goals of care order.
- Policy: paper GCD order.
- Calgary Zone: electronic GCD orders in acute care.
- History of electronic orders – an opportunity for analysis.
- Before December 2014 there were no data fields distinguishing orders with or without ACP/GCD conversation, with or without creating paper documents.

Objectives

1. Analyze large electronic GCD data set of all GCD orders for patients admitted to acute care (AHS chart audits cover 1-2 thousand of patients).
2. Look for emerging patterns in GCD.
3. Look for determinants of GCD orders.

Adult GCD order types

GOALS OF CARE DESIGNATIONS		Chest compressions	Intubate	Resuscitate	ICU	Site transfer	Surgery	Life sustaining	Symptom control
R Resuscitative Care	1	✓	✓	✓	✓	✓	✓	✓	✓
	2	✗	✓	✓	✓	✓	✓	✓	✓
	3	✗	✗	✓	✓	✓	✓	✓	✓
M Medical Care	1	✗	✗	✗	✗	✓	✓	✓	✓
	2	✗	✗	✗	✗	Only for symptom control		✓	✓
C Comfort Care	1	✗	✗	✗	✗			✓	✓
	2	✗	✗	✗	✗	✗	✗	✗	✓

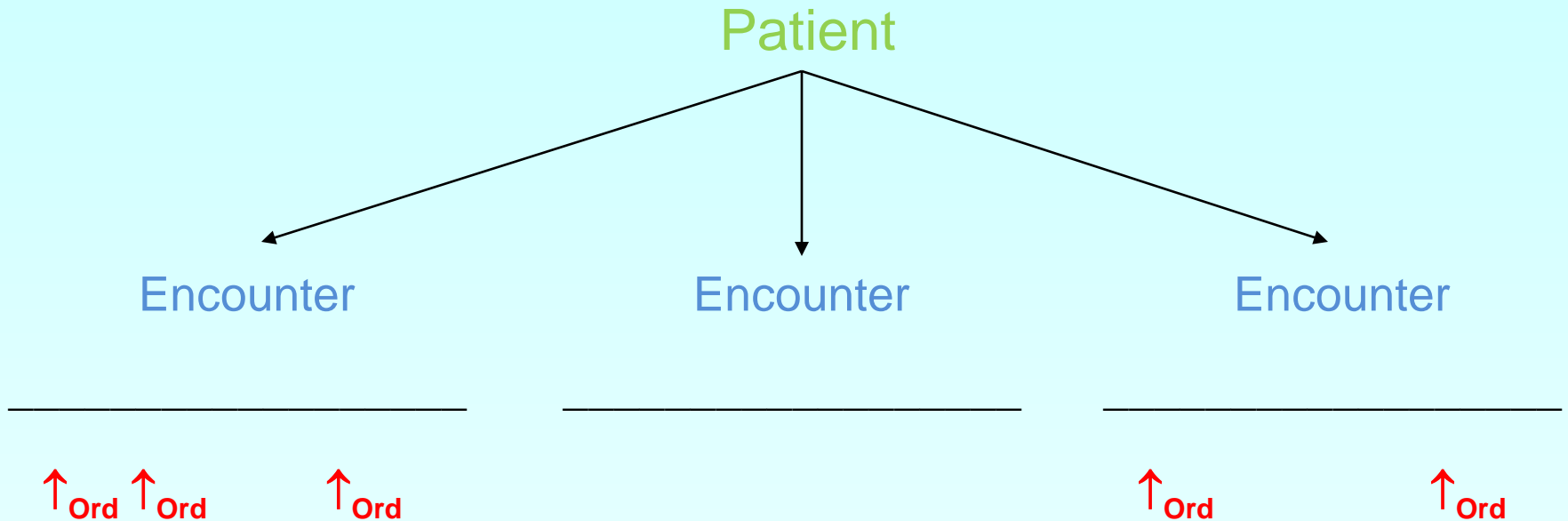
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Adult GCD order types

- **R1** orders — no restriction on medical interventions;
- **Non-R1** — some restriction on interventions, GCD conversation must take place;
- **R2, R3** — restrictions on resuscitation [no intubation (**R2**), no chest compression];
- **M1, M2** — medical focus [no life-saving ICU interventions, **M2** — no transfer to Acute Care];
- **C1, C2** — symptoms comfort focus [Life Sustaining Measures & Transfers only for symptom relief, **C2** — preparation for imminent death];
- **Natural progression: R → M → C.**

Three Levels of Analysis:

Patient – Encounter – GCD Order



- A patient may have several encounters;
- One encounter may have several orders or no orders;

1. Data Overview

Data from AHS, Calgary Zone

- **Data Set 1:** All electronic GCD orders from 1 Dec. 2008 to 31 Dec. 2014.
- **Data Set 2:** Monthly admissions by site and patient age (denominator data for % calculation)
- Validation for monthly admissions: Quarterly AHS Performance Reports.

GCD data: variables

Variable Name	Description
Care Level	Where the order was made (6 categories)
RHRN	Zone 2 Patient ID ($n=251038$)
Encounter	Encounter ID ($n=416087$)
DOB	Month/Day/Year (1900-2014)
Gender	M/F
Admit Date	Date, Time
Discharge Date	Date, Time
Location	Site, Unit

GCD data: variables

Variable Name	Description
Attending Physician	Full name
Attending group	258 Att. Phys. Groups, combined into 5 categories
Order	7 Adult and 13 Pediatric order types
Start Date	Date, Time
Stop Date	Date, Time
Order Requested By	Full name
Order Requested Occupation	66 occupations

GCD data cleaning and cohort formation

All GCD orders ($n=569589$)

Exclusion criteria:

- Records with missing/incorrect data (80, 0.014%);
- Clinical Services, Day Services, Hospices (12900, 2.27%) * ;
- Site “Southern Alberta Forensic Psychiatry Centre” (1675, 0.29%);
- Pediatric orders (6313, 1.12%);
- Site “Alberta Children’s Hospital” (3588, 0.68%);
- Patients less than 19 years old (23332, 4.10%).

Adult GCD orders for acute care admissions: $n=525284$
(92.2%)

* [CareLevel="Ambulatory", "Day Surgery", "IP Ch Pall", "Pediatric DS", "Unknown", "Urgent Care"];

Acute Care Order Locations:

By site:

- Foothills Medical Centre (FMC);
- Peter Lougheed Centre (PLC);
- Rockyview General Hospital (RGH);
- South Health Campus (SHC) since January 2013.

By department:

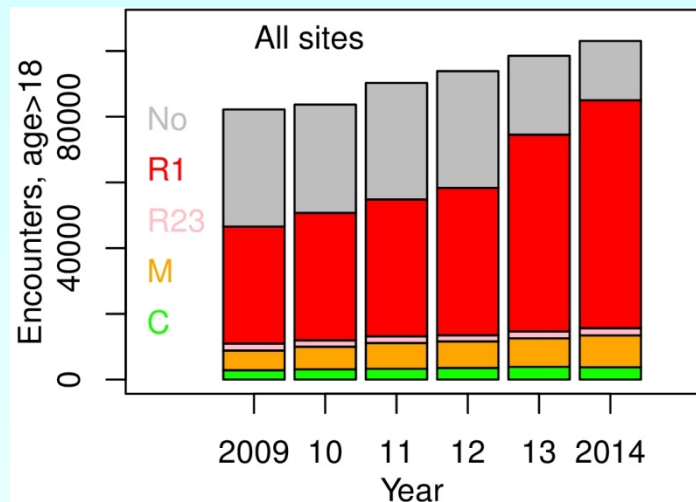
- At Emergency Department prior to admission;
- At Acute Care unit

2. Totals and trends

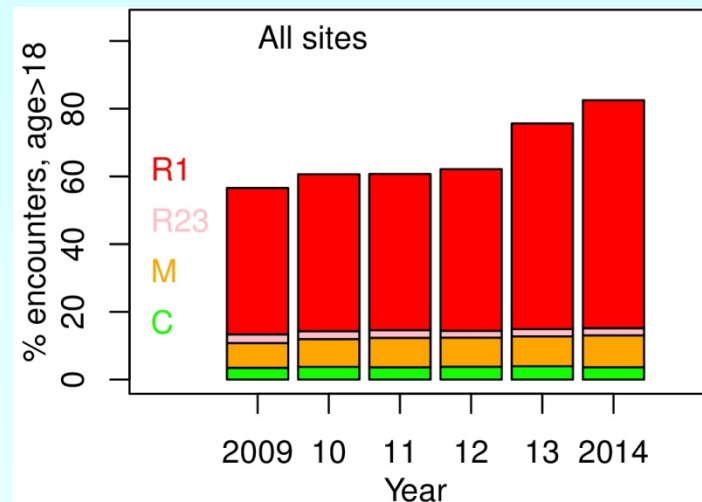
Total numbers by year and by site.

Adult encounters with completed GCD: All sites, by year

Absolute numbers



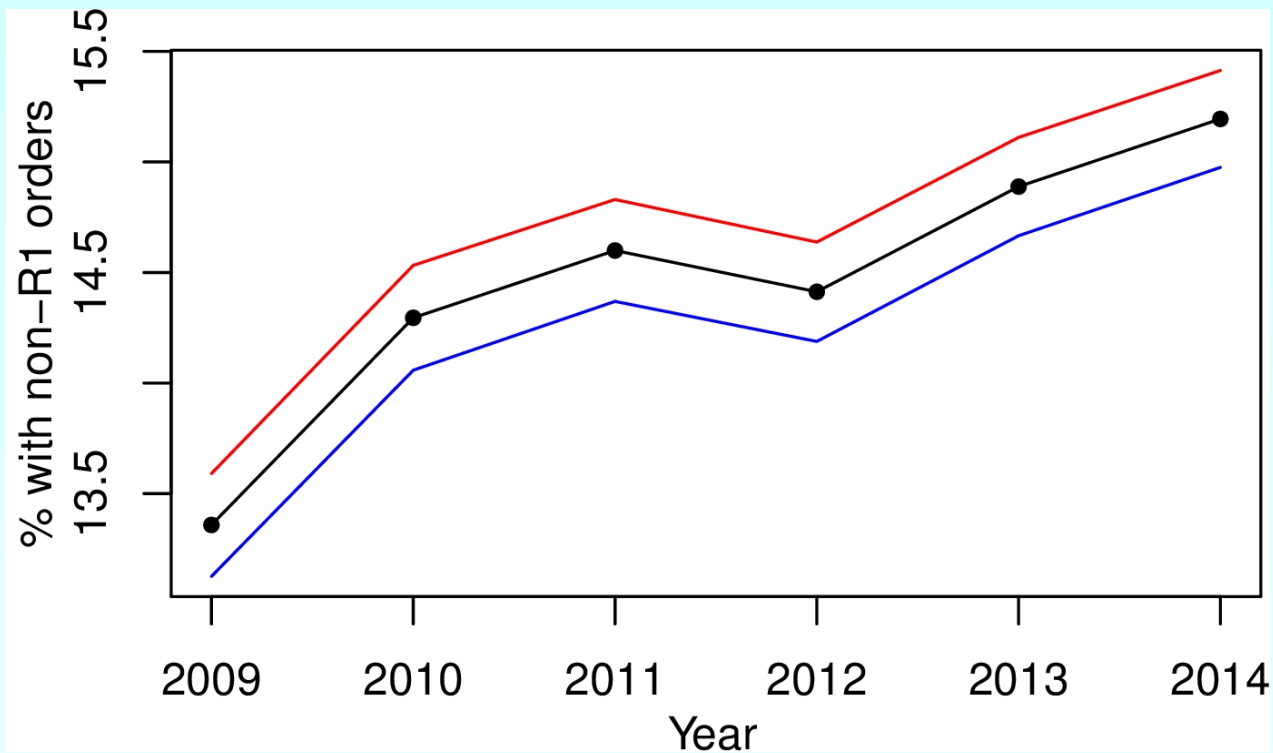
Percentage



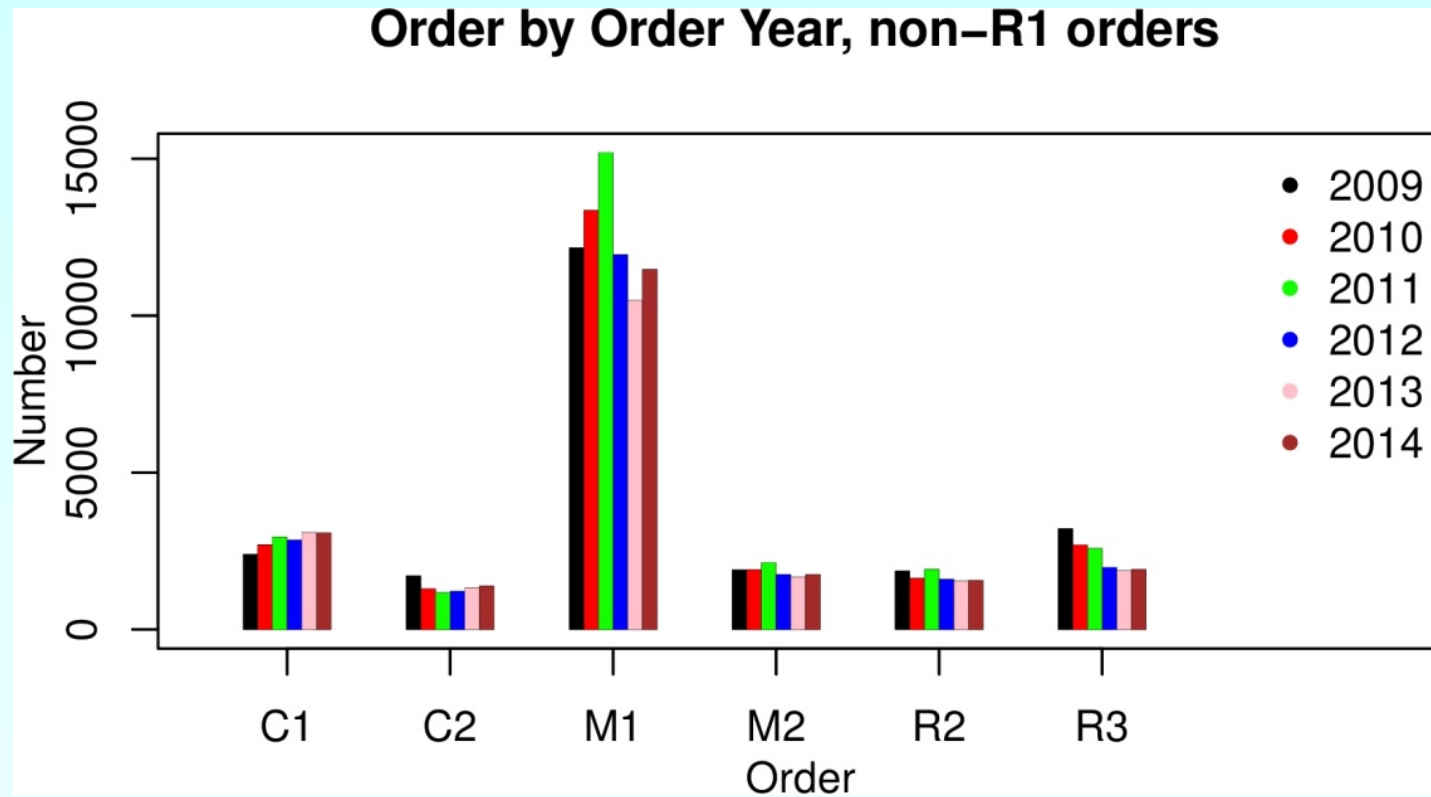
C – Encounters with at least one C-order; M - at least one M and no C;
R23 - at least one R2/R3 and no M or C; R1 – only R1 orders

% Encounters with at least one non-R1 order

95% Confidence Interval



The number of **non-R1** orders, by year

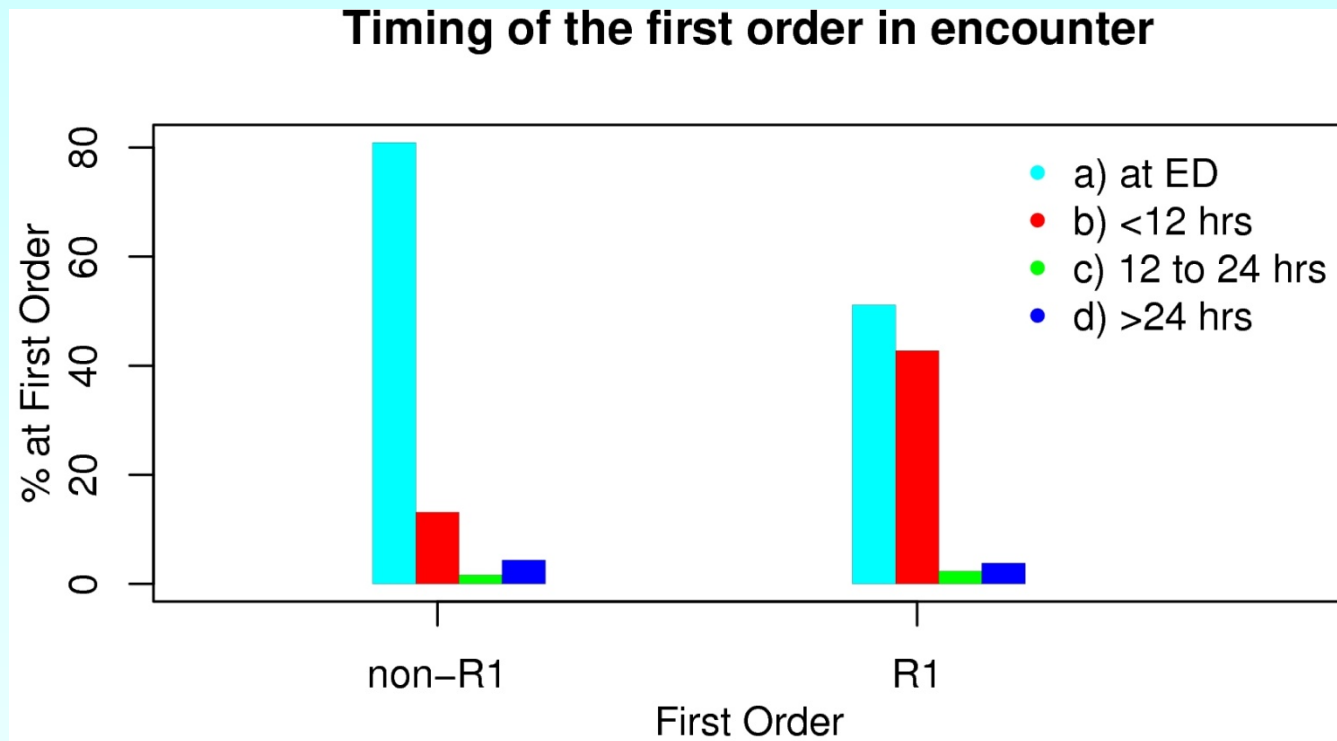


3. Timing

When the first GCD order has been made relative to the admission?

- In ED;
- Within 24 hours from admission;
- Later than 24 hours from admission.

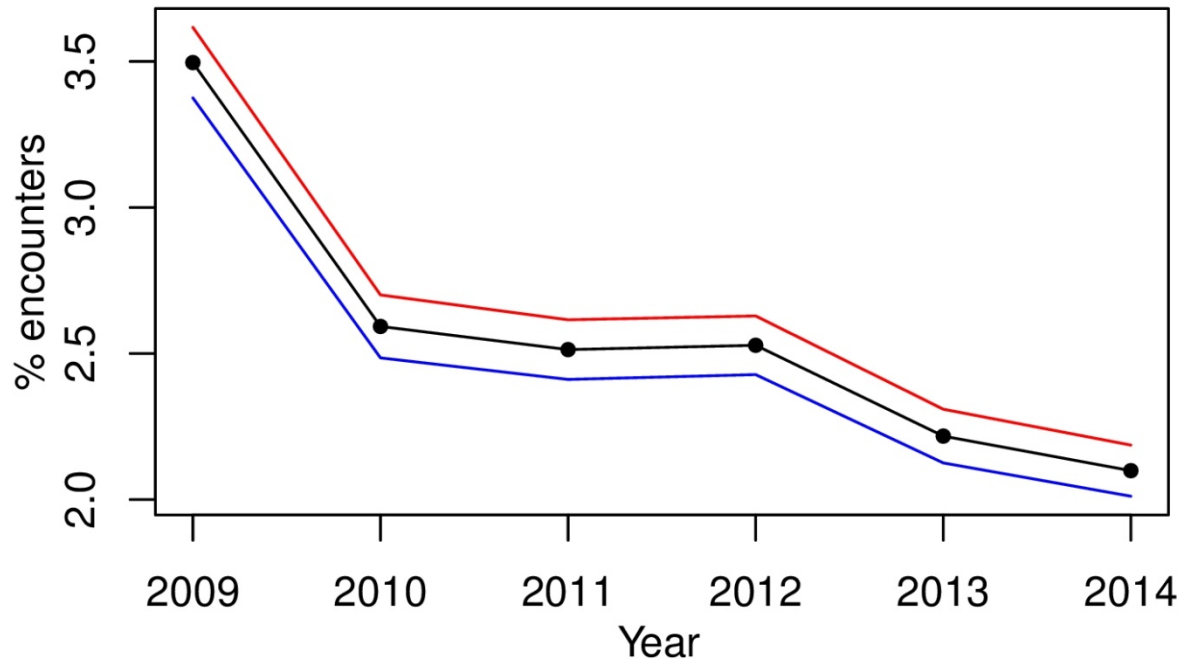
Interval between admission and the first order



- The majority of first orders is made in ED.
- Only 3.9% of all first orders are made later than 24 hours from admission.

Interval between admission and the first order

% of encounters with order after 24hrs from admission, 95% CI

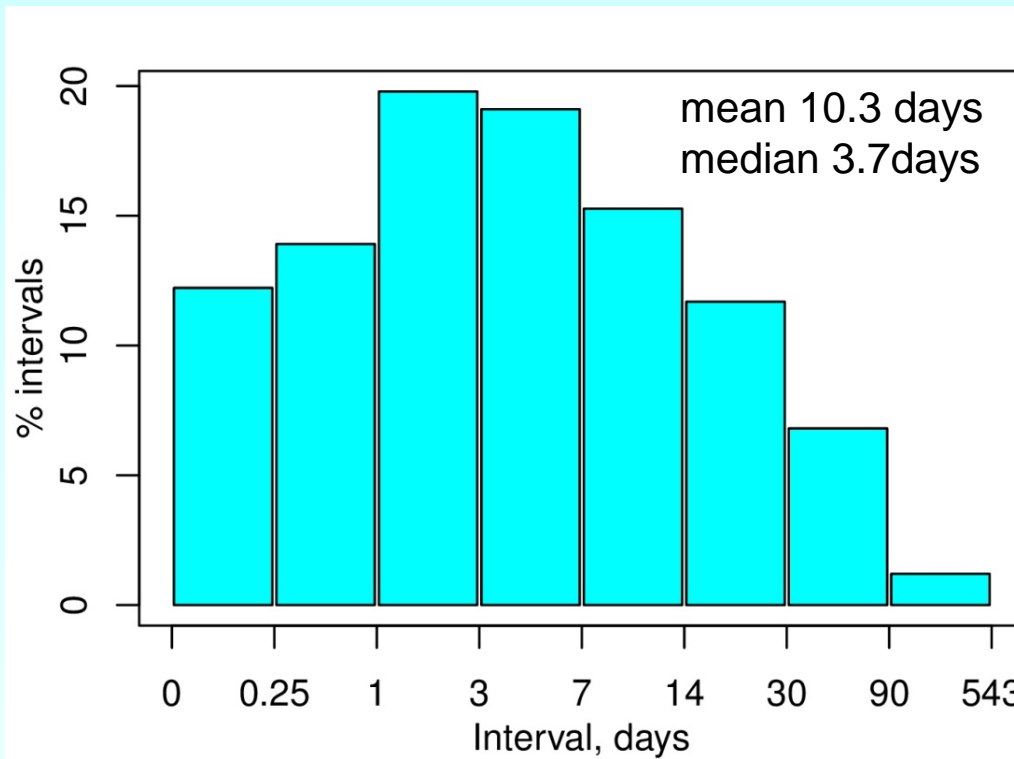


Shown % of all admitted patients (all encounters, including those without an order)

4. Order Frequency

- 48% patients with GCD have 1 order
- 25% patients have 3 or more orders
- 67% encounters with GCD have 1 order
- 5.5% encounters have 3 or more orders
- Multiple orders are often renewals

Intervals between order changes within encounters (renewals excluded)



- 7.4% of encounters have order changes
- 88% of order changes imply focus of care change (R2/3, M, C)

Top 10 Changes (out of 42)	% cases
M1→C1	18.2
R1→M1	17.9
R1→R2	8.9
M2→C1	6.1
M1→C2	5.5
M1→M2	5
R1→R3	4.6
R3→M1	3.9
C1→C2	3.5
R2→M1	3.1

Order sequences within and across encounters (including renewals)

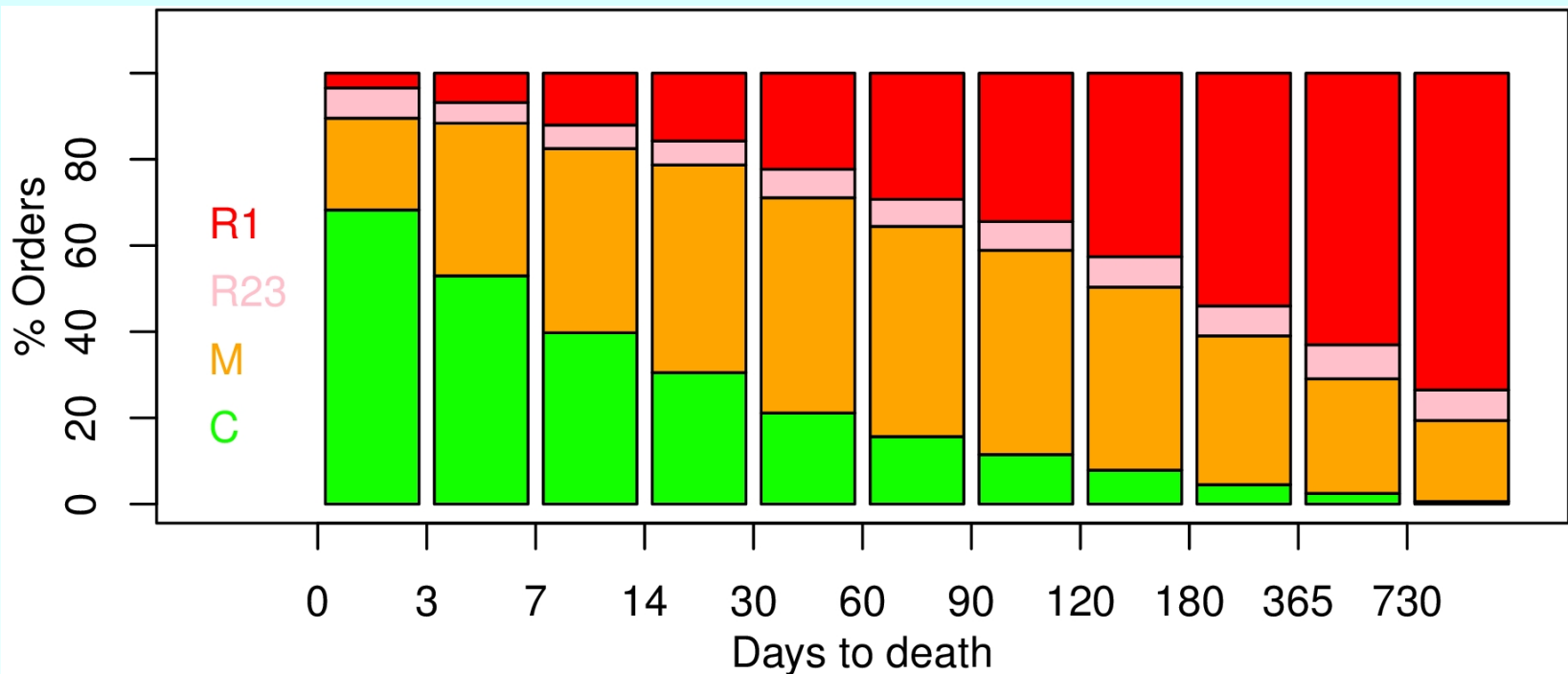
Order keep/change	% in encounters	% for patients
Keep R1	78.4	81.0
Keep R2/3, M or C	14.8	5.9
Natural progression R→M→C	6.5	12.3

Natural R→M→C : any of R1→R2,R3, R→M, M→C

More than 50% of R→M→C changes are made at the beginning of encounters

GCD Orders for Deceased Adult Cancer Patients, 2008-2014, Calgary zone

---C--- ← ---M--- ← ---R1---



5. Determinants

- Administrative changes
- Patient Care Unit type
- Patient age
- Multivariate modeling with model selection

GCD orders assigning

- As a result of ACP/GCD conversation.
- As a part of an order set.

From Dec 2008 to Dec 2014

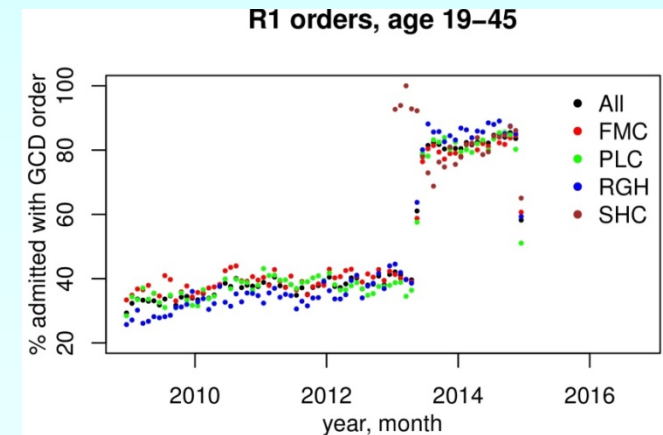
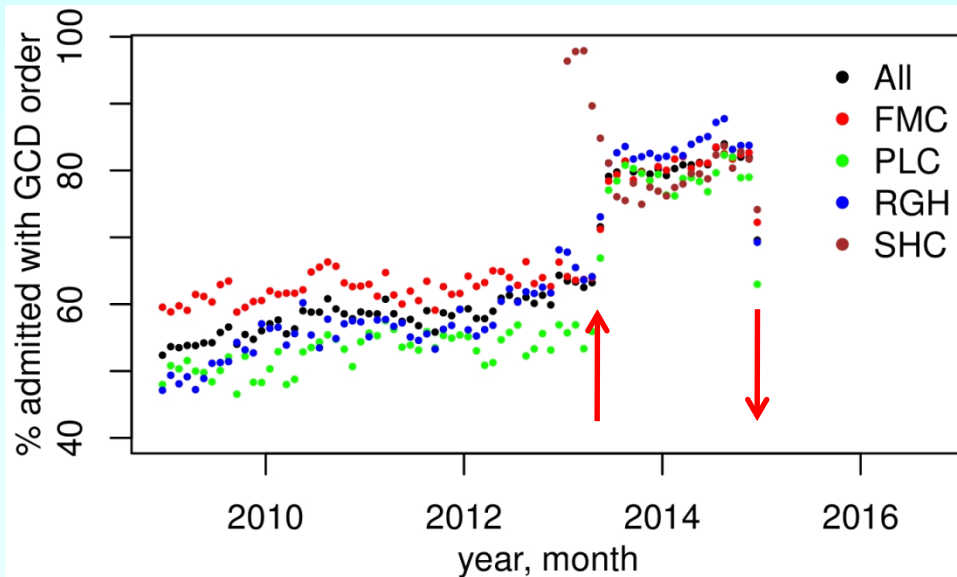
- **106 order sets that contained the GCD item,**
- **49 preselected as R1,**
- **2 preselected as C2.**

(Information from AHS, 21.5.2015)

- Both types of orders are pooled together
- After discharge, the electronic GCD order (SCM) stops, but the printed copy remains valid if exists.

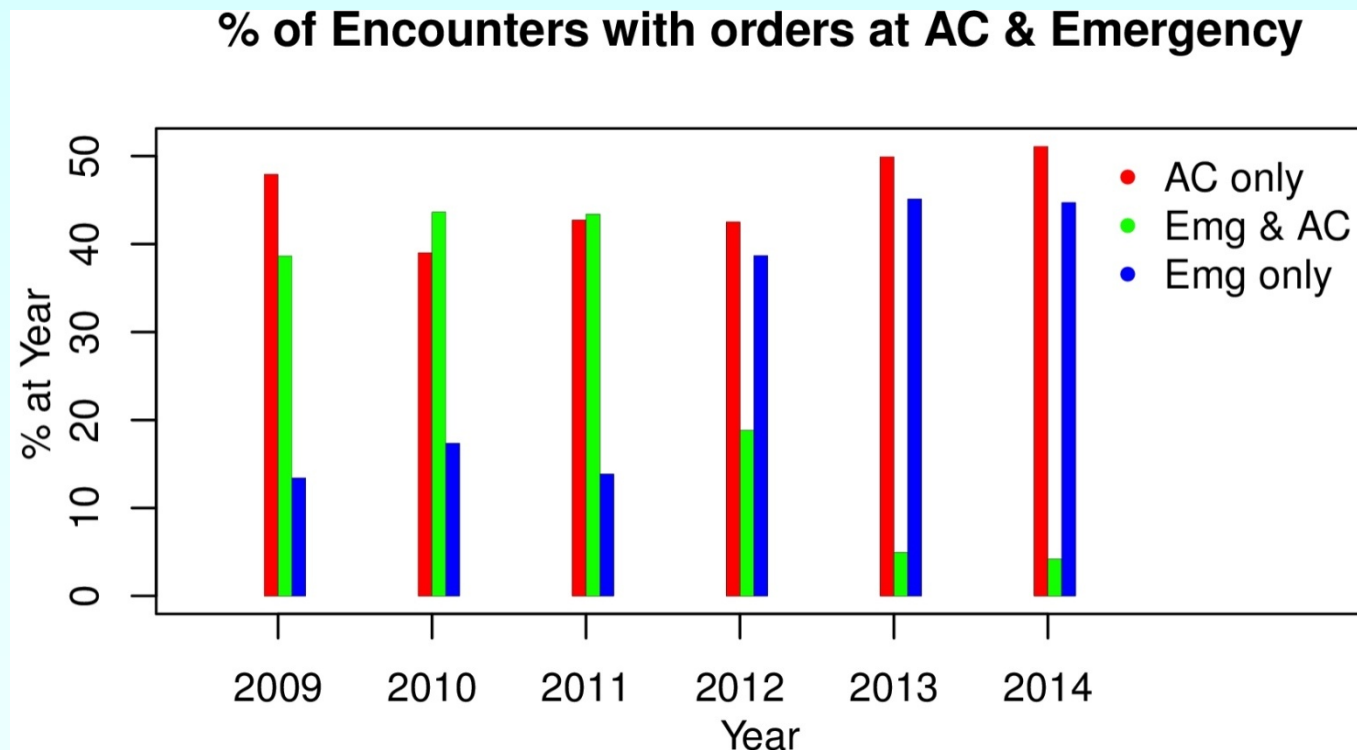
Jumps in % of completed GCD due to changes in one order set

- Order set in obstetrics (May 2013 - December 2014, Affects females of age 19-45)



April 2012 – Continuous Encounters

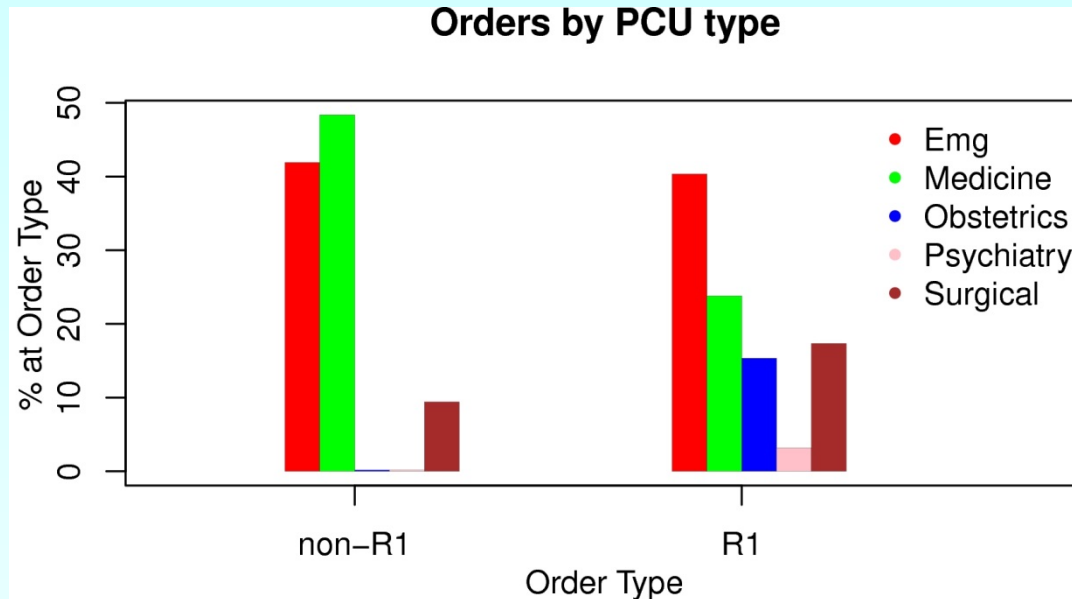
% of Encounters with GCD orders made only in Emergency increases from ~15% to ~50%
(and fewer orders with short duration)



Patient Care Unit (PCU) Types

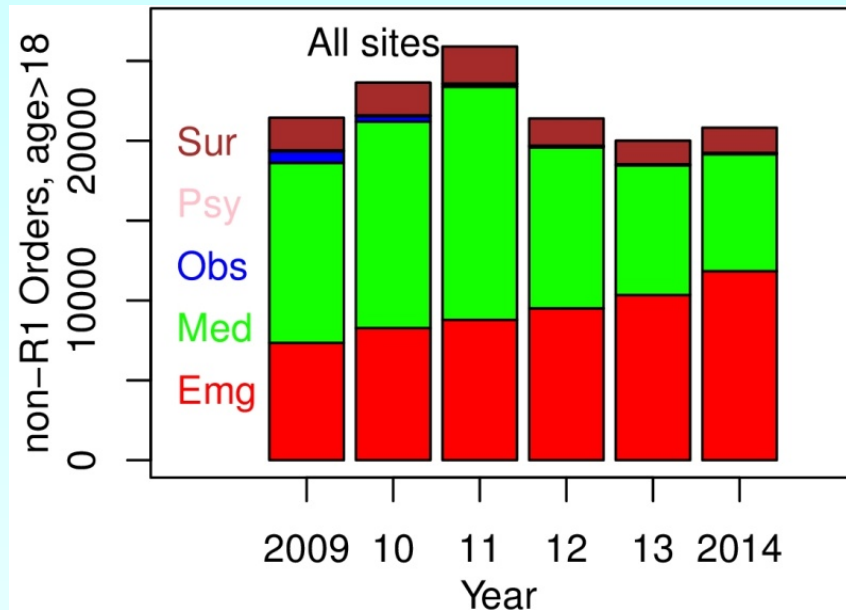
- Most of Patient Care Units can be classified as **Medicine, Surgical, Obstetrics, Psychiatry** and **Emergency**.
- For the patients' location data, PCU types were verified by Site Directors and by Clinibase information.

Orders by PCU Type

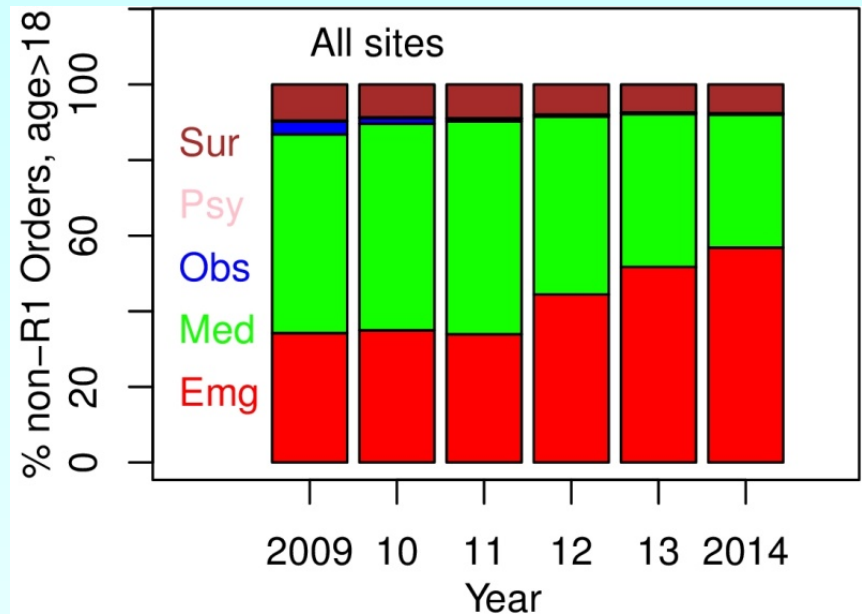


About 90% of non-R1 orders are made in Medicine and Emergency units.

Non-R1 Orders Location (PCU Type) by Year



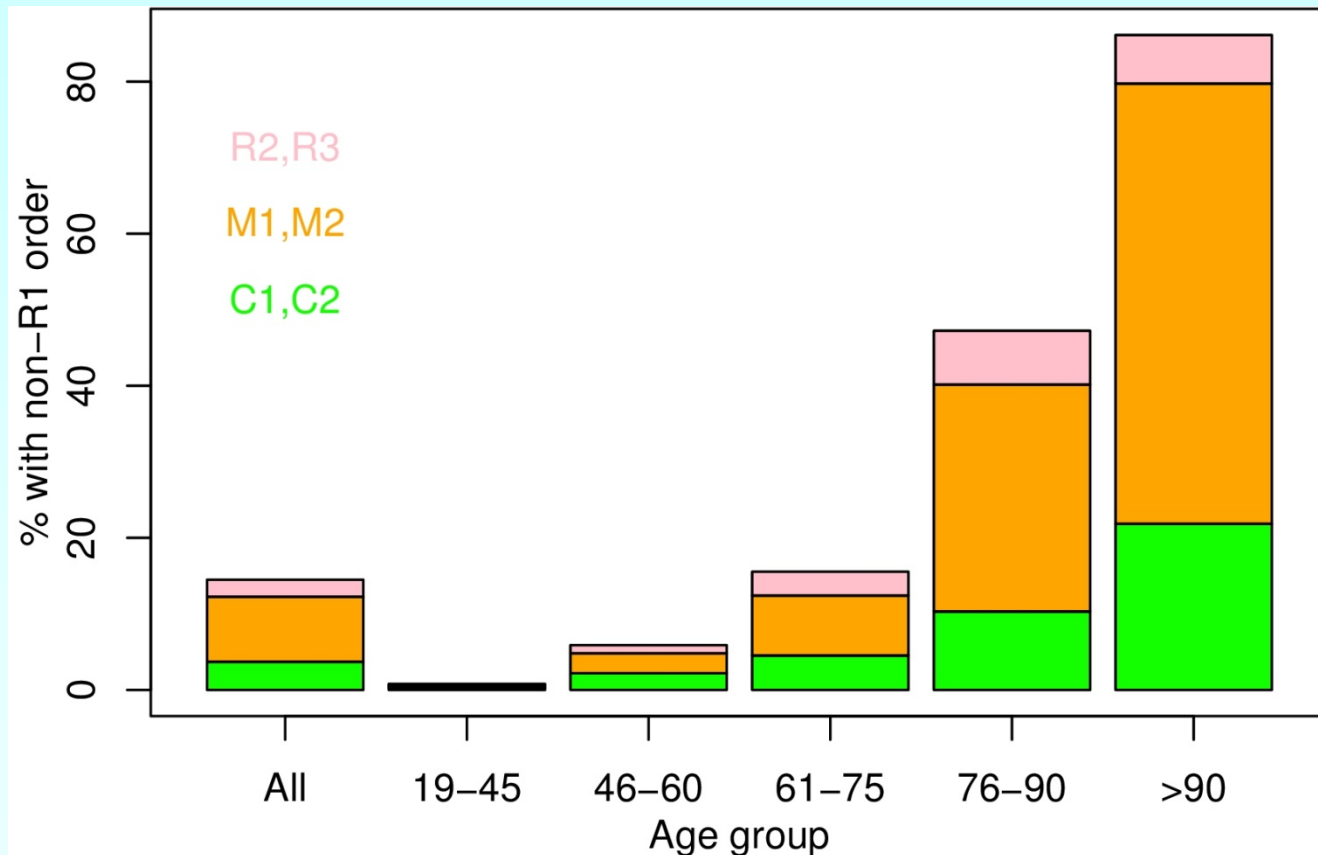
Numbers



Percentage

In 2012-2014 steady growth of % non-R1 orders made in Emergency units.

Age: % encounters with **non-R1** GCD



% of GCD reporting: population definition may be critical

AHS GCD indicator “% of acute care patients with a GCD in place”

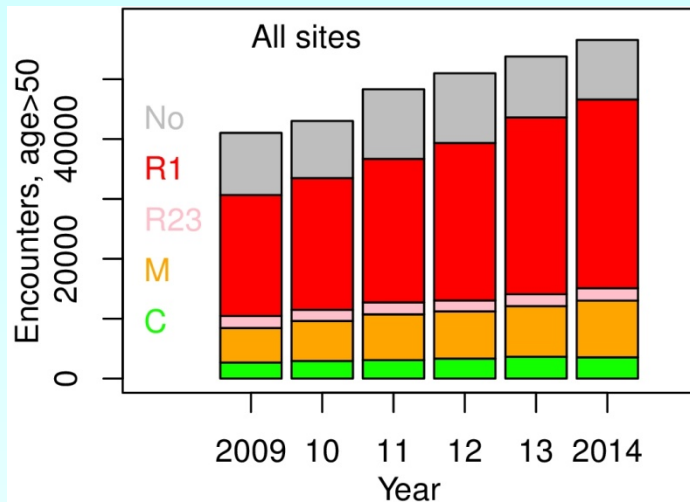
2014 Chart Audit Report #1. **Exclusion** criteria:

- Patients \leq **50 years of age**
- Transferred from out of province
- Paediatrics and Mental Health & Addictions patients
- Stay of $<$ **7 days**

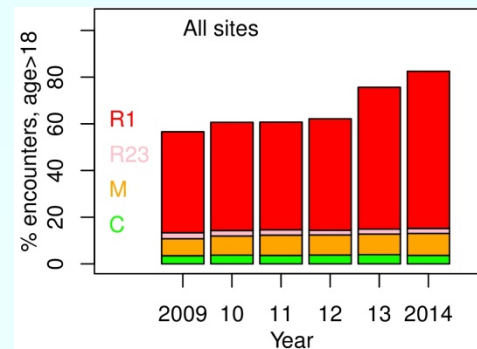
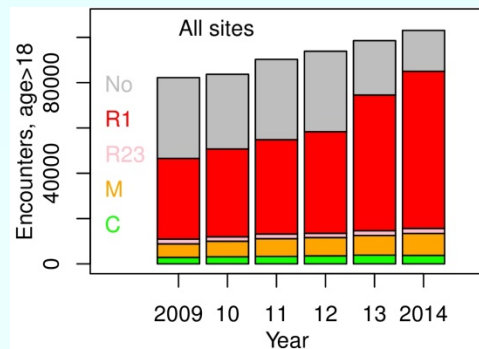
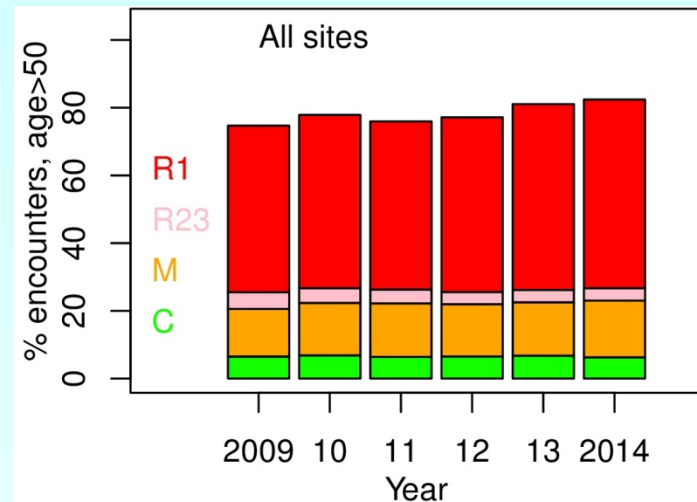
(Our totals discriminate admissions only by age)

Adult encounters (age>50) with completed GCD: All sites, by year

Absolute numbers



Percentage



6. Multivariate Model:

Probability(non-R1 GCD) in Encounter

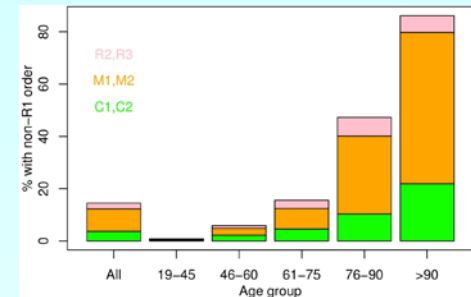
Explains 41% of deviance, all $p < 0.0001$

Factor	d.f.	Contribution to explained deviance, %	Odds Ratio
Age	10	80.7	29.1 to 0.11
PCU type	4	8.2	4.71 to 0.42
Admission >6 days	1	4.8	2.53
GCD in Emergency	1	4.1	3.39
After April 2012	1	1.8	1.88
Gender (male)	1	0.5	0.73

Why age is so important?

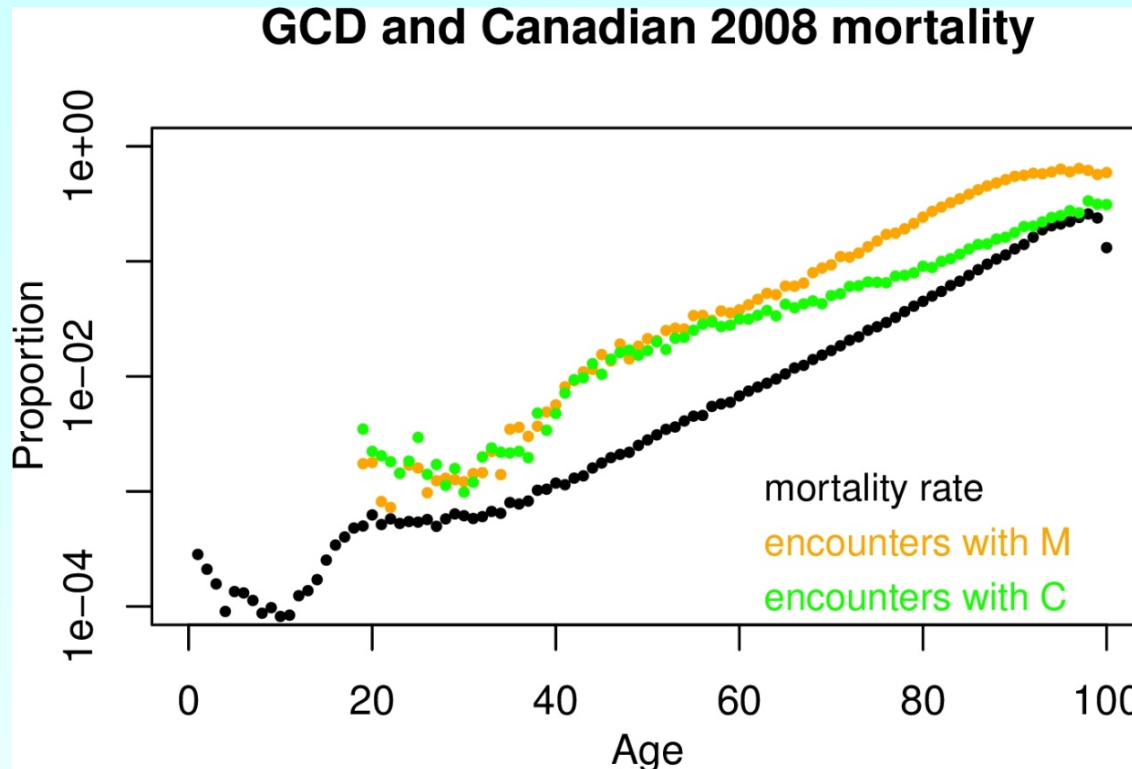
- Percentage of non-R1 GCD orders grows exponentially with age.

- Is there something similar?



- Yes! Human mortality rate or probability to die at the given age.

Probability to Die and GCD at Age



Does switch from R-orders to M-orders occur when the patient feels that death may be approaching?

Age-structured mortality and population data obtained through the Human Mortality Database, www.mortality.org

Summary and Discussion

1. Percentage of non-R1 orders is slowly growing from 13.5% to 15% in 2008-2014

Related trends in acute care:

- Demographics - more patients of older age.
- More workforce (SHC opens in 2013).
- Continuous encounters since 2012.
- Something else? Experience with GCD?
Education/knowledge translation? Awareness of merits of non-R1 GCD?

Summary and Discussion

2. Non-R1 orders are more likely in:

- Older patients (similar to mortality rate);
 - Emergency and Medicine units;
 - Length of stay >6 days.
-
- Focus education in ED and Medicine first
 - Focus ACP engagement on > 70 years?
 - Encourage ACP-GCD talks at community care, *before* people get to emergency?

Summary and Discussion

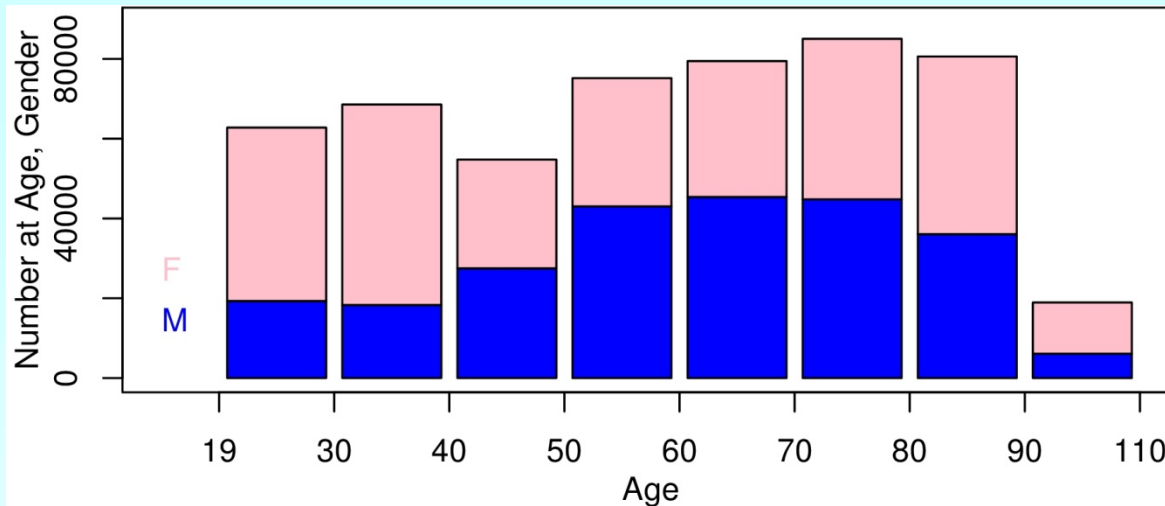
3. Most GCD ordered in ED or <24 hours; later changed again in 7.4% of encounters.
 - Need process for reviewing GCD before discharge or if > 6 days of stay (*after* emergency)?
4. Administrative changes may strongly influence GCD orders.
 - Be mindful of order sets/SCM changes.
5. EHR data-mining – a rich resource.

Acknowledgements

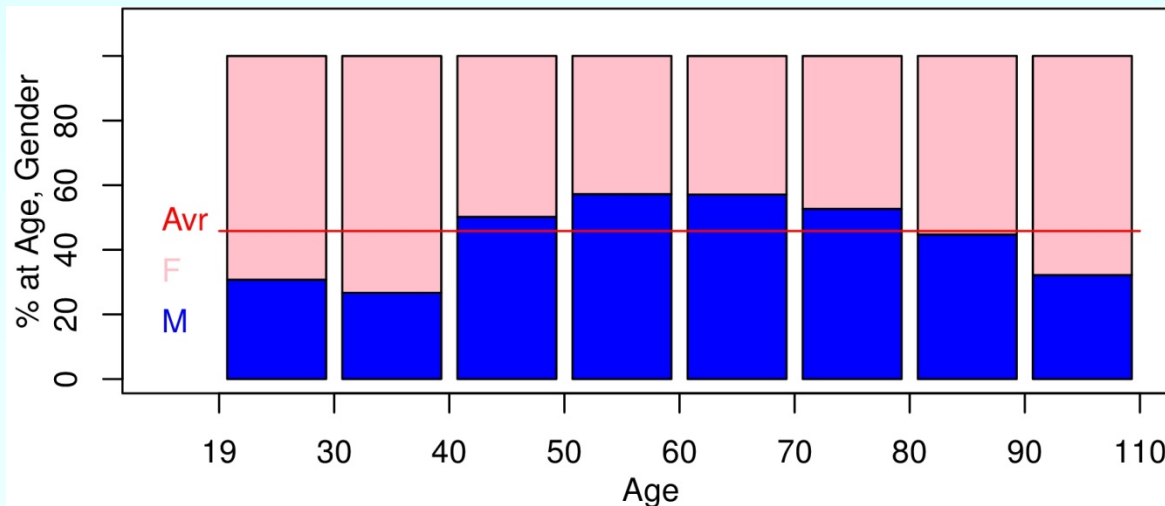
- **Bev Berg**, AHS Palliative and End of Life Care;
- **Barb Wheler**, AHS Palliative/End of Life Care – CZ;
- **Denis Langlois**, AHS SCM Clinical Documentation and Patient Care Orders;
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Thank you!

GCD orders demographics



Numbers
284,891 Females
240,393 Males

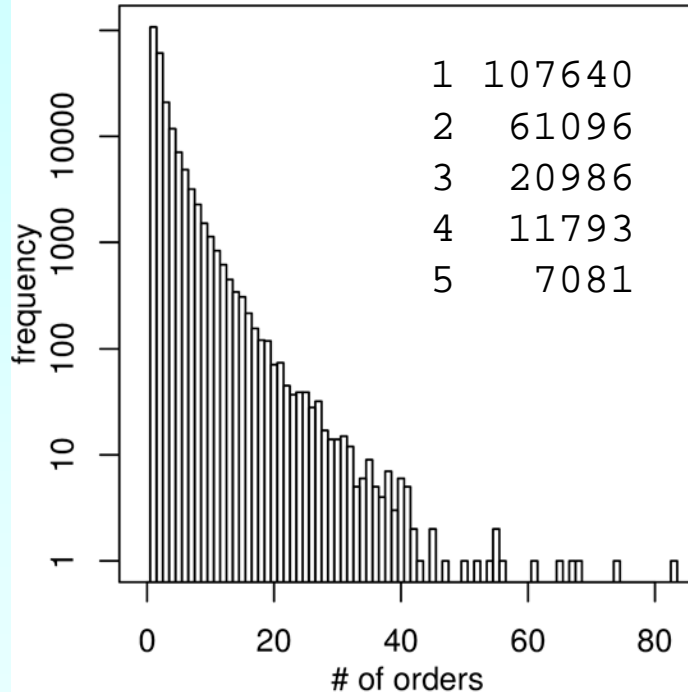


Percentage
Totals:
54.2% Females
45.8% Males

GCD Orders (all types)

Per Patient and Per Encounter

orders per patient



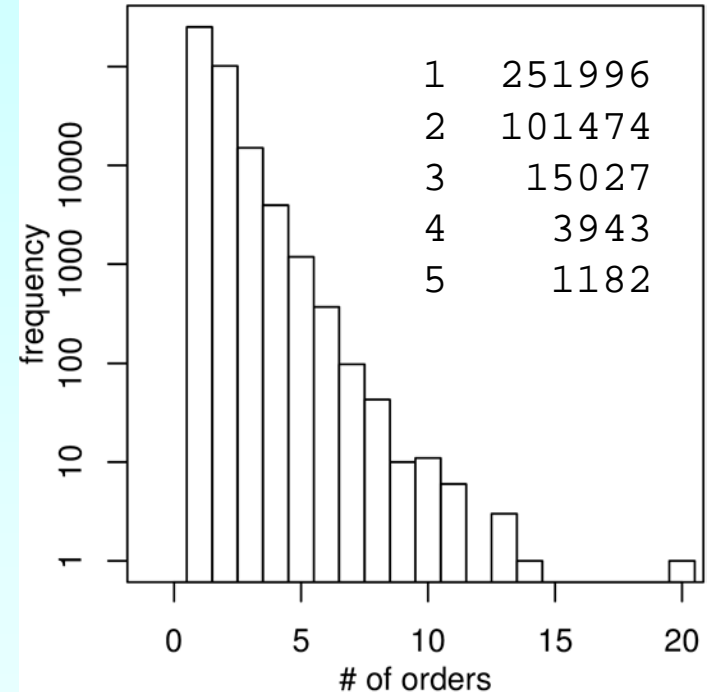
Median 2

Mean 2.3

48% patients have 1 order

25% patients have 3 or more orders

orders per encounter



Median 1

Mean 1.4

67% encounters have 1 order

5.5% encounters have 3 or more orders

Multivariate Model of the Probability of non-R1 Orders in Encounter

Covariates for regression (Binomial distribution)

- Age: 11 age groups (66-70=base)
- PCU type: Med, Sur, Obs, Psy
- Admission duration > 6 days.
- GCD order in Emergency
- Time: before/after Continuous orders
- Gender (female=base)
- Site: (FMC=base)
- Interaction terms

Covariates and Odds Ratios - 1

Covariate		OR	95% CI	p-value
Age Group	19-45	0.11	0.10-0.12	<0.0001
	46-50	0.28	0.26-0.30	<0.0001
	51-55	0.38	0.36-0.41	<0.0001
	56-60	0.51	0.49-0.54	<0.0001
	61-65	0.71	0.68-0.74	<0.0001
	66-70	Base		
	71-75	1.55	1.49-1.62	<0.0001
	76-80	2.46	2.36-2.56	<0.0001
	81-85	4.58	4.40-4.77	<0.0001
	86-90	10.1	9.60-10.5	<0.0001
	91+	29.1	27.1-31.2	<0.0001

Covariates and Odds Ratios - 2

	Covariate	OR	95% CI	p-value
Gen	Female	Base		
	Male	0.73	0.72-0.75	<0.0001
PCU	Medicine	4.71	4.56-4.86	<0.0001
	Surgical	1.50	1.45-1.56	<0.0001
	Obstetrics	0.45	0.38-0.53	<0.0001
	Psychiatry	0.42	0.36-0.49	<0.0001
	GCD in Emerg.	3.39	3.30-3.49	<0.0001
	Admiss.>6days	2.53	2.48-2.59	<0.0001
Mths	1-41	Base		
	42-73 Cnt.Ord.	1.88	1.83-1.93	<0.0001

GCD Orders for Deceased Adult Cancer Patients, 2008-2014, Calgary zone

Percentages (7-day bins)

