# A Multiple Sclerosis Flowsheet Registry Integrated With The Electronic Health Record To Provide Comprehensive Care And Local Research Opportunities

Kimberly Cooley, RN, CCRC, Carl Asche, MBA, MSc, PhD, Dennis Garwacki, MD, Linda Gonia, MPA, Noreen Khan, Jorge Kattah, MD, Min-Chul Kim, PhD, Annie McClure, Phil Oelkers, Bonnie Paris, PhD, Jinma Ren, PhD, Reuben Valenzuela, MD, and Kim Wankel





Illinois Neurological Institute 530 NE Glen Oak Avenue Peoria IL, USA kimberly.l.cooley@osfhealthcare.org





Department of Neurology, University of Illinois College of Medicine at Peoria and the Illinois Neurological Institute, Peoria IL USA

Integration

Integrated

Figure 2.

MS database

Onset of MS symptoms

Relapse information

Motor assessments

Scale (MSSS)

MS medication history with

reason for discontinuation

a) Expanded Disability

b) 9 Hole Peg Test

Multiple Sclerosis Severity

MS Imaging and lab tests

Clinical service

Status Scale (EDSS)

Date of diagnosis

EMR database

Date of inpatient and discharge

Demographics

(length of stay)

Comorbidity

10. Medications

11. Place of Service

Research service

Payor/insurance

Medication history

Direct/indirect Cost

Follow-up and readmission

12. Geographic patient distribution

All diagnosis codes

All procedure codes

## INTRODUCTION

Multiple Sclerosis (MS) is an autoimmune disease which affects over 2 million people world-wide. Management of MS is complicated because the clinical course differs among individuals. The entire clinical picture of an MS patient could be viewed easier by the care providers with the implementation of a MS database registry that is integrated with the electronic health record (EHR). Tracking long-term patient outcomes in the real-world clinical setting could help physicians and researchers understand this disease better.

#### BACKGROUND

The promise of information technology solutions to improve health care is seldom realized, and the gap between health information system design and reality persists. Not every electronic health record (EHR) has the same capabilities for automated data extraction. Many times information can only be entered in narrative format within progress notes, which creates a challenge extracting data efficiently. Manual chart review to retrieve information is time-consuming and not an effective use of EHRs and staff resources. The INI MS Center treats over 800 MS patients each year. This clinic predicted benefits of integrating a MS registry database with the EHR:

- 1. Cost savings due to early access to Disease Modifying Therapy (DMTs).
- 2. Improved patient care due to a decrease in relapse rates, disability progression, and MS related hospitalizations.
- 3. Improved staff satisfaction due to less time searching the EHR to view the complete individual MS patient
- 4. Increase in local research opportunities due to outcome reporting functionality.

| Characteristics | Factors | LABEL             | Frequency | Percent  | CumFrequency |
|-----------------|---------|-------------------|-----------|----------|--------------|
| Gender          | gender  | 1:Male            | 313       | 26.0     | 313          |
|                 |         | 2:Female          | 893       | 74.0     | 1206         |
| Age (n=1206)    |         | mean(SD) in years |           | 50.7 (12 | .8)          |
| Race            | race    | 1:White           | 1126      | 93.1     | 1126         |
|                 |         | 2:Black           | 60        | 5.0      | 1186         |
|                 |         | 3:Other           | 24        | 2.0      | 1210         |

Figure 8.

RESULTS

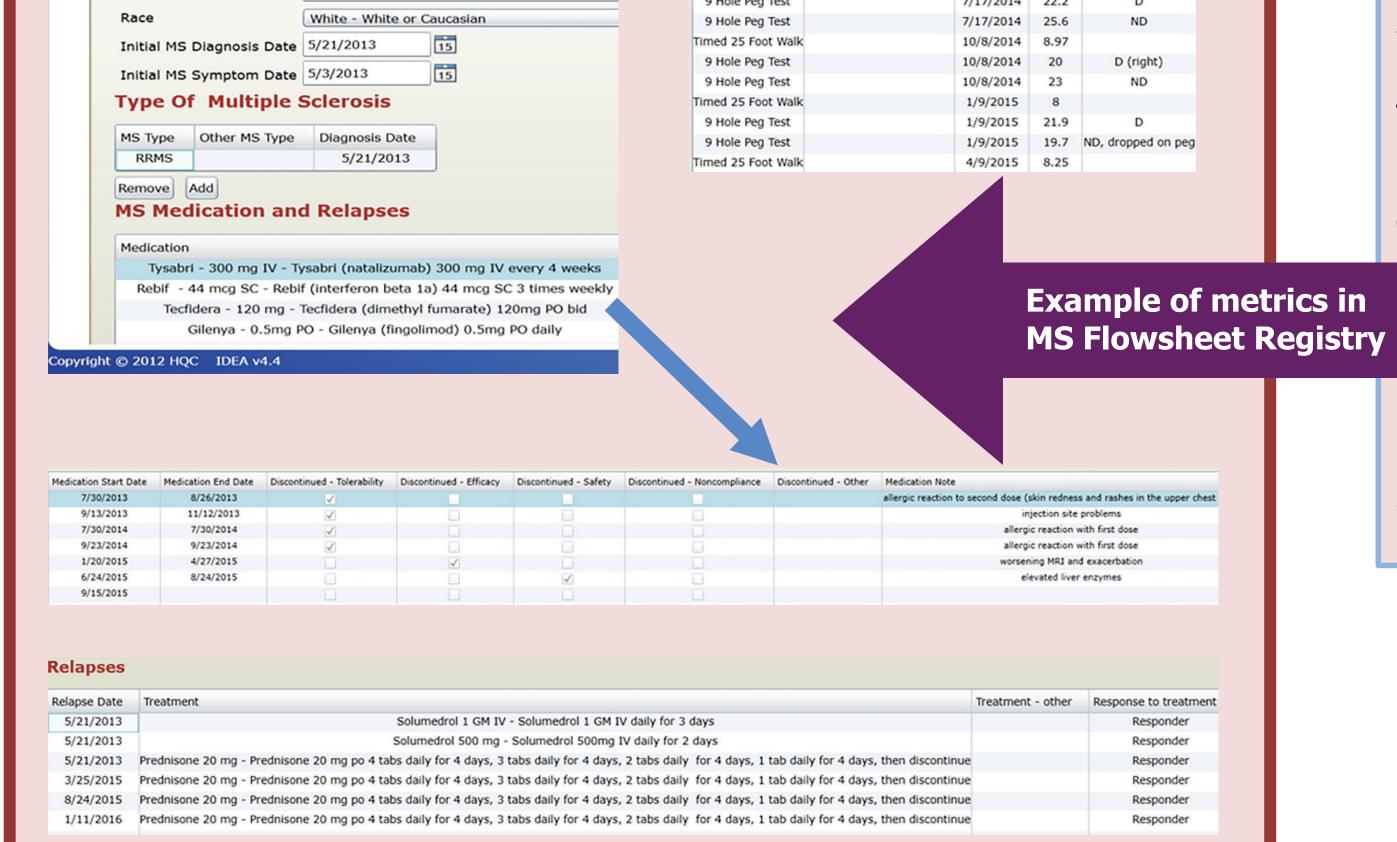


Figure 1.

\* "Prior" stands for the

after using new system.

1=Strongly disagree

3=Somewhat Disagree

4=Somewhat Agree

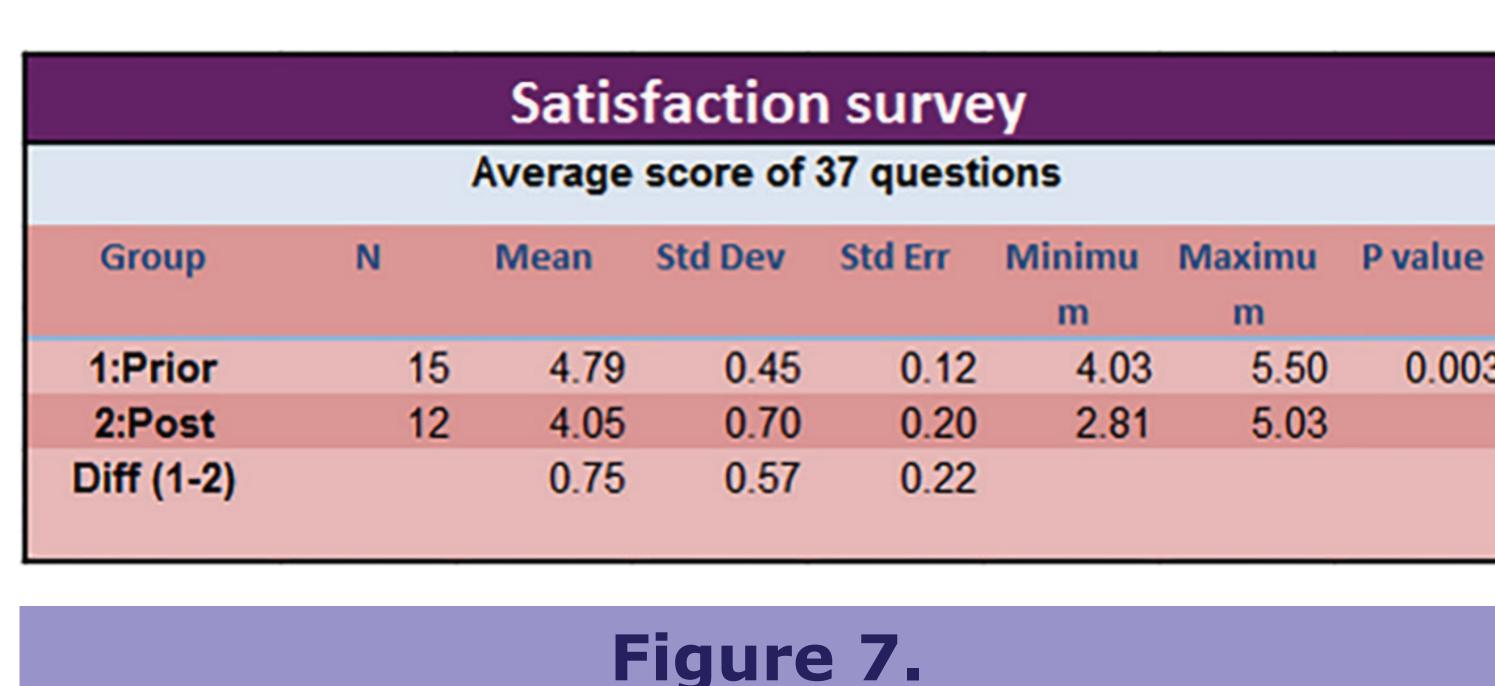
6=Strongly Agree

2=Disagree

expectation before using the new

system, not evaluation on the old

\* "Post" stands for the evaluation



| 1 Year Prior to Flowsheet Registry Implementation |           |           |      |      |  |  |  |  |
|---|-----------|-----------|------|------|--|--|--|--|
| IS hospitalization                                | ns 0:No   | 1189      | 98.3 | 1189 |  |  |  |  |
|   | 1:Yes     | 21        | 1.7  | 1210 |  |  |  |  |
| ength of stay in                                  |           |           |      |      |  |  |  |  |
| ays   | Mean (SD) | 3.4 (1.5) |      |      |  |  |  |  |
| IS Relapses                                       | 0:No      | 1016      | 84.0 | 1016 |  |  |  |  |
|   | 1:Yes     | 194       | 16.0 | 1210 |  |  |  |  |
|   |           |           |      |      |  |  |  |  |

| Figure 4. |  |
|-----------|--|
|-----------|--|

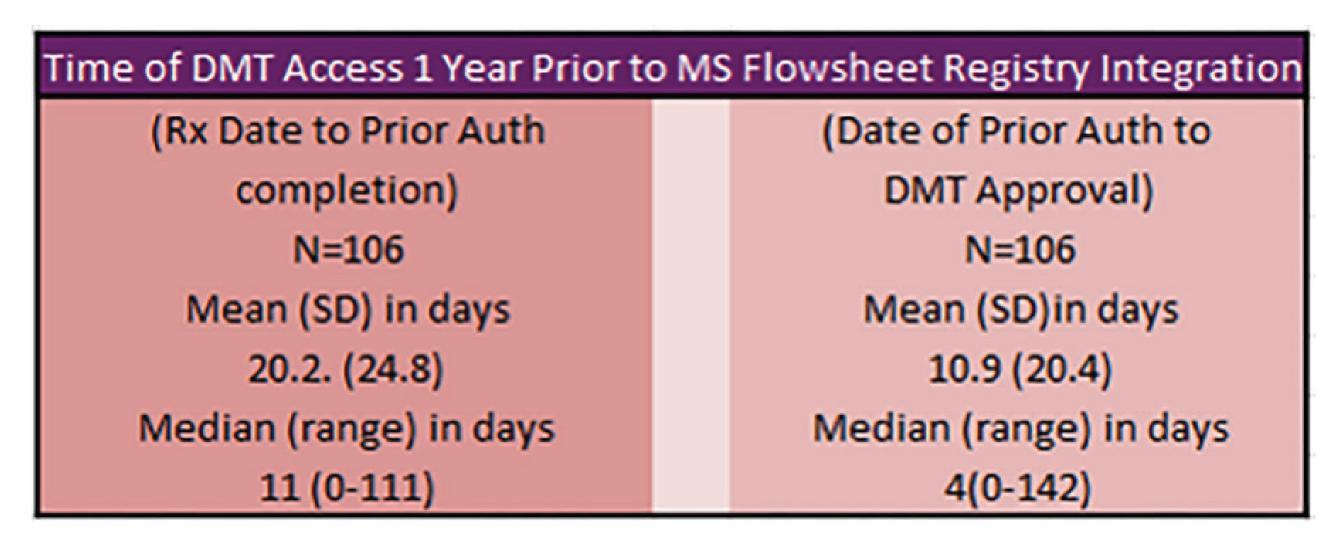
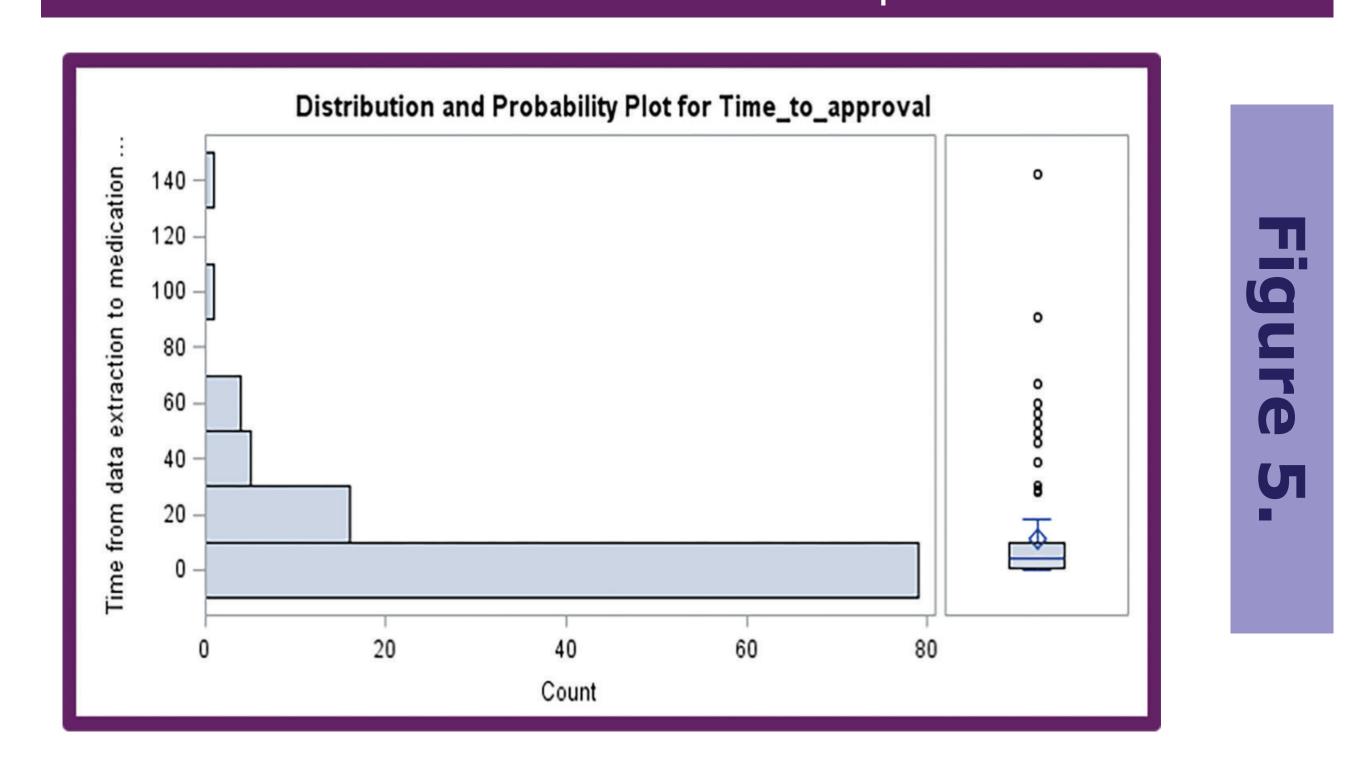


Figure 3.

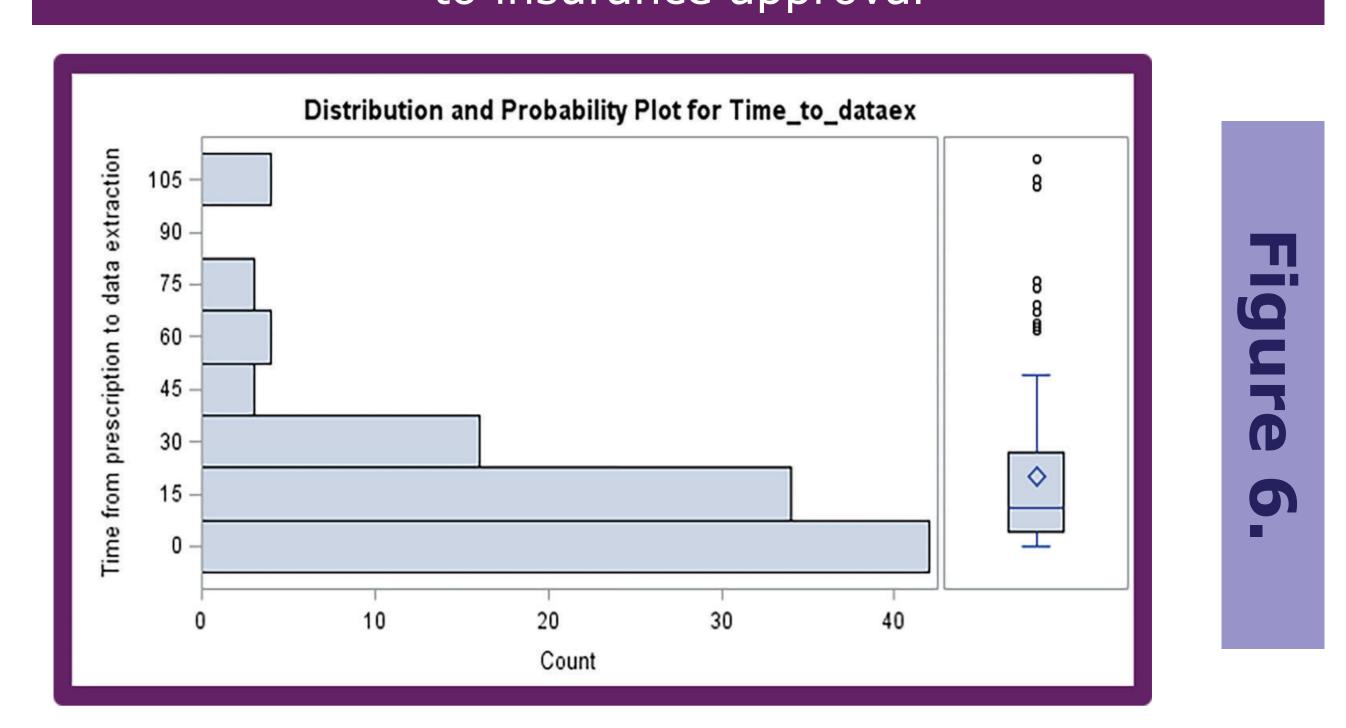
# MATERIALS / METHODS

An EHR was implemented in 2011 at the INI MS Center. Although it greatly improved dissemination of healthcare data among disciplines, the MS Clinic saw a gap in regards to data extraction for outcome reporting with the MS population. In the EHR, specific MS information was documented in narrative format only. Over time it became cumbersome to search through multiple encounters to review the MS patient's individual clinical course. In 2013, an OSF MS research coordinator, INI MS Clinic providers and staff, OSF Data Analytics, and an outcomes researcher at UICOMP collaborated on the concept of an integrated MS Flowsheet Registry. The database registry was created using Instant Data Entry Application (IDEA) Software and was customized to capture the specific MS metrics missing in the EHR, Figure 1 - 2. Since EPIC and IDEA interface with the Enterprise Data Warehouse (EDW), outcome reporting was possible. The clinic implemented the MS Flowsheet Registry in May 2015. Year 1 data prior to the integration is available here.

#### Time of prescription to insurance priorauthorization form completion



#### Time of prior-authorization form completion to insurance approval



# DISCUSSION / CONCLUSION

access, relapse rates, and MS related hospitalizations from the year prior to integration are presented in Figures 3-6. INI clinic population (N=1210). No. of relapses (N=194). No. of MS hospital admissions (N=21). DMT access data, Figure 3, represents the time it took staff to extract data from the EHR prior to the registry integration to receive insurance authorizations. Staff at the INI clinic were presented with the Clinical Information System Implementation Effectiveness Scale (CISIES) © Brian Gugerty 2005, prior to "going live" with the database and after 3-4 months of consistent use. Satisfaction results both prior to and after implementation were favorable and statistically significant (P value < 0.003)

We hypothesize that improving DMTs access will occur because of the implementation of the MS Flowsheet Registry. This could result in decrease relapse rates and MS hospitalizations, cost savings and staff satisfaction.

Post 1 year results will be available in 2017 and we hope to present these findings next year.

#### REFERENCES

- . Cooley, KL, Paris, BL, Asche, CV and Valenzuela, R. Development of an Integrated Multiple Sclerosis Flowsheet Registry to Bridge the Gap between Electronic Health Record Functionality and Clinical Information Needs. Austin Journal of MS and Neuroimmunology. 2016; 2(4); 1-7.
- . Jansen DE, Krol B, Groothoff JW, Post D Integrated care for MS patients. Disabil Rehabil. 2007;29(7):597-603.
- NICE. Multiple Sclerosis Clinical Guideline 186: Management of multiple sclerosis in primary and secondary care. 2014.
- Noonan CW, Williamson DM, Henry JP Indian R, Lynch SG, Neuberger JS, et al. The prevalence of multiple sclerosis in 3 US communities. Prev Chronic Dis. 2010;7(1):A12.
- 5. Tullman MJ. Overview of the epidemiology, diagnosis, and disease progression associated with multiple sclerosis. Am J Manag Care. 2013;19(2 Suppl):S15-20.
- 6. Valenzuela MR, Cooley, KL, Gonia L, Taylor AJ, Paris, BL and Asche CV. Comorbidities of Multiple Sclerosis Patients Treated at the Illinois Neurological Institute (INI) Multiple Sclerosis Center. AustinJournal of MS and Neuroimmunology.2016 3(1); 1-7.

### ACKNOWLEDGEMENTS

We would like to thank the Central Illinois MS Council for funding this research. The Central Illinois MS Council & MS Clinic Fund is a not-for-profit volunteer organization dedicated to transforming healthcare for MS patients and their families in Central Illinois.

