

Online Supplementary Material

Saultz JW, Lochner J. Interpersonal continuity of care and care outcomes. *Ann Fam Med.* 2005;3:159-166.

<http://www.annfammed.org/cgi/content/full/3/2/159/DC1>

**Supplemental Table 2. Summary of Studies Examining Interpersonal Continuity and Care Outcome by Outcome**

Outcome Measured	Study	Study Method	Measurement Technique	Outcome Significantly Improved?	Findings	Overall Quality of Evidence
<b>Preventive care</b>						
Influenza immunization	Weiss & Bluestein 1996 <sup>45</sup>	Retrospective cohort	Duration of continuity	+	Longer duration relationship with the physician correlated with increased influenza immunization	9.5
Timeliness of childhood immunizations	Christakis et al, 2000 <sup>52</sup>	Retrospective cohort	COC index	+	Higher continuity scores predicted the delivery of childhood MMR immunization by 15 mo	9
Childhood immunization rates	Gill et al, 2002 <sup>60</sup>	Retrospective cohort	Patient survey	+	Babies were more likely to receive timely immunizations if they received care from the clinician who cared for their mothers during prenatal care	8.5
Immunization use in children	Gordis & Markowitz, 1971 <sup>24</sup>	Clinical trial	Assignment to continuity clinic	+ -	No significant difference noted in immunization rate based on clinic assignment. Only polio vaccination by age 1 y was significantly better in continuity clinic. Continuity not measured in either clinic	7

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Outcome Measured	Study	Study Method	Measurement Technique	Outcome Significantly Improved?	Findings	Overall Quality of Evidence
Immunization rates	Becker et al, 1974 <sup>26,27</sup>	Clinical trial	Assignment to continuity clinic	-	No significant difference in immunization rates between the 2 clinics. Continuity of care not measured in either group	6
Mammogram rate	Weiss & Bluestein 1996 <sup>45</sup>	Retrospective cohort	Duration of continuity	-	Mammography rate did not correlate with duration of continuity	9.5
Mammogram rate	O'Malley et al, 1997 <sup>46</sup>	Correlation	Patient survey	+	Mammograms were performed significantly more often in patients with usual site of care and most often in those with regular clinicians	8
Mammogram rate	Ettner, 1996 <sup>43</sup>	Correlation	Patient survey	+	Having usual source of care correlated significantly with improved rates of mammograms	7
Papanicolaou (Pap) tests	O'Malley et al, 1997 <sup>46</sup>	Correlation	Patient survey	+	Pap tests were performed significantly more often in patients with usual site of care and most often in those with regular clinicians	8
Pap tests	Ettner, 1996 <sup>43</sup>	Correlation	Patient survey	+	Usual source of care correlated significantly with improved rates of Pap smears	7
Breast examinations	O'Malley et al, 1997 <sup>46</sup>	Correlation	Patient survey	+	Breast examinations were performed significantly more often in patients with usual site of care and most often in those with regular clinicians	8
Breast examinations	Ettner, 1996 <sup>43</sup>	Correlation	Patient survey	+	Usual source of care correlated significantly with improved rates of breast examinations in women	7
Access to preventive and primary care services	Lambrew et al, 1996 <sup>44</sup>	Correlation	Patient survey	+	Patients with any regular source of care had better access to preventive care than those who did not. Patients with regular physicians had better access than those with regular site of care, but this difference was found only for patients receiving care in physician offices, clinics, or HMOs, as opposed to walk-in clinics and emergency departments	8.5

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Outcome Measured	Study	Study Method	Measurement Technique	Outcome Significantly Improved?	Findings	Overall Quality of Evidence
Well-child visits	Alpert et al, 1968 <sup>22</sup>	Clinical trial	Assignment to continuity clinic	+	Well-child visits were significantly more common in continuity clinic. Continuity of care not measured in either group	7.5
Preventive visits	Ettner, 1999 <sup>50</sup>	Correlation	Patient survey	+	Patients with self-reported usual physicians were significantly more likely to have a preventive care visit during the past year	7
Well-child visits	Ettner, 1996 <sup>43</sup>	Correlation	Patient survey	-	Usual source of care did not correlate significantly with well-child visits	7
Preventive visits in children	Alpert et al, 1976 <sup>29</sup>	Clinical trial	Assignment to continuity clinic	+	Children in the experimental group were significantly more likely to receive immunizations and preventive visits. Continuity not measured in any group	6.5
BP screening in women	Ettner, 1996 <sup>43</sup>	Correlation	Patient survey	-	Usual source of care did not correlate significantly with blood pressure checks in women	7
Obesity prevalence	Weiss & Bluestein, 1996 <sup>45</sup>	Retrospective cohort	Duration of continuity	-	Obesity did not correlate with duration of continuity	9.5
Tobacco use	Weiss & Bluestein, 1996 <sup>45</sup>	Retrospective cohort	Duration of continuity	-	Tobacco use did not correlate with duration of continuity	9.5
Health behaviors	Ettner 1999 <sup>50</sup>	Correlation	Patient survey	+ -	Patients with self-reported usual physician were significantly less likely to report substance abuse behaviors, were more likely to have stopped smoking. No difference in obesity rates	7
Counseling about hormone replacement therapy	Gallagher et al, 2001 <sup>55</sup>	Correlation	Patient survey	- *	Women receiving care from both family physician/internists and obstetrician were more likely to receive counseling than women seeing only 1 physician	5.5

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Outcome Measured	Study	Study Method	Measurement Technique	Outcome Significantly Improved?	Findings	Overall Quality of Evidence
<b>Hospitalization</b>						
Hospitalization rate	Weiss & Bluestein, 1996 <sup>45</sup>	Retrospective cohort	Duration of continuity	+	Longer duration relationship with physician correlated with decreased hospitalization	9.5
Hospitalization rate	Mainous & Gill, 1998 <sup>48</sup>	Retrospective cohort	UPC index	+	Physician continuity was associated with significantly lower likelihood of hospitalization than site continuity only	9
Emergency hospitalization rate	Wasson et al, 1984 <sup>33</sup>	Clinical trial	COC index	+	For 18-mo period, patients in continuity group had better continuity of care and fewer emergency hospitalizations	9
ICU days	Wasson et al, 1984 <sup>33</sup>	Clinical trial	COC index	+	For 18-mo period, patients in continuity group had better continuity of care and fewer ICU hospital days	9
Hospital length of stay	Wasson et al, 1984 <sup>33</sup>	Clinical trial	COC index	+	For 18-mo period, patients in continuity group had better continuity of care and shorter lengths of hospital stay	9
Risk of hospitalization	Christakis et al, 2001 <sup>53</sup>	Retrospective cohort	COC index	+	Children with highest clinician continuity were least likely to be hospitalized	9
Hospitalization for all conditions and ambulatory-sensitive conditions	Gill & Mainous, 1998 <sup>47</sup>	Retrospective cohort	MMCI index	+	Physician continuity was associated with decreased likelihood of hospitalization	8.5
Rate of hospitalization	Alpert et al, 1968 <sup>22</sup>	Clinical trial	Assignment to continuity clinic	+ -	Comprehensive clinic patients had higher rates of hospitalization in first 6 mo, but control group patients had higher rate after first 6 mo. Continuity of care not measured in either group	7.5
Rate of hospitalization	Alpert et al, 1976 <sup>29</sup>	Clinical trial	Assignment to continuity clinic	+	Children in experimental group were hospitalized less often. Continuity not measured in any groups	6.5

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Outcome Measured	Study	Study Method	Measurement Technique	Outcome Significantly Improved?	Findings	Overall Quality of Evidence
Hospital length of stay	Shear et al, 1983 <sup>32</sup>	Retrospective cohort	SECON index	-	Physician continuity was higher in family practice clinics, but no significant difference was found in length of hospital stay	5
Readmission within 10 days after hospital discharge	Smith, 1995 <sup>41</sup>	Prospective cohort	UPC index	+	Readmission decreased by 28% after change as team continuity improved after reorganization	3
<b>Quality of doctor-patient relationship</b>						
Trust in the doctor-patient relationship	Mainous et al, 2001 <sup>57</sup>	Correlation	UPC index and duration of continuity	+	Trust correlated with duration of relationship with usual physician, but not with UPC index	7.5
Difficult consultations	Sweeney & Gray, 1995 <sup>42</sup>	Case control	Index physician identification	+	Poor continuity patients were more likely to have difficult consultations with physicians	6.5
Quality of doctor-patient relationship	Becker et al, 1974 <sup>26,27</sup>	Clinical trial	Assignment to continuity clinic	+	Patients receiving care in continuity clinic rated quality of doctor-patient relationship higher. Continuity of care not measured in either group	6
Quality of doctor-patient relationship	Freeman & Richards, 1994 <sup>38</sup>	Correlation	UPC index	+	Continuity of doctor correlated with patient assessment of doctor-patient relationship	4.5
Degree of patient enablement	Howie et al, 1999 <sup>51</sup>	Correlation	Patient survey	+	Patient enablement correlated with how well patients knew their doctors as measured by patient survey	4.5
<b>Chronic illness care</b>						
HbA <sub>1c</sub>	Overland et al, 2001 <sup>58</sup>	Correlation	Duration of continuity	-	Glucose did not correlate significantly with duration of physician continuity. Patients who were older and had more complicating illnesses were more likely to have longer continuity duration	8.5

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Outcome Measured	Study	Study Method	Measurement Technique	Outcome Significantly Improved?	Findings	Overall Quality of Evidence
Lipid control	Overland et al, 2001 <sup>58</sup>	Correlation	Duration of continuity	-	Lipid control did not correlate significantly with duration of physician continuity. Older patients with more complicating illnesses were more likely to have longer continuity duration	8.5
Blood pressure control	Overland et al, 2001 <sup>58</sup>	Correlation	Duration of continuity	-	Blood pressure did not correlate significantly with duration of physician continuity. Older patients with more complicating illnesses were more likely to have longer continuity duration	8.5
Presence of diabetic complications	Overland et al, 2001 <sup>58</sup>	Correlation	Duration of continuity	-	Diabetic complication rate did not correlate significantly with duration of physician continuity. Older patients with more complicating illnesses were more likely to have longer continuity duration	8.5
Blood glucose control	Hanninen & Takala, 2001 <sup>56</sup>	Correlation	Patient survey	- *	Physician continuity was associated with poorer glucose control as measured by HbA <sub>1c</sub>	8.5
Recommended diabetes care measures	O'Connor et al, 1998 <sup>49</sup>	Retrospective cohort	Patient survey	+	After controlling for case mix, diabetic patients with regular physicians were more likely to receive recommended diabetic care	8.5
Glucose control	O'Connor et al, 1998 <sup>49</sup>	Retrospective cohort	Patient survey	+ -	After controlling for case mix, diabetic patients with regular physicians had lower likelihood of HbA <sub>1c</sub> >10%. Average HbA <sub>1c</sub> levels did not correlate significantly with physician continuity	8.5
Hypertension control	Phillips & Shear, 1984 <sup>34</sup>	Correlation	SECON index	+	Significantly fewer elevated blood pressure readings were found with increasing continuity scores	6.5
<b>Maternity outcomes</b>						
Neonatal morbidity	Boss & Timbrook, 2001 <sup>54</sup>	Retrospective cohort	UPC index	+	Continuity group had more prenatal visits, higher birth weight, and better Apgar scores. Multivariate analysis showed that continuity correlated with higher visit frequency, but higher visit frequency correlated best with improved birth outcomes	9

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Outcome Measured	Study	Study Method	Measurement Technique	Outcome Significantly Improved?	Findings	Overall Quality of Evidence
Apgar score	Boss & Timbrook, 2001 <sup>54</sup>	Retrospective cohort	UPC index	+	Continuity group had more prenatal visits, higher birth weight, and better Apgar scores. Multivariate analysis showed that continuity correlated with higher visit frequency, but higher visit frequency correlated best with improved birth outcomes	9
Birth weight	Boss & Timbrook, 2001 <sup>54</sup>	Retrospective cohort	UPC index	+	Continuity group had more prenatal visits, higher birth weight, and better Apgar scores. Multivariate analysis showed that continuity correlated with higher visit frequency, but higher visit frequency correlated best with improved birth outcomes	9
Pregnancy complications	Flynn, 1985 <sup>35</sup>	Correlation	COC index	-	No significant relationship between measurements of continuity and perinatal outcomes	6.5
Birth weight	Shear et al, 1983 <sup>32</sup>	Retrospective cohort	SECON index	+	Physician continuity was higher in family practice clinics, and this group had significantly higher birth weights	5
Neonatal intensive care unit (NICU) admissions	Shear et al, 1983 <sup>32</sup>	Retrospective cohort	SECON index	-	Physician continuity was higher in family practice clinics, but no significant difference was found in NICU admissions	5
Apgar scores	Shear et al, 1983 <sup>32</sup>	Retrospective cohort	SECON index	-	Physician continuity was higher in family practice clinics, but no significant difference was found in Apgar scores	5
Cesarean rate	Shear et al, 1983 <sup>32</sup>	Retrospective cohort	SECON index	-	Physician continuity was higher in family practice clinics, but no significant difference was found in cesarean section rate	5
Labor augmentation	Shear et al, 1983 <sup>32</sup>	Retrospective cohort	SECON index	-	Physician continuity was higher in family practice clinics, but no significant difference was found in labor augmentation rate	5
Length of labor	Shear et al, 1983 <sup>32</sup>	Retrospective cohort	SECON index	-	Physician continuity was higher in family practice clinics but no significant difference was found in length of labor	5

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Outcome Measured	Study	Study Method	Measurement Technique	Outcome Significantly Improved?	Findings	Overall Quality of Evidence
Prenatal visits	Rowley et al, 1995 <sup>40</sup>	Clinical trial	Assignment to continuity clinic	+	Continuity clinic patients were more likely to attend prenatal classes. Continuity of care not measured in either group	4
Intervention at delivery	Rowley et al, 1995 <sup>40</sup>	Clinical trial	Assignment to continuity clinic	+	Continuity clinic patients were more likely to give birth without intervention. Continuity of care not measured in either group	4
Newborn resuscitation	Rowley et al, 1995 <sup>40</sup>	Clinical trial	Assignment to continuity clinic	+	Babies from continuity clinic required less newborn resuscitation. Continuity of care not measured in either group	4
Apgar score	Rowley et al, 1995 <sup>40</sup>	Clinical trial	Assignment to continuity clinic	-	Babies from continuity clinic had similar 5-min Apgar scores. Continuity of care not measured in either group	4
Birth weigh	Rowley et al, 1995 <sup>40</sup>	Clinical trial	Assignment to continuity clinic	-	Newborn birth weights were not significantly different between the 2 clinics. Continuity of care not measured in either group	4
Newborn mortality	Rowley et al, 1995 <sup>40</sup>	Clinical trial	Assignment to continuity clinic	-	Newborn mortality rates were not significantly different between the 2 clinics. Continuity of care not measured in either group	4

COC = continuity of care; MMR = measles-mumps-rubella; HMO = health maintenance organization; UPC = usual provider care; ICU = intensive care unit; MMCI = modified, modified continuity index ; SECON = sequential continuity of care.

+ = Outcome significantly improved with interpersonal continuity.

- = Outcome not significantly improved with interpersonal continuity.

-\* = Outcome significantly worse with interpersonal continuity.