

# A Disease Specific Drug Alert – Interpreting Alert Data

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# Disclosures

- Nothing to disclose

# Background – Parkinson's and hospitalization

- Patients with Parkinson's are frequently admitted to hospital and generally not under the care of neurology
- Medications that block central dopamine receptors result in worsening of motor symptoms in Parkinson's disease.
- Computerized physician order entry systems are capable of producing custom alerts which can potentially decrease prescription of these medications in patients with Parkinson's disease.

# Background – Calgary, Alberta Canada

- 4 adult and 1 pediatric hospital using a single integrated Clinical Information System
  - 2667 beds
  - 140,563 Discharges (2014/15)
  - 493,861 ED Visits (2014/15)
- Computerized physician order entry since 2006

# Methods – Intervention

- 2 alerts when placing an order:
  - Combination of levodopa and a neuroleptic (excluding quetiapine or clozapine)
  - Combination of levodopa and metoclopramide
- Does not matter which is ordered first
- Will fire again with dose change
- Advice for alternates provided

## Alert Summary

Ack...	View...	Do...	Alert	Priority	Type	Comment	Scope
✓	✓		Parkinson's Medications Alert	LOW	WARNING		Chart

Alert: Parkinson's Medications Alert

Message: This patient has an active/pending order of levodopa. Medications that block central dopamine receptors result in worsening of Parkinson's Disease symptoms

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Suggest use of low dose quetiapine starting at 12.5 to 25 mg qhs

Acknowledgement Comment:

Acknowledge when seen

Unacknowledge

<< Previous

Alert 1 of 1

Next >>

To view suggested actions for the haloperidol inj order click View Action

View Actions...

To continue with the haloperidol inj unchanged click Proceed.

Proceed

To return to the haloperidol inj and discard alerts click Go Back.

Go Back

Help

## Alert Summary

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Alert: Parkinson's Medications Alert

Message: This patient has an active/pending order of levodopa. Medications that block central dopamine receptors result in worsening of Parkinson's Disease symptoms

[Expand](#)

Suggest Antinausea Options for Older Patients

Acknowledgement Comment:

Acknowledge when seen

Unacknowledge

<< Previous

Alert 1 of 1

Next >>

To view suggested actions for the metoclopramide tab order click View Action

View Actions...

To continue with the metoclopramide tab unchanged click Proceed.

Proceed

To return to the metoclopramide tab and discard alerts click Go Back.

Go Back

Help

**Melt11, Bacon**  
RGH-56-5606-2

2160028849 / 100041611873  
Canada, Albert A

70y (1945-Dec-06) Female

Unreviewed Allergies



**Antinausea Options for Older Patients [0 orders of 4 are selected]**

Gravol (DimenhyDRINATE) is contraindicated in the older patient. DimenhyDRINATE has Anticholinergic properties and affects the Central Nervous System increasing drowsiness.

Ondansetron is best practice and cost effective for anti nausea treatment, particularly post-operatively.

Medications

Order	Dose	Unit	Route	Frequency	PRN	PRN Reason	Additional Information
Medications - 2 item(s)							
<input checked="" type="checkbox"/>	ondansetron inj	4	mg	IVPB	q8h	<input checked="" type="checkbox"/>	for nausea
<input type="checkbox"/>	ondansetron inj	8	mg	IVPB	q8h	<input checked="" type="checkbox"/>	for nausea

Clinical Communication

Order	Clinical Communication
Clinical Communication - 1 item(s)	
<input type="checkbox"/>	Clinical Communication Use non-pharmacologic approaches to manage nausea: small meals throughout the day, bland foods; avoid acidic, fatty and spicy foods.

Drug Info

OK Cancel



# Methods

- Alert placed in production October 21, 2014
- Report of alerts generated for November 1, 2014 to October 31, 2015

# Initial look at the month 1

Name	Proceed	GoBack	Cancel	UnitTotal
aripiprazole tab	1	2	0	3
haloperidol tab	1	0	0	1
haloperidol inj	5	0	0	5
levodopa / carbidopa tab	9	1	1	11
levodopa / carbidopa CR tab	11	2	1	14
methotrimeprazine inj	2	0	0	2
metoclopramide tab	2	1	0	3
metoclopramide inj	3	0	0	3
olanzapine DISINTEGRATING tab	2	0	0	2
olanzapine inj	1	0	0	1
PROLOPA cap	3	0	0	3
risperidone tab	1	1	0	2
risperidone DISINTEGRATING tab	0	1	0	1
Total	<b>41</b>	<b>8</b>	<b>2</b>	<b>51</b>

# Data extract

AlertCreatedWhen	AlertComments	UserResponse	MLMTriggeringObject	MLMTriggeringEvent	OrderSetGUID	OrderSet	OrderID	OrderItem	RequestedBy	RequestedByRole	ReqByOccupationCode
2014-11-27 09:25	ok	PROCEED	ORDER	OrderRelease			0010Q9JUM	levodopa / carbidopa tab		Physician	MD-Family Practitioner
2014-11-25 10:01	continue as at home	PROCEED	ORDER	OrderInitNoVAdditives			0010Q57KH	PROLOPA cap		Physician	MD-Plastic Surgery
2014-11-20 12:32	NULL	PROCEED	ORDER	OrderInitNoVAdditives			0010PVM68	levodopa / carbidopa tab		Resident	Resident
2014-11-18 16:59	stabalized on this at home	PROCEED	ORDER	OrderInitNoVAdditives			0010PQLFF	risperidone tab		Physician	MD-Paediatrics
2014-11-18 10:23	ok	PROCEED	ORDER	OrderInitNoVAdditives			0010PPKWD	levodopa / carbidopa CR tab		Resident	Resident
2014-11-15 00:09	seen	PROCEED	ORDER	OrderInitNoVAdditives			0010PHDVY	levodopa / carbidopa CR tab		Physician	MD-Family Practitioner
2014-11-15 00:06	seen	CANCEL	ORDER	OrderInitNoVAdditives				levodopa / carbidopa tab			
2014-11-14 19:14	ack	PROCEED	ORDER	OrderUnsuspend			0010PDGTM	PROLOPA cap		Physician	MD-Family Practitioner
2014-11-14 08:58	ok	PROCEED	ORDER	OrderInitNoVAdditives			0010PFPF0	levodopa / carbidopa CR tab		Resident	Resident
2014-11-12 10:56	OK	PROCEED	ORDER	OrderInitNoVAdditives			0010P9LQG	levodopa / carbidopa CR tab		Physician	MD-Family Practitioner
2014-11-12 10:54	OK	GO BACK	ORDER	OrderInitNoVAdditives				levodopa / carbidopa CR tab			
2014-11-10 16:27	OK	PROCEED	ORDER	OrderInitNoVAdditives			0010P6JM2	aripirazole tab		Physician	MD-Family Practitioner
2014-11-09 20:47	NULL	PROCEED	ORDER	OrderInitNoVAdditives			0010P4XPX	levodopa / carbidopa CR tab		Resident	Clinical Assistant
2014-11-09 20:46	NULL	CANCEL	ORDER	OrderInitNoVAdditives				levodopa / carbidopa CR tab			
2014-11-09 11:25	aware	PROCEED	ORDER	OrderInitNoVAdditives			0010P42W8	metoclopramide tab		Physician	MD-Critical Care Medicine
2014-11-09 10:46	NULL	PROCEED	ORDER	OrderInitNoVAdditives			0010P414P	levodopa / carbidopa CR tab		Physician	MD-Family Practitioner
2014-11-07 19:26	aware	PROCEED	ORDER	OrderInitNoVAdditives			0010P1JV4	methotrimeprazine inj		Physician	MD-Family Practitioner
2014-11-07 08:30	ok	PROCEED	ORDER	OrderModify			0010KCYZL	olanzapine DISINTEGRATING tab		Physician	MD-Family Practitioner
2014-11-06 10:31	NULL	PROCEED	ORDER	OrderInitNoVAdditives			0010NY3TB	levodopa / carbidopa CR tab		Physician	MD-Family Practitioner
2014-11-05 11:10	NULL	PROCEED	ORDER	OrderInitNoVAdditives			0010NVY7R	levodopa / carbidopa CR tab		Physician	MD-Family Practitioner
2014-11-05 10:58	aware	PROCEED	ORDER	OrderInitNoVAdditives			0010NVX83	metoclopramide tab		Physician	MD-Family Practitioner
2014-11-05 10:57	aware	PROCEED	ORDER	OrderInitNoVAdditives			0010NVX7B	metoclopramide inj		Physician	MD-Family Practitioner
2014-11-05 10:57	NULL	GO BACK	ORDER	OrderInitNoVAdditives				metoclopramide tab			
2014-11-04 09:05	aware	PROCEED	ORDER	OrderInitNoVAdditives			0010NS7SC	methotrimeprazine inj		Physician	MD-Orthopedic Surgery
2014-11-03 10:32	clarification to continue as at home	PROCEED	ORDER	OrderInitNoVAdditives			0010NQ57N	levodopa / carbidopa CR tab		Physician	MD-Family Practitioner
2014-11-03 04:30	aware	PROCEED	ORDER	OrderInitNoVAdditives			0010NPK94	levodopa / carbidopa tab		Physician	MD-Family Practitioner
2014-11-02 11:28	NULL	GO BACK	ORDER	OrderInitNoVAdditives				risperidone tab			
2014-11-01 11:59	ok	PROCEED	ORDER	OrderModify			0010JZ852	levodopa / carbidopa tab		Physician	MD-Family Practitioner
2014-10-30 14:36	NULL	PROCEED	ORDER	OrderInitNoVAdditives			0010NH852	levodopa / carbidopa CR tab		Physician	MD-Family Practitioner
2014-10-30 14:36	NULL	PROCEED	ORDER	OrderInitNoVAdditives			0010NH833	levodopa / carbidopa CR tab		Physician	MD-Family Practitioner
2014-10-30 12:14	ok	PROCEED	ORDER	OrderInitNoVAdditives			0010NGY01	levodopa / carbidopa tab		Physician	MD-Family Practitioner
2014-10-30 12:13	ok	PROCEED	ORDER	OrderInitNoVAdditives			0010NGXZ3	levodopa / carbidopa tab		Resident	Resident
2014-10-30 08:12	ok	PROCEED	ORDER	OrderInitNoVAdditives			0010NGBFF	levodopa / carbidopa tab		Resident	Resident
2014-10-28 20:58	NULL	GO BACK	ORDER	OrderInitNoVAdditives				risperidone DISINTEGRATING tab			
2014-10-28 07:58	NULL	PROCEED	ORDER	OrderInitNoVAdditives			0010N9D0H	olanzapine inj		Physician	MD-Family Practitioner
2014-10-28 07:51	NULL	GO BACK	ORDER	OrderInitNoVAdditives				levodopa / carbidopa CR tab			
2014-10-28 07:51	NULL	GO BACK	ORDER	OrderInitNoVAdditives				levodopa / carbidopa tab			
2014-10-22 15:53	NULL	GO BACK	ORDER	OrderModify			0010GMQF7	aripirazole tab		Physician	MD-Psychiatry
2014-10-22 15:00	NULL	GO BACK	ORDER	OrderModify			0010GMQF7	aripirazole tab		Physician	MD-Psychiatry
2014-10-21 16:42	ad	PROCEED	ORDER	OrderInitNoVAdditives			0010MWGTV	levodopa / carbidopa tab		Physician	MD-General Surgery
2014-10-21 13:55	NULL	PROCEED	ORDER	OrderInitNoVAdditives			0010MW25K	levodopa / carbidopa tab		Resident	Resident

# Data extract 2

EnteredBy	EnteredByRole	EntByOccupationCode	RHRN	Encounter	VisitType	AdmitDtm	DischargeDtm	Unit	AttendingGroup	AttendingPhysician
	Physician	MD-Family Practitioner			I/P					
	Pharmacist	Pharmacist			I/P					
	Resident	Resident			I/P					
	Physician	MD-Paediatrics			I/P					
	Resident	Resident			I/P					
	Physician	MD-Family Practitioner			I/P					
	Physician	MD-Family Practitioner			I/P					
	Resident	Resident			I/P					
	Resident	Resident			I/P					
	Physician	MD-Family Practitioner			I/P					
	Physician	MD-Family Practitioner			I/P					
	Physician	MD-Family Practitioner			I/P					
	Registered Nurse	Registered Nurse			I/P					
	Registered Nurse	Registered Nurse			I/P					
	Physician	MD-Critical Care Medicine			I/P					
	LPN	LPN			I/P					
	Physician	MD-Family Practitioner			I/P					
	Physician	MD-Family Practitioner			I/P					
	Physician	MD-Family Practitioner			I/P					
	Physician	MD-Family Practitioner			I/P					
	Physician	MD-Family Practitioner			I/P					
	Physician	MD-Family Practitioner			I/P					
	Physician	MD-Orthopedic Surgery			I/P					
	Pharmacist	Pharmacist			I/P					
	Physician	MD-Family Practitioner			I/P					
	Physician	MD-Family Practitioner			I/P					
	Physician	MD-Family Practitioner			I/P					
	Physician	MD-Family Practitioner			I/P					
	Physician	MD-Family Practitioner			I/P					
	Pharmacist	Pharmacist			I/P					
	Resident	Resident			I/P					
	Resident	Resident			I/P					
	Physician	MD-Family Practitioner			I/P					
	Physician	MD-Family Practitioner			I/P					
	Registered Nurse	Registered Nurse			I/P					
	Registered Nurse	Registered Nurse			I/P					
	Physician	MD-Psychiatry			I/P					
	Physician	MD-Psychiatry			I/P					
	Physician	MD-General Surgery			I/P					
	Resident	Resident			I/P					

# Methods - Analysis

- Orders reviewed directly in Clinical Information System for admissions with alerts in this time period
- A successful alert was defined as one that caused the order for the offending medication to be cancelled or changed from an ongoing order to a one time dose

# Results

- 922 admissions by 627 patients with any levodopa order
  - 218 (23.6%) of the admissions had at least 1 alert fire
- Alert fired in 404 order sessions

## Results – Of the 404 alerts:

- 112 (27.7%) – offending medication cancelled or changed to single dose
- Metoclopramide – 189 (46.8%) of the alerts
  - 72 (38.1%) cancelled
- Neuroleptics – 215 (53.2%) of the alerts
  - 40 (18.6%) cancelled or changed to a one time dose

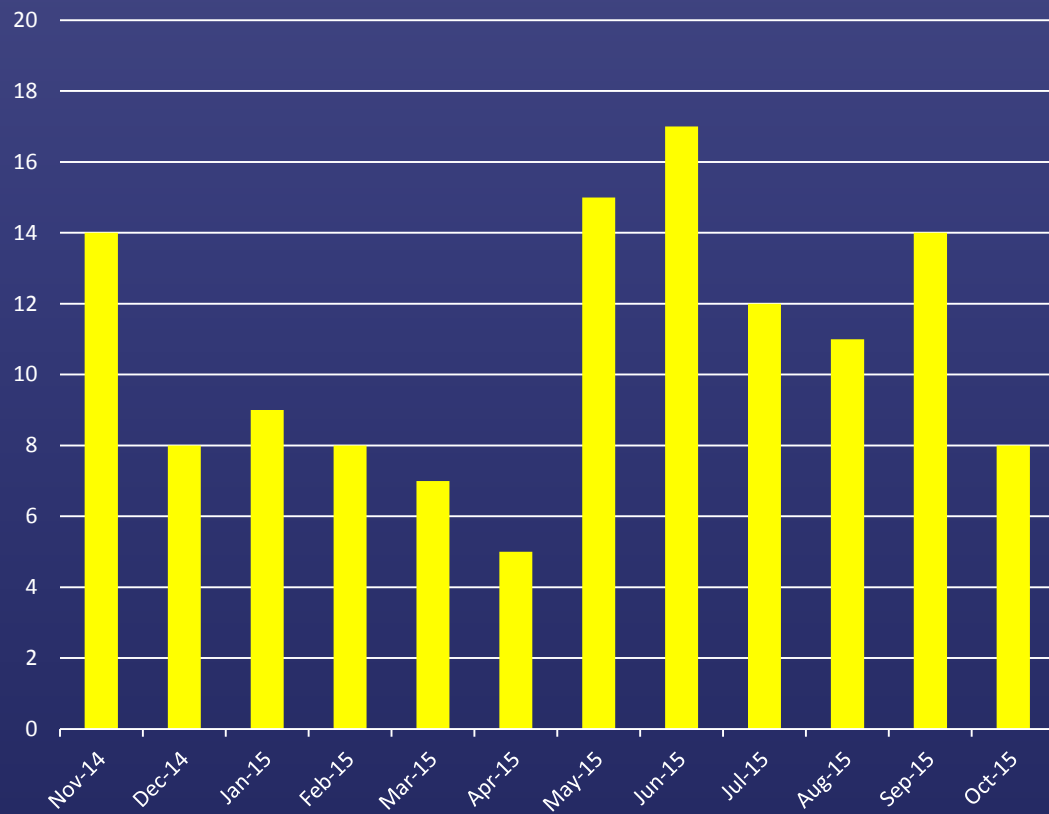
# Results – Initial alert vs subsequent alerts

- For the initial order session in which an alert displayed
  - 35.2% (99/281) resulted in the medication being cancelled
    - Metoclopramide 40.5% (62/153)
    - Neuroleptics 28.9% (37/128)
- Subsequent alerts
  - 10.6% (13/123) resulted in the medication being cancelled
    - 10 of these 13 were for metoclopramide
    - Metoclopramide 10/36 (27.8%)
    - Neuroleptic 3/87 (3.4%)

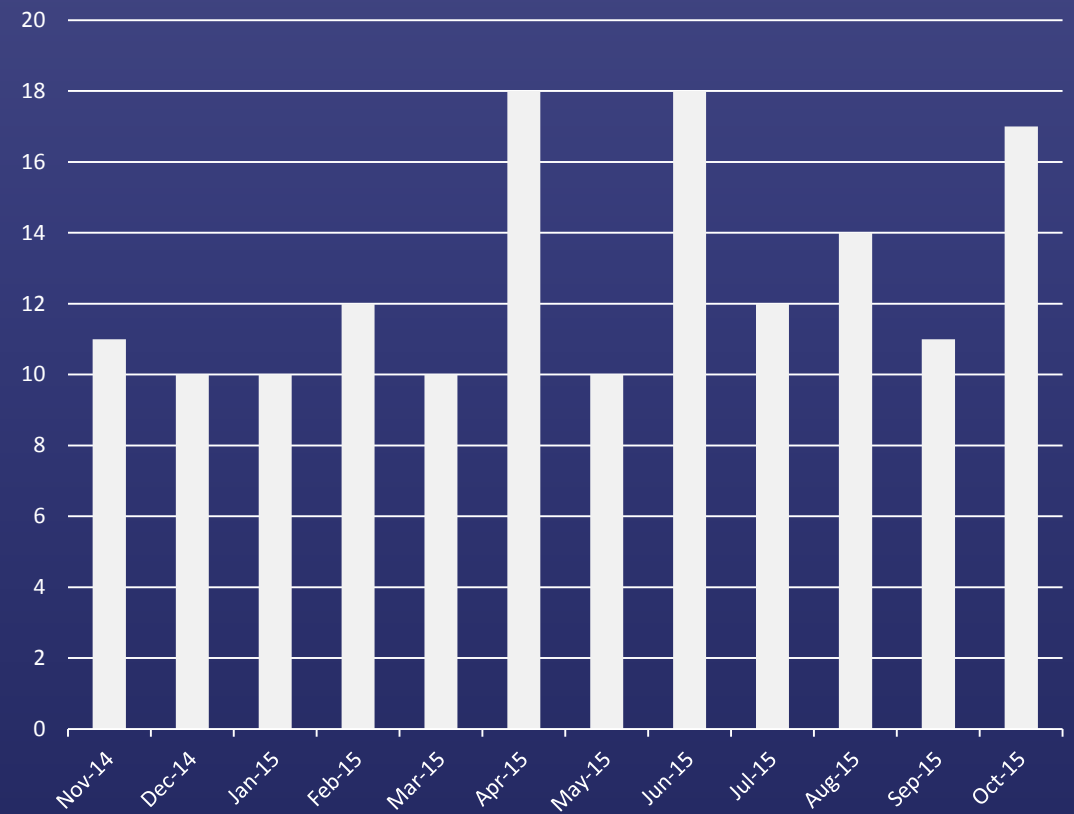


# Results – Any evidence of learning?

Initial Alerts By Month - Neuroleptics



Initial Alerts By Month - Metoclopramide



# Many ways to slice results: By person entering

Row Labels	n	y	Grand Total	
Clinical Assistant	6		6	0.0%
Fellow	5	3	8	37.5%
Graduate Nurse	2		2	0.0%
LPN	2		2	0.0%
MD-Anesthesia		3	3	100.0%
MD-Critical Care Medicine	2		2	0.0%
MD-Emergency Medicine	4	4	8	50.0%
MD-Family Practitioner	57	34	91	37.4%
MD-General Surgery	3	3	6	50.0%
MD-Neurology	1		1	0.0%
MD-Obstetrics/Gynecology	1		1	0.0%
MD-Orthopedic Surgery	2	4	6	66.7%
MD-Paediatric General Surgery	1		1	0.0%
MD-Psychiatry	6	1	7	14.3%
MD-Respirology	1		1	0.0%
MD-Urology	7	1	8	12.5%
Nurse Practitioner	4	3	7	42.9%
Pharmacist	3	1	4	25.0%
Registered Nurse	29	14	43	32.6%
Resident	45	19	64	29.7%
(blank)	1	9	10	90.0%
Grand Total	182	99	281	35.2%

# Interpreting the action on alert

- System records Cancel, Proceed, or Go Back
  - But this may not reflect what happens
- For 19/83 where the action was to Cancel or Go Back they ended up ordering the dopamine blocking agent in the end anyways
- For 38/321 that the action was Proceed the alert actually worked and the medication was cancelled
  - 34/38 were because the alert fired on the levodopa as the dopamine blocking agent was ordered before levodopa

# Discussion – Limitations

- Did not review all documentation to see if there were possible legitimate uses in the patients or to confirm what the diagnosis truly was
- Difficult to link ignoring the alert with complications and length of stay

# Discussion - Other alert mechanisms

- Drug-disease alerts using a diagnosis of Parkinson's only fire if Parkinson's is entered in the system prior to order entry
  - Would also need to include other Parkinsonian disorders
- Standard drug-drug interaction alerts do not specifically describe the impact on Parkinson's patients and do not provide advice for alternatives

# Discussion - Future work

- Modification of order sets to provide alternates
- Targeted education
- Change alert wording to be more blunt
  - Do not give Metoclopramide to Parkinson's patients. Giving Metoclopramide will result in poor mobility, falls and increased length of stay

# Conclusions

- An alert that displays both the rationale and a suggestion for an alternative can decrease the prescription of central dopamine blocking agents to inpatients with Parkinson's disease
- Changing ordering behaviour with an alert is more likely for metoclopramide than neuroleptics especially with the first appearance of the alert
- Simply looking at the actions on alert does not necessarily give an accurate representation of success or failure

# Questions?

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