A Synoptic Reporting System for Peripheral Blood Smear Interpretation.

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INTRODUCTION

Checklists such as those provided by the College of American Pathologists (CAP) are frequently used to generate surgical pathology reports (1). Web-based synoptic reporting systems that incorporate such checklists have been shown to improve efficiency, reduce turnaround time, and decrease reporting errors (2). Synoptic systems for hematologic neoplasms and bone marrow reporting have also been described with similar results (3,4).

To date, such a system has not been described for the reporting of peripheral blood smear findings. Peripheral blood smear reports often encompass a broad spectrum of complex hematologic changes. This can be challenging both for practicing pathologists and pathology trainees attempting to create a peripheral blood smear report that is both accurate and concise while including all pertinent findings. Consequently, there is a need for such a system to aid in peripheral blood smear reporting and assisting trainees in rendering optimal peripheral blood smear reports.

DESIGN

We have developed a web-based synoptic reporting system that can be used alone or incorporated into a laboratory information system (LIS). The system contains a knowledge-base encompassing 150 peripheral blood smear report templates covering a wide range of findings.

The synoptic panel consists of 45 key findings seen in different cell types. Users access the system on the Internet (www.hemepathreview.com) and select relevant attributes from drop-down lists to obtain a short list of report templates with findings that match those of the case under consideration. These templates are used to create a draft which can then be edited online to create a final report.

A

Address http://www.uth.tmc.edu/pathology/faculty/pages/nguyen-nghia/ReportTemplates/PBS-Report3.htm

Enter Data on RBC:		Enter Data on Hemolysis:	
Anemia of chronic disease:	☐	A cold agglutinin:	☐
Anemia in response to Epogen treatment:	☐	A sickling disease:	☐
B12/folate deficiency:	☐	DIC:	☐
Beta-thalassemia trait and hemoglobinopathies cannot be ruled out:	☐	Hemolytic disease of the newborn (HDN):	☐
Increased erythropoiesis in response to anemia:	☐	Hereditary elliptocytosis cannot be ruled out:	☐
Iron deficiency anemia:	☐	Hereditary spherocytosis:	☐
Iron deficiency anemia in response to iron treatment:	☐	Microangiopathic hemolysis:	☐
Macrocytosis secondary to medication:	☐	Microangiopathic hemolysis cannot be ruled out:	☑
Polycythemia:	☐	No evidence of microangiopathic hemolysis:	☐
		Non-microspherocytic hemolysis:	☐
Enter Data on PLT:		Sickle cell disease:	☐
ITP:	☐	TTP/HUS:	☐
ITP and blood loss with increased erythropoiesis:	☐	Warm auto-antibody:	☐
Marked thrombocytosis (cannot r/o ET):	☐	Warm auto-antibody cannot be ruled out:	☐
Reactive thrombocytosis:	☐		
Spurious thrombocytopenia:	☐		
Enter Data on WBC:		**Enter Data on OTHERs:**	
Acute leukemia:	☐	Hypothyroidism:	☐
CLL / other lymphoproliferative disorders:	☐	Liver disease:	☐
CML:	☐	No pathological changes:	☐
Eosinophilia:	☐	Normal/Premature-Newborn:	☐
Immature leukocytes:	☐	Pancytopenia due to inadequate hematopoiesis by bone marrow:	☐
Myeloproliferative disorder:	☐	Renal disease:	☐
Leukocytosis with reactive PMNs:	☑	Rouleaux formation:	☐
Leukemoid reaction:	☐	Rouleaux formation due to monoclonal gammopathy:	☐
Leukopenia:	☐		
Positive for fungal organisms:	☐		
Reactive lymphocytosis:	☐		
Reactive neutrophilia:	☐		

B

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DRAFT FOR PERPHERAL BLOOD REPORT:

```
Peripheral blood smear shows normochromic normocytic anemia with moderate
polychromasia, presence of a few schistocytes, and moderate thrombocytopenia
with a few large forms, leukocytosis with reactive PMNs. Impression:
microangiopathic hemolysis cannot be ruled out. Further testing is suggested
if clinically indicated (LDH, haptoglobin, and DIC panel). CPT: 85060
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Peripheral blood smear shows normochromic normocytic anemia with moderate
polychromasia, presence of a few schistocytes, and marked thrombocytopenia
with a few large forms. DIC results show prolonged PT and elevated FSP.
Impression: microangiopathic hemolysis cannot be ruled out. Further testing is
suggested if clinically indicated (LDH, haptoglobin). CPT: 85060
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```

Clear Window | Start Over

FINAL DRAFT:

```
Peripheral blood smear shows marked normochromic normocytic anemia with
moderate polychromasia, presence of many schistocytes, and moderate
thrombocytopenia with a few large forms, mild leukocytosis with reactive PMNs.
Impression: microangiopathic hemolysis cannot be ruled out. Further testing is
suggested if clinically indicated (LDH, haptoglobin, and DIC panel).
CPT: 85060
```

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<-Back | REPORT Home Page | Survey

USER INTERFACE

The user interface consists of two components: data input panel and report template display:

Data input panel: This panel contains 45 typical findings categorized in 5 groups for ease of input: (a) erythrocytes, (b) hemolysis, (c) leukocytes, (d) platelets, and (e) other miscellaneous findings. (See **Figure A**).

Report template display: This represents an editable window where the report templates (any where from 1 to 5) are displayed (**See Figure B**). These templates are extracted from reports in the knowledge-base of the system.

RESULTS

This reporting system was put into place and used by senior and junior residents rotating through hematopathology from July 2008 through September 2009. All reports were reviewed by faculty before final verification and evaluated for accuracy and typographical errors.

Evaluation of the program by residents and attending pathologists was overwhelmingly positive and most users reported a significant reduction in typographic errors with decreased turn-around-time and improved accuracy.

CONCLUSION

This synoptic reporting system can help both practicing pathologists and pathology trainees to draft a complete and concise report. It has been found to reduce errors and improve turn-around-time and can be easily used by both senior and junior trainees.

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