Lab Report Formatting for Pap Smears

Narrative Lab Reports such as PAP Smears have long been a frustration for EMRs. The textual nature of these reports doesn’t fit well into the EMR flowsheet model where a cell only shows the first 8-10 characters of a result yet the rigidly defined format of the Centricity Lab Report doesn’t lend itself to displaying Pap Smear data in an easily readable narrative format either.

Processing within EMR-Link

Since Pap reports are primarily textual in nature Ignis Systems has implemented an option that improves the look of the Lab Report by replacing many of the OBX records with NTE segments. This not only delivers a more readable report but also eliminates several EMR Import warning messages as well that often result from unmapped lab codes.

The Lab Report cleanup option can be enabled by the customer through a configuration setting in their EMR-Link account. When enabled, this solution performs the following logic:

1. Replace all OBX records that contain no data or the word “Comment” or “SPRCS” in OBX.5 with an NTE segment containing the test name from OBX.3. Essentially going from this:

   OBR|1|30394786810^LAB|30394786810^LAB|195050^Pap Lb, HPV- hr^L|||200811020800|||200811021626||^HIPPOCRAT^D|||30394786810||200811021639|||F
   OBX|1|TX|191108^DIAGNOSIS:^L||Comment||||N||F||200811021634|Performed At: EDITE, LabCorp EDI Testing 3060 S Church Street Burlington, NC 272150000 EDI Testing Phone: 336584517
   NTE|1||Negative for intraepithelial lesion and malignancy.
   OBX|2|TX|191109^Specimen adequacy:^L||Comment||||N||F||200811021634|
   NTE|1||Satisfactory for evaluation. Endocervical and/or squamous-metaplastic cells (endocervical component) are present.

   To this:

   OBR|1|30394786810^LAB|30394786810^LAB|195050^Pap Lb, HPV- hr^L|||200811020800|||200811021626||^HIPPOCRAT^D|||30394786810||200811021639|||F
   OBX|1|TX|191108^DIAGNOSIS:^L||See Report||||N||F||200811021634
   NTE|1||Negative for intraepithelial lesion and malignancy.
   NTE|1||SPECIMEN ADEQUACY:
   NTE|1||Satisfactory for evaluation. Endocervical and/or squamous
   NTE|1||metaplastic cells (endocervical component) are present.

2. It’s not possible to set font characters to bold in Lab Reports but we can make the header stand out by setting it entirely to upper case.

3. Removing the leading ~ character from the original NTE segment and then replacing additional ~ with NTEs ensures all text grouped together and is left justified to the same place.

4. Adding an extra (blank) NTE before the header helps to visually group the information together.

Putting all of these together can significantly improve the readability of the report. Look at the before and after examples below.
(Before) Typical Pap Lab Report created using unmodified HL7 ORU message

<table>
<thead>
<tr>
<th>Patient: TEST EDITEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>Note: All result statuses are Final unless otherwise noted.</td>
</tr>
<tr>
<td>Tests: (1) Pap Lb, HPV-hr (195050)</td>
</tr>
<tr>
<td>DIAGNOSIS: Negative for intraepithelial lesion and malignancy.</td>
</tr>
<tr>
<td>! Specimen adequacy: Satisfactory for evaluation. Endocervical and/or squamous metaplastic cells (endocervical component) are present.</td>
</tr>
<tr>
<td>! Clinician provided ICD9: V72.31 : Routine gynecological examination</td>
</tr>
<tr>
<td>Performed by: CoPath testing Pathologist/Cytotech</td>
</tr>
<tr>
<td>NIL</td>
</tr>
<tr>
<td>! Note: This liquid based ThinPrep(R) pap test was screened with the use of an image guided system.</td>
</tr>
<tr>
<td>HPV, high-risk Negative Negative</td>
</tr>
<tr>
<td>This high-risk HPV test detects thirteen high-risk types (16/18/31/33/35/39/45/51/52/56/58/59/68) without differentiation.</td>
</tr>
<tr>
<td>Note: An exclamation mark (!) indicates a result that was not dispersed into the flowsheet.</td>
</tr>
</tbody>
</table>

Document Creation Date: 11/04/2008 1:44 PM

| (1) Order result status: Final |
| Collection or observation date-time: 11/02/2008 08:00 |
| Requested date-time: 11/02/2008 16:26 |
| Reported date-time: 11/02/2008 16:39 |
| Referring Physician: D HIPPOCRAT |
| Ordering Physician: |
| Specimen Source: Source: 1100 |
| Filler Order Number: 30394786810 LAB |
| Lab site: 30394786810 |
| Producer ID *1:Performed At: EDITE, LabCorp EDI Testing 3060 S Church Street Burlington, NC 272150000 EDI Testing Phone: 3365845171 |
| Producer ID *2:Performed At: EDITE, LabCorp EDI Testing 3060 S Church Street Burlington, NC 272150000 EDI Testing Phone: 3365845171 |
| Producer ID *3:Performed At: EDITE, LabCorp EDI Testing 3060 S Church Street Burlington, NC 272150000 EDI Testing Phone: 3365845171 |
| Producer ID *4:Performed At: EDITE, LabCorp EDI Testing 3060 S Church Street Burlington, NC 272150000 EDI Testing Phone: 3365845171 |
| Producer ID *5:Performed At: EDITE, LabCorp EDI Testing 3060 S Church Street Burlington, NC 272150000 EDI Testing Phone: 3365845171 |
(After) Same Lab Report created using EMR-Link modified HL7 ORU message

Patient: TEST EDITEST
Note: All result statuses are Final unless otherwise noted.

Tests: (1) Pap Lb, HPV-hr (195050)
DIAGNOSIS: See Report
Negative for intraepithelial lesion and malignancy.

SPECIMEN ADEQUACY:
Satisfactory for evaluation. Endocervical and/or squamous metaplastic cells (endocervical component) are present.

CLINICIAN PROVIDED ICD9: V72.31 : Routine gynecological examination

PERFORMED BY: CoPath testing Pathologist/Cytotech

NOTE:
This liquid based ThinPrep(R) pap test was screened with the use of an image guided system.

HPV, high-risk Negative Negative *1
This high-risk HPV test detects thirteen high-risk types (16/18/31/33/35/39/45/51/52/56/58/59/68) without differentiation.

Note: An exclamation mark (!) indicates a result that was not dispersed into the flowsheet.
Document Creation Date: 11/04/2008 1:44 PM

(1) Order result status: Final
Collection or observation date-time: 11/02/2008 08:00
Requested date-time: 11/02/2008 16:26
Reported date-time: 11/02/2008 16:39
Referring Physician:
Ordering Physician: D HIPPOCRAT
Specimen Source:
Source: 1100
Filler Order Number: 30394786810 LAB
Lab site: 30394786810
Producer ID *1:Performed At: BN, LabCorp Burlington 1447 York Court
Burlington, NC 272153361 William F Hancock MD Phone: 8882005439

The modifications shown above do much to improve the look of the lab report and since the original file did not contain any actual data in OBX.5 (just the word “Comment”), converting the bulk of the data to NTE segments doesn't result in the loss of any key information, but it still lacks one key element desired by the physicians, which is, meaningful Pap data in the flowsheet.
Next Round of Improvements for Pap Reports

Physicians agree that the current set of changes improve the Lab Report but are still left with no relevant data in the flowsheet. What they really want is a solution that improves the look of the report (as shown above) but also gives them something in OBX.5 that will push to the flowsheet.

Ignis Systems has worked with the labs on a solution that may fill this gap. Instead of filling the OBX.5 field with “Comment” or “SPRCS” the lab can now insert one of the acronyms listed below into the Diagnosis, Adequacy and Interpretation records.

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Meaning (which follows the OBX in an NTE segment)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGUS</td>
<td>Atypical glandular cells of undetermined significance</td>
</tr>
<tr>
<td>ASCUS</td>
<td>Atypical squamous cells of undetermined significance</td>
</tr>
<tr>
<td>ENDO</td>
<td>Endocervical and/or squamous metaplastic cells are present</td>
</tr>
<tr>
<td>HSIL</td>
<td>High-grade squamous intraepithelial lesion</td>
</tr>
<tr>
<td>LSIL</td>
<td>Low-grade squamous intraepithelial lesion</td>
</tr>
<tr>
<td>MAL</td>
<td>Malignant</td>
</tr>
<tr>
<td>NIL</td>
<td>Negative for intraepithelial lesion and malignancy</td>
</tr>
<tr>
<td>OTHNSI</td>
<td>Other: Negative for squamous intraepithelial lesion (NSI)</td>
</tr>
<tr>
<td>RNIL</td>
<td>Reactive: Negative for squamous intraepithelial lesion</td>
</tr>
<tr>
<td>SVDY</td>
<td>Severe dysplasia is present</td>
</tr>
<tr>
<td>UNS</td>
<td>Unsatisfactory for evaluation</td>
</tr>
</tbody>
</table>

These acronyms are based on industry standards.

The acronyms are applied for Diagnosis, Adequacy and Interpretation OBX records. The next page shows an example. While this enhancement doesn’t significantly change the look of the report, it provides a great benefit to the physician who now has meaningful data in the flowsheet. (The differences in the report below are shown in blue.)
# Lab Report that includes Acronyms in OBX.5 for Diagnosis and Adequacy

Patient: TEST EDITEST
Note: All result statuses are Final unless otherwise noted.

Tests: (1) Pap Lb, HPV-hr (195050)

<table>
<thead>
<tr>
<th>Test</th>
<th>Status</th>
<th>Result</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>HPV, high-risk</td>
<td>Negative</td>
<td>Negative</td>
<td></td>
</tr>
</tbody>
</table>

**DIAGNOSIS:** NIL
Negative for intraepithelial lesion and malignancy.

**SPECIMEN ADEQUACY:** ENDO
Satisfactory for evaluation. Endocervical and/or squamous metaplastic cells (endocervical component) are present.

CLINICIAN PROVIDED ICD9: V72.31 : Routine gynecological examination

PERFORMED BY: CoPath testing Pathologist/Cytotech

NOTE:
This liquid based ThinPrep(R) pap test was screened with the use of an image guided system.

*1 This high-risk HPV test detects thirteen high-risk types (16/18/31/33/35/39/45/51/52/56/58/59/68) without differentiation.

Note: An exclamation mark (!) indicates a result that was not dispersed into the flowsheet.

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(1) Order result status: Final
Collection or observation date-time: 11/02/2008 08:00
Requested date-time: 11/02/2008 08:00
Receipt date-time: 11/02/2008 16:26
Reported date-time: 11/02/2008 16:39
Referring Physician: D HIPPOCRAT
Ordering Physician: D HIPPOCRAT
Specimen Source: Source: 1100
Filler Order Number: 30394786810 LAB
Lab site: 30394786810
Producer ID *1:Performed At: BN, LabCorp Burlington 1447 York Court Burlington, NC 272153361 William F Hancock MD Phone: 8882005439
Original HL7 File as it comes directly from the Lab

MSH|^~\&|1100|7G|IGNIS|TEST1410|200811021639|ORU|0301|P|2.3||AL
PID|1|14455|30394786810|14455|EDITEST|TEST|20010101|F|885099070^XR^ F |123456789
OBR|1|30394786810^LAB|30394786810|LAB|195050^Pap Lb, HPV-
hr^ D| ||200811021626| ^HIPPOCRAT^ D||30394786810|200811021639| F
OBX|1|TX|191108^DIAGNOSIS:^L||NIL||N||F||200811021634|Performed At: EDITE, LabCorp EDI Testing 3060 S Church Street Burlington, NC 272150000 EDI Testing Phone: 3365845171
NTE|1|L|Negative for intraepithelial lesion and malignancy.
OBX|2|TX|191109^Specimen adequacy:^L||ENDO||N||F||200811021634|Performed At: EDITE, LabCorp EDI Testing 3060 S Church Street Burlington, NC 272150000 EDI Testing Phone: 3365845171
NTE|1|L|Satisfactory for evaluation. Endocervical and/or squamous-metaplastic cells (endocervical component) are present.
OBX|3|TX|191160^Clinician provided ICD9:^L||Comment||N||F||200811021635|Performed At: EDITE, LabCorp EDI Testing 3060 S Church Street Burlington, NC 272150000 EDI Testing Phone: 3365845171
NTE|1|L|V72.31: Routine gynecological examination
OBX|4|TX|191112^Performed by:^L||Comment||N||F||200811021635|Performed At: EDITE, LabCorp EDI Testing 3060 S Church Street Burlington, NC 272150000 EDI Testing Phone: 3365845171
NTE|1|L|CoPath testing Pathologist/Cytotech
OBX|5|TX|019016^L||NIL||N||F||200811021633|Performed At: EDITE, LabCorp EDI Testing 3060 S Church Street Burlington, NC 272150000 EDI Testing Phone: 3365845171
OBX|6|TX|190109^Note:^L||Comment||N||F||200811021633|Performed At: EDITE, LabCorp EDI Testing 3060 S Church Street Burlington, NC 272150000 EDI Testing Phone: 3365845171
NTE|1|L|This liquid based ThinPrep(R) pap test was screened with the use of an image guided system.
OBX|7|ST|507303^HPV, high-risk^L||Negative||Negative||N||F||200811021634|Performed At: BN, LabCorp Burlington 1447 York Court Burlington, NC 272153361 William F Hancock MD Phone: 8882005439
NTE|1|L|This high-risk HPV test detects thirteen high-risk types (16/18/31/33/35/39/45/51/52/56/58/59/68) without differentiation.

Same file after applying Ignis modifications to improve Lab Report readability

MSH|^~\&|1100|7G|IGNIS|TEST1410|200811021639|ORU|0301|P|2.3||AL
PID|1|14455|30394786810|14455|EDITEST|TEST|20010101|F|885099070^XR^ F |123456789
OBR|1|30394786810^LAB|30394786810|LAB|195050^Pap Lb, HPV-
hr^ D| ||200811021626| ^HIPPOCRAT^ D||30394786810|200811021639| F
OBX|1|TX|191108^DIAGNOSIS:^L||NIL||N||F||200811021634|Performed At: EDITE, LabCorp EDI Testing 3060 S Church Street Burlington, NC 272150000 EDI Testing Phone: 3365845171
NTE|1|L|Negative for intraepithelial lesion and malignancy.
OBX|2|TX|191109^Specimen adequacy:^L||ENDO||N||F||200811021634|Performed At: EDITE, LabCorp EDI Testing 3060 S Church Street Burlington, NC 272150000 EDI Testing Phone: 3365845171
NTE|1|L|Satisfactory for evaluation. Endocervical and/or squamous-metaplastic cells (endocervical component) are present.
OBX|3|TX|191160^Clinician provided ICD9:^L||Comment||N||F||200811021635|Performed At: EDITE, LabCorp EDI Testing 3060 S Church Street Burlington, NC 272150000 EDI Testing Phone: 3365845171
NTE|1|L|V72.31: Routine gynecological examination
OBX|4|TX|191112^Performed by:^L||Comment||N||F||200811021635|Performed At: EDITE, LabCorp EDI Testing 3060 S Church Street Burlington, NC 272150000 EDI Testing Phone: 3365845171
NTE|1|L|CoPath testing Pathologist/Cytotech
OBX|5|TX|019016^L||NIL||N||F||200811021633|Performed At: EDITE, LabCorp EDI Testing 3060 S Church Street Burlington, NC 272150000 EDI Testing Phone: 3365845171
OBX|6|TX|190109^Note:^L||Comment||N||F||200811021633|Performed At: EDITE, LabCorp EDI Testing 3060 S Church Street Burlington, NC 272150000 EDI Testing Phone: 3365845171
NTE|1|L|This liquid based ThinPrep(R) pap test was screened with the use of an image guided system.
OBX|7|ST|507303^HPV, high-risk^L||Negative||Negative||N||F||200811021634|Performed At: BN, LabCorp Burlington 1447 York Court Burlington, NC 272153361 William F Hancock MD Phone: 8882005439
NTE|1|L|This high-risk HPV test detects thirteen high-risk types (16/18/31/33/35/39/45/51/52/56/58/59/68) without differentiation.