

CLINICAL REVIEW

Group Visits: A Qualitative Review of Current Research

Raja Jaber, MD, Amy Braksmajer, MPH, and Jeffrey S. Trilling, MD

Purpose: The group visit model has emerged as one possible solution to problems posed by the limitations of current structures of care and the demands of a growing chronic illness load. In this article, we summarize current group visit research and develop suggestions for furthering this care model.

Methods: An electronic review of all group visit articles published from the years 1974 to 2004 was conducted via the PubMed and MedLine databases. Reference sections of articles thus obtained were mined for additional citations. Articles were excluded if: (1) they were not research studies (ie, purely descriptive, with no evaluative component); or (2) the group visit intervention was subsumed under larger primary or hospital-based interventions.

Results: Although the heterogeneity of the studies presented renders the assessment of this care model problematic, there is sufficient data to support the effectiveness of group visits in improving patient and physician satisfaction, quality of care, quality of life, and in decreasing emergency department and specialist visits.

Conclusion: Group visits are a promising approach to chronic care management for the motivated patient. Future research may benefit, however, from abandoning old nomenclatures and clearly defining the structure, processes of care, content of visits, and appropriate outcome measures. (J Am Board Fam Med 2006;19:276–90.)

Over the past 2 decades, chronic illness has become a pressing public health issue. Over 90 million Americans suffer from a chronic disease, accounting for more than 75% of the nation's total medical care costs.¹ In the United States, 70% of deaths are secondary to chronic illness¹; in addition, chronic illness is a leading cause of morbidity, disability, pain, and reduction in quality of life.^{2–5} Medicine's historic focus on the treatment of acute illness has rendered many physicians ill-equipped to handle this influx of chronically ill patients, who usually require complex services and in-depth case management.⁶

The group visit model has emerged as one possible solution to problems posed by the limitations of current care structures relating to chronic illness

management. Originally conceived in 1974 as a model for well-child consultations,⁷ group visits are mentioned as one of the 10 features of the Future of Family Medicine Project's New Model of Family Medicine⁸ and have recently been popularized in practice management literature.^{9–14}

Group visits include most components of individual visits, usually including private or semiprivate one-on-one medical evaluations conducted by a physician or nurse practitioner at each visit, as well as group educational sessions that emphasize patient self-management and address topics such as medical and pharmaceutical management, nutrition, exercise, and psychosocial contributors to health and illness. The time spent with each patient is therefore increased while maintaining or sometimes increasing profitability.^{11,15,16} Group visits, with the exception of drop-in group medical appointments (DIGMAs), are usually diagnosis- or population-specific (ie, diabetics or frail elderly at high risk for hospitalization), comprise the same cohort of patients from visit to visit, and usually include separate private individual medical consultations.^{9,15} In contrast, DIGMAs are meant to address problems of patient access and are composed

Submitted 11 March 2005; revised 14 November 2005; accepted 17 November 2005.

From the State University of New York at Stony Brook, Department of Family Medicine, School of Medicine, Stony Brook, NY.

Conflict of interest: none declared.

Corresponding author: Raja Jaber, MD, Department of Family Medicine, School of Medicine, Health Science Center, Level 4, SUNY at Stony Brook, Stony Brook, NY 11794-8461 (E-mail: rjaber@notes.cc.sunysb.edu).

of different patients from meeting to meeting who participate when they have a specific medical need.^{9,17} DIGMAs always include a mental health specialist or social worker that addresses the emotional sequelae of chronic illness, and include an individual medical visit conducted within the group, rather than privately.

Education sessions may be didactic, interactive, or a combination of the 2, and include various levels of skill building and collaboration with other professionals. Group visits vary in length (sessions may range from 1 hour to half a day) and frequency, meeting once (headache clinics), weekly (high risk cohorts), monthly (cooperative health care clinics (CHCCs), high risk cohorts, and cluster visits), or quarterly (chronic care clinics that usually last half a day). Programs may last for one session or continue over a number of years.

Group visits seem particularly suited to chronic illness management in that they allow more time for self-management education, skill-building, and doctor-patient interaction. Group education reinforces messages received in the individual medical visit, increases perceived benefits, and provides social persuasion and effective action cues.¹⁸ Group problem solving and social support may also reduce perceived barriers to behavior change. Group visits may reinforce patients' self-efficacy (ie, judgment of their capabilities to carry out the specific tasks necessary to achieve a desired goal¹⁹), which is itself strongly associated with successful chronic disease self-management.²⁰ Modeling, or seeing that others have accomplished the desired behavior and overcome obstacles, is another powerful contributor to patient self-efficacy.¹⁸

We have been providing group visits for chronically ill patients since 2001. Our fee-for-service practice currently offers group visits for asthma, lipid management, menopause, and osteoporosis that are based on the high-risk cohort model, meet weekly over the course of 3 or 4 weeks, and are led by a physician/nurse practitioner team.²¹

In this article, we (1) systematically summarize current group visit research to familiarize the reader with this adjunctive model of chronic care management; (2) critically assess the impact of this model on various health outcomes; and (3) offer suggestions for clarifying the structures, processes, and content of this line of care in the hopes of facilitating future research.

Methods

The authors conducted a systematic, electronic review of the literature from the years 1974 to 2004 via the PubMed and MedLine databases. Search terms included "group visit(s)" and "cluster visit(s)"; the search had to be restricted to article titles because of the extreme commonality of the terms "group" and "visit(s)." Furthermore, articles were obtained by reviewing bibliographies of articles gathered through our database search. This search produced 33 articles. Articles were reviewed in full for descriptions of the target population and intervention, research design and methods, outcomes studied, rates of attendance, and study quality. Articles were excluded if: (1) they were not research studies (ie, purely descriptive, with no evaluative component)^{6,7,9,11-13,17,22-26}; or (2) the group visit intervention was subsumed under larger primary or hospital-based interventions.²⁷ Finally, 2 articles were excluded because they were subanalyses of data that were covered in greater detail in other studies.^{28,29} After excluding these articles, 18 articles remained for review, 3 of which were reports of the same study.³⁰⁻³² We included prospective observational studies and randomized controlled clinical trials. The control group always referred to usual care except for Masley's, where it referred to usual care and nutritional educational handouts.³³

Several research studies that claimed to examine the effects of "group visits" did not include one-on-one medical assessments in addition to group education sessions in their protocol³³ or, alternatively, provided the individual visit as needed,³⁴⁻³⁸ although the addition of this individualized component is what differentiates group visits from educational workshops and peer-led support and self-management groups.

We organized this qualitative review by sequentially describing the effect of all reviewed interventions on each of the following health outcomes (if measured): patient satisfaction, health services utilization, quality of care, health behaviors, physical function/depression/quality of life, disease-specific outcomes, physician satisfaction, and cost of care. Over the course of the review, we were confronted with organizing a large body of heterogeneous information, including various chronic conditions, populations, program lengths, follow-up frequencies, study durations, group visit models used, research designs, and patient attendance rates. We have summarized these differences in Table 1, both

Table 1. Summary of Research on Group Visits, Including Study Sample, Type of Group Visit, Strength of Evidence, and Outcomes

Primary Author	Year	Sample	N	Visit Type	Length/ Frequency of Visit	Rate of Attendance	RCT?	Intent-to-Treat Analysis?	≥ 80% Follow-up?	Significantly Favorable Outcomes	Nonsignificant Outcomes
Beck	1997	Chronically ill, high-utilizing older adults	321	CHCC; individual visits as needed	2 hours, once a month for 1 year	Average number of sessions attended: 6.62 (55% of sessions)	Yes	Yes	Nearly (78.5%)	<ul style="list-style-type: none"> ● Emergency room visits ● Subspecialist visits ● Repeat hospital admissions ● Same-day internal medicine visits ● Imaging tests ● Influenza and pneumonia vaccinations ● Aggregate cost savings (\$14.79 per participant per month) ● Patient satisfaction 	<ul style="list-style-type: none"> ● Number of laboratory tests prescribed ● Prescription medications ● Admissions to SNFs ● Receiving VNS ● Length of hospital stays ● Median hospital charges ● Mobility ● ADLs ● IADLs ● Depression (Short Geriatric Depression Scale)
Blumenfeld	2003	Headache	497	Headache Management Program; 2 comprehensive individual visits with NP.	2 hours; one session (offered weekly), led by neurologist followed by 2 self-management consultations with an NP 2 and 8 weeks later	N/A (one session)	No	N/A	N/A	<ul style="list-style-type: none"> ● Decreased primary care visits ● Decreased emergency visits ● Decreased CT scans ● Quality of life (migraine-specific) ● Physical function (SF-36) ● Symptom improvement ● Medication use (injected and oral narcotics) 	<ul style="list-style-type: none"> ● Increased neurology visits ● Nonsignificant increase in non-headache visits ● Nonsignificant increase in oral triptan use
Clancy	2003*	Type II diabetes	120	CHCC; individual visits every session	2 hours; once per month for 6 months	Not described	Yes	Not reported	Yes (data obtained via chart abstraction)	<ul style="list-style-type: none"> ● Improvement in ADA standards of care ● Improved sense of trust in physician 	<ul style="list-style-type: none"> ● HbA1c ● Lipid profiles ● Perceptions of better coordination of care, community orientation, and culturally competent care (trend towards significance) (Patient Care Assessment Tool)
Coleman	1999	Frail older adults at high risk of hospitalization	169	Chronic Care Clinic; individual visits every session	One half-day; once every 3 months to 4 months over 2 years	53% attended 2 or more sessions; 29% attended none	Yes	Yes	Yes	<ul style="list-style-type: none"> ● Decreased urinary incontinence at 12-month follow-up 	<ul style="list-style-type: none"> ● Primary care visits ● Emergency visits ● Hospitalizations ● Mean hospital days ● Urinary incontinence at 24-month follow-up ● Frequency of falls ● Depression (CES-D) ● Patient satisfaction ● Functional status (SF-36) ● Rate of use of high-risk medications ● Costs

Dodds	1992	Physicians (quality of care study)	31	'Group discussions' individual visits every session	53 minutes; 14 sessions offered	N/A (physicians, not patients, were studied)	No	N/A	N/A	<ul style="list-style-type: none"> Recommended content covered in the following areas: safety, nutrition, behavior and development, and sleep Increase in triptan costs (nearly all accounted for by previous non-users of triptans); no statistical analysis Decrease in triptan costs among previously high utilizers of triptans; no statistical analysis Decrease in frequency of severe headaches; no statistical analysis Reduction in total costs; no statistical analysis Reduction in headache-related total and emergency visits; no statistical analysis 	<ul style="list-style-type: none"> Recommended content regarding family and parenting issues
Maizels	2003	Headache	264	Headache Clinic; individual visits every session	One session; 25 separate sessions offered; length not described	N/A (one session)	No	N/A	N/A	<ul style="list-style-type: none"> Increase in health behaviors (eating fruits and vegetables, cooking with monounsaturated fat) compared to controls Reductions in low-density lipoprotein reductions among intervention patients (compared to baseline) HbA1c Total and pharmacy PMPM expenses 	<ul style="list-style-type: none"> Total per member per month expenses Total and saturated fat intake Difference in LDL reduction between groups Total cholesterol/HDL ratio, triglycerides, and HDL HbA1c Total and pharmacy PMPM expenses
Masley	2001	Coronary artery disease	97	Group Education; no individual medical visits	1.5 hours; 14 sessions over 1 year (weekly during the first month, monthly thereafter)	Not described	Yes	No	Yes	<ul style="list-style-type: none"> Increased health behaviors (eating fruits and vegetables, cooking with monounsaturated fat) compared to controls Reductions in low-density lipoprotein reductions among intervention patients (compared to baseline) HbA1c Total and pharmacy PMPM expenses 	<ul style="list-style-type: none"> Total per member per month expenses Total and saturated fat intake Difference in LDL reduction between groups Total cholesterol/HDL ratio, triglycerides, and HDL HbA1c Total and pharmacy PMPM expenses
Miller	2004	Chronically ill, low-income women (ages 40 to 64)	28	CHCC; individual visits within the group every session	1.5 hours; 6 sessions over a 9-month period	57% attended 3 or more sessions, 32% attended 1 or 2 sessions, and 11% attended only the orientation session; overall 51% attendance rate	No	N/A	Yes	<ul style="list-style-type: none"> Decrease in emergency and urgent care visits 	<ul style="list-style-type: none"> Overall frequency of clinic visits (including emergency, urgent care, primary provider and specialty visits)
Noffsinger	2001	All patients in 4 practices.	Avg. 41.8/wk	DIGMA	1.5 hours (3 practices); 1 hour (1 practice); 1 session offered weekly	The average attendance rate for pre-registered patients was 81%. This was not a cohort.	No	N/A	N/A	<ul style="list-style-type: none"> Increased patient satisfaction Increased physician satisfaction (qualitative) 	N/A

Table 1. Continued

Primary Author	Year	Sample	N	Visit Type	Length/ Frequency of Visit	Rate of Attendance	RCT?	Intent-to-Treat Analysis?	≥80% Follow-up?	Significantly Favorable Outcomes	Nonsignificant Outcomes
Osborn	1981	Mother-infant pairs	78	Group visits' group discussion; individual visits every session	45 sessions, each followed by individual visit; at least 3 visits during first 6 months of baby's life	Those attending group visits averaged 3.4 visits in first 6 months; controls completed 2.9 visits. 28% of control infants and 10% of group infants did not complete 3 visits	No	No	Yes	<ul style="list-style-type: none"> Increased attendance at prescribed well-child visits Increased likelihood of stating their child had not been ill Decreased likelihood of seeking advice between visits Less time discussing physical aspects of care and more time discussing personal issues in baby's daily care Decrease in direct questions and reassurance from baseline, but increased explanations. Decrease in indirect questions and reassurance compared to controls, but an increase in direct questions 	<ul style="list-style-type: none"> Clinician time spent per infant Utilization of health care services Patient satisfaction
Power	1983	Diabetes (type unclear)	203	Group visits' different patients each visit; individual visits as needed	6 sessions; 1 hour each over the course of a year. Patients scheduled for groups according to need.	10 patients did not complete the study (4.9%). Long-term no-show rate for return visits was 10%.	Yes	No	Yes	<ul style="list-style-type: none"> Improved control of mean blood glucose compared to baseline among group patients 	<ul style="list-style-type: none"> Body weight Insulin use
Power	1992	Obese patients (20 lbs. or more above ideal body weight)	121	Group visits' no individual visit	1-hour classes held weekly, and biweekly, and monthly over 5 years.	Patients stayed long enough to be followed for 5 years.	No	N/A	Yes	<ul style="list-style-type: none"> Reduction in obesity (significance not reported; 20%) Reduction in blood pressure (significance not reported; 20%) Reduction in cholesterol (significance not reported; 80%) 	N/A

Sadur	1999	Type I and II diabetes	185	Cluster visits led by diabetes nurse educator; rare individual medical visits	2 hours; once per month for 6 months. Between meetings, the nurse educator reviewed diabetes management by telephone according to patient needs.	Not described	Yes	Not reported	Yes
									<ul style="list-style-type: none"> ● Decrease in physician visits (although this was almost significant) ● Urgent care clinic visits ● Emergency visits ● Optometry and ophthalmology visits ● Difference between control and intervention HbA1c at 12 months ● Proportion of subjects monitoring blood glucose at home ● Self-assessed ease of maintaining an acceptable blood glucose level ● Frequency of foot self-exam ● Exercise ● Self-efficacy (follow a low-fat diet, exercise regularly, monitor blood glucose regularly, communicating with physicians, expressing feelings about diabetes to family and friends) ● Satisfaction with general medical care
									<ul style="list-style-type: none"> ● Decrease in HbA1c levels compared to controls at six months ● Increase in medication use (insulin, sulfonylureas, metformin) compared to controls ● Increased nutritionist consultation ● Increased frequency of blood glucose monitoring) ● Decrease in average home blood glucose level over the past month ● Increase in self-efficacy compared with the control group (balancing one's diet to maintain blood glucose, the ability to recognize and treat blood glucose, maintaining blood glucose when ill) ● Satisfaction with diabetes care compared to controls ● Lowered frequency of hospitalizations compared to controls ● Decrease in non-physician visits compared to controls ● Decreased inpatient admissions ● Decreased emergency visits ● Decreased professional services ● Decreased ED costs ● Increased quality of life compared to controls (general) ● Increased self-efficacy regarding communicating with physicians compared with controls ● Increased patient satisfaction with primary care physician, physician unhurriedness, time spent with physician, overall quality of care, learning medication management from pharmacists, and management from nurses compared to controls
Scott	2004	Chronically ill, high-utilizing older adults	294	CHCC; individual visits as needed	90 minutes; once per month for 24 months	Average number of sessions attended: 10.6 (40.8% of sessions); 25.5% attended 2 or fewer sessions	Yes	Yes	Nearly (78%)

Table 1. Continued

Primary Author	Year	Sample	N	Visit Type	Length/ Frequency of Visit	Rate of Attendance	RCT?	Intent-to-Treat Analysis? ≥ 80% Follow-up?	Significantly Favorable Outcomes	Nonsignificant Outcomes
Trento	2002	Type II diabetes	112	'Group Care' shared similarities with both Chronic Care Clinics and DIGMAs; individual visits as needed	69 minutes, including elective individual care; approximately once every 3 months for 4 years	Unclear, but implied to be high.	Yes	Yes	<ul style="list-style-type: none"> Stable serum nitrogen compared to control group, in which it increased Increases in health behaviors (compared to controls, in whom they decreased) Less progression of retinopathy Total patient costs: \$159,111 for group patients, \$95,251 for controls (significance not reported) For other outcomes, see Trento 2004 	<ul style="list-style-type: none"> Relative CVD risk Systolic/diastolic blood pressure Microalbuminuria For other outcomes, see Trento 2004
Trento	2004	Type II diabetes	112	'Group Care' shared similarities with both Chronic Care Clinics and DIGMAs; individual visits as needed	69 minutes, including elective individual care; approximately once every 3 months for 5 years (continuation of prior study; slightly different outcomes examined)	Not described	Yes	No	<ul style="list-style-type: none"> Increase in problem-solving ability from baseline (controls worsened) Stable HbA1c compared to controls (in which it increased) Increased quality of life (diabetes-specific) Increased diabetes knowledge (compared to controls, in whom it decreased) Decrease in hypoglycemic agents (compared to controls, in whom they increased) 	<ul style="list-style-type: none"> BMI Body weight HDL Use of antihypertensive and lipid-lowering medication Triglyceride Creatinine Fasting blood glucose
Wagner	2001	Type II diabetes	707	Chronic Care Clinic; individual visits every session	One half-day; once every 3 months to 6 months over 2 years	Majority attended 3 or more sessions (up to 6); 35% attended none	Yes	Yes	<ul style="list-style-type: none"> Increased quality of care (number of recommended preventive procedures, increased participation in patient education) Fewer bed disability days Lowered frequency of specialty visits Lowered frequency of emergency room visits Improved general health status (SF-36 subscale) 	<ul style="list-style-type: none"> Primary care visits (trend towards significance) Hospitalization frequency Rates of foot exams, retinal exams, and medication reviews Patient satisfaction (diabetes-specific and overall) Physical function, physical role function (two SF-36 subscales) Depression (CES-D) Restricted-activity days Total health care costs HbA1c and cholesterol

* Clancy et al. published three articles that month using the same study data.

to demonstrate this heterogeneity and so that readers may evaluate the strength of evidence presented. We chose to proceed with a qualitative review, as it was impossible to complete a systematic review based on SORT criteria³⁹ because of the multiplicity of outcomes and sub-outcomes (ie, different aspects of patient satisfaction) measured in each study. We encourage the reader to refer to the table frequently, as it will facilitate the navigation of information and allow more meaningful comparisons and conclusions.

Results

Patient Satisfaction

Most studies examining patient satisfaction found that this outcome improved in those subjects receiving group visit interventions.

The first controlled evaluation of group visits examined their effectiveness in well-baby consultations. Osborn and Wooley⁴⁰ found that although patient satisfaction did not significantly differ between groups, patients preferred the group visit format because of the benefits provided by group interaction.

Clancy et al studied 120 economically disadvantaged patients with type 2 diabetes. Group visit participants demonstrated increased levels of trust in their physician compared with controls; there were also trends toward significance pertaining to perceptions of better coordination of care, community orientation, and cultural competency. There were no differences, however, in perceptions of first contact care, longitudinal/ongoing care, comprehensive care, or family-centered care.^{30–32} These findings are supported by Beck et al, as well as Scott et al, who found greater levels of satisfaction in chronically ill, high-using older patients participating in group visits. Patients appreciated the physician's unhurriedness, time spent with the physician, and overall quality of care.^{34,36} Sadur et al also found significantly higher levels of patient satisfaction with diabetes-specific care in the intervention group.³⁵

In a qualitative study exploring the feasibility of conducting group visits with low-income women at an inner city clinic, Miller et al reported that factors contributing to patient satisfaction included personalized attention, advice from others in the group, self-management education, and increased access to prescription refills and examinations. Pa-

tients who attended more sessions reported higher levels of satisfaction.⁴¹

Two large randomized studies involving diabetics⁴² and frail elderly at high risk for hospitalization⁴³ found no significant differences between controls and group visit participants regarding patient satisfaction. These 2 studies, however, featured half-day group visits with long intervals between sessions (3 to 4 and 3 to 6 months), and attendance rate was poor in both; among diabetics, 35% of intervention subjects attended no sessions and participation was even lower in the elder study. In both studies, increased participation was associated with higher levels of patient satisfaction.

In the only study of patient satisfaction for those attending DIGMAs, Noffsinger and Atkins found that the overall mean patient satisfaction score was 4.7 out of 5.¹⁶

Health Service Utilization

The majority of studies measuring health service utilization demonstrated decreased utilization of some specific health services. These were emergency department visits, visits to specialists, and hospitalization rates.

Beck et al found that chronically ill older adults attending CHCCs made fewer "same day" internal medicine visits, emergency department visits, imaging tests, visits to specialists and had less repeat hospital admissions. There were no differences between groups regarding number of laboratory tests, medications prescribed, admissions to skilled nursing facilities, or visiting nurse services.³⁴ Similarly, the study by Scott et al of chronically ill elderly revealed that CHCC patients with chronic illness had fewer emergency department visits, hospital admissions, and professional services than controls. Although there were no differences between study groups in utilization of outpatient hospital visits, observation unit admissions, and home health visits, subjects with higher attendance rates had fewer clinic visits, pharmacy fills, and skilled nursing facility admissions.³⁶ Miller's small feasibility study on low-income, chronically ill women demonstrated a significant decrease in emergency and urgent care visits during the intervention compared with a similar period before the intervention; there were no differences, however, in regards to overall frequency of clinic visits.⁴¹

Sadur's investigation of diabetic group visits demonstrated fewer hospitalizations and non-phy-

sician (eg, nutritionist) visits than controls; however, there were no differences in regards to physician visits (which approached significance), urgent care visits, emergency visits, or visits to the optometrist or ophthalmologist.³⁵ Wagner's investigation of diabetic patients demonstrated lower frequency of specialty and emergency department visits, but no significant differences in primary care visits (which approached significance), hospitalization frequency, rates of foot and retinal exams, or medication reviews.⁴²

Maizels reported that a group visit intervention designed for chronic headache resulted in dramatically lower outpatient and emergency department utilization, although significance was not assessed.⁴⁴ The study done by Blumenfeld and Tischio of a group visit program for headache also reported decreased primary care visits, emergency visits, and CT scans, but neurology visits and use of injected and oral narcotics increased.⁴⁵

Osborn's evaluation of well-child group visits implied no significant differences between intervention subjects and controls regarding illness-related calls, visits to physicians and nurses, or emergency department visits.⁴⁰ These study results may have been due to the low-risk nature of the population, as well as a small sample. Similarly, Coleman, who studied 169 frail elderly at high risk for hospitalization and functional decline, found no differences in health care utilization, including frequency of hospitalization, hospital days, emergency and ambulatory visits, total costs of care, or use of high-risk medications between control and intervention groups. These results, however, may be secondary to low attendance rates, large time interval between visits, and/or the choice of extremely frail elderly at high risk for hospitalization for the study sample.⁴³

Quality of Care

Quality of care improved in all group visits studies measuring this outcome. Wagner, in a study of 707 diabetic patients, reported that group visit participation was positively associated with subjects receiving preventive procedures, having medications reviewed, and having a microalbuminuria test recorded in the diabetes registry.⁴² Similarly, Clancy found that diabetic patients participating in group visits demonstrated improvement in 10 American Diabetes Association processes of care indicators.³⁰⁻³² A study by Sadur showed that poorly

controlled diabetics (average HbA1C greater than 8.5%), who attended group visits significantly increased intake of insulin, sulfonylureas, and metformin compared with controls,³⁵ whereas another study of relatively well-controlled type 2 diabetic patients attending group visits demonstrated lowered dosage of hypoglycemic agents than in standard care.³⁷

In a study of chronically ill, high-using older adults attending CHCCs, Beck found that group visit participants received more influenza and pneumonia vaccinations compared with controls.³⁴ Scott et al found that group visit participants reported significantly higher frequencies of patient education about medication management from pharmacists and self-management techniques from nurses compared with controls.³⁶ Finally, Dodds reported that physicians providing group well-child visits covered significantly more American Academy of Pediatrics-recommended content in their education sessions than did control physicians, particularly about safety, nutrition, behavior and development, and sleep.⁴⁶

Healthy Behaviors, Self-Care, and Self-Efficacy

Investigations exploring the effects of group visits on healthy behaviors and self-efficacy demonstrated mixed results.

Trento et al studied 112 previously diagnosed, non-insulin-treated type 2 diabetics who were randomized to a control arm receiving usual care, and an experimental arm participating in group visits. Group visit patients demonstrated increases in diabetes knowledge and healthy behaviors, whereas both decreased in controls.³⁷ Five-year follow-up of this patient cohort revealed that group patients also demonstrated significantly increased problem-solving abilities, in which they were able to identify underlying health problems and potential solutions, compared with controls (in whom this ability decreased).³⁸ Sadur found that compared with controls, diabetic group visit patients increased their frequency of blood glucose monitoring, although the proportion of patients monitoring blood glucose did not increase. In addition, there were no differences between groups in regards to self-assessed ease of maintaining an acceptable blood glucose level, frequency of foot self-examinations, or exercise.

Masley reported that subjects with coronary artery disease participating in group visits signifi-

cantly increased fruit and vegetable intake, as well as utilization of monosaturated cooking oils compared with controls, although there were no differences in regards to total and saturated fat intake.³³

Sadur found that group visit patients reported significantly higher levels of self-efficacy in controlling diet to lower blood glucose, recognizing and treating hyperglycemia, and maintaining blood glucose when ill, although there were no differences between groups in self-efficacy for following a low-fat diet, exercising regularly, monitoring blood glucose regularly, communicating with physicians, or expressing feelings about diabetes to family and friends.³⁵ Scott et al found that patients participating in CHCCs reported significantly higher self-efficacy in communicating with their physician, but no differences between groups in self-efficacy for disease management, doing chores, participating in social or recreational activities, or controlling/managing depression.³⁶

Physical Function, Depression, and Quality of Life

Whereas it seems that group visits increase quality of life, they do not succeed as well at improving physical function and depression.

Trento et al reported improved diabetes specific quality of life for adults with type 2 diabetes participating in group visits, although this improvement did not occur until the second intervention year³⁸; in contrast, controls worsened. In a study conducted by Blumenfeld and Tischio, a small prospective cohort of patients attending group visits for the treatment of headache showed improvement in headache-related quality of life and physical function measured with the SF-36 Health Survey (SF-36) at 8 weeks, which was maintained 6 months postintervention.⁴⁵ The evaluation of Osborn and Wooley of well-child group visits found that mothers attending group visits were significantly less likely to say their child had been ill.⁴⁰

Scott et al conducted a study of 294 chronically ill patients (>60 years old) who were high service utilizers, defined as having had 11 or more outpatient visits in the past 18 months. CHCC patients reported a significantly higher overall quality of life, but there were no significant differences between the intervention group and controls regarding physical function [ie, activities for daily living (ADLs) and instrumental ADLs (IADLs)].³⁶ Wag-

ner demonstrated that increased group visit participation was positively associated with a reduction in bed disability days and an increase in the general health status subset of the SF-36 compared with usual care among diabetics, but there were no significant improvements in the physical function and physical role function subsets of the SF-36 or depression as measured by the Centers for Epidemiologic Studies Depression Scale (CES-D).⁴²

Beck et al found no significant differences between group patients and controls in functional status (ie, mobility, ADLs, and IADLs) or depression.³⁴ Finally, Coleman et al found that frail elderly at high risk of hospitalization participating in group visits demonstrated no significant improvements in depression or physical function (SF-36) compared with the control group. Although group patients had decreased urinary incontinence compared with controls at a 12-month follow-up, this difference had disappeared at 24 months.⁴³

Disease-specific Outcomes

The group visit literature discussed several disease outcomes, including coronary artery disease, headache, obesity, and type 2 diabetes; again, the results have been mixed.

In a 12-month randomized controlled trial of a group visit program for cardiovascular disease, Masley et al found that group visit participants achieved significant reductions in low-density lipoprotein (LDL) levels compared with baseline, although the difference in LDL reduction between groups was not significant. No differences were noted for HbA1C, triglyceride levels, high-density lipoprotein (HDL), or total cholesterol/HDL ratio.³³ In a non-controlled trial, Power demonstrated a 20% success rate (defined as a loss of 10 pounds or greater) among obese group visit participants over 5 years, compared with a 5% success rate to obesity interventions that had been thus far reported in the literature. In addition, he reported a 20% reduction in blood pressure among obese hypertensive patients and an 80% reduction in cholesterol among obese hypercholesterolemic patients, although significance was not assessed.⁴⁷

Trento et al found that type 2 diabetics participating in group visits achieved stable HbA1C and serum urea nitrogen, whereas those receiving individualized treatment demonstrated increases in

both outcomes. Diabetic retinopathy improved among group patients but worsened in controls.³⁷ There were no differences in body mass index, body weight, relative cardiovascular disease risk, blood pressure, HDL, triglyceride, or creatinine between the intervention and control group. Power found that among diabetic group visit participants, satisfactory control of blood glucose levels (80–120 mg/dL) was achieved in ~35% of patients by their fourth group session, whereas blood glucose levels among diabetics receiving individual visits were not significantly altered after 1 year.⁴⁸ No differences in body weight were found between groups. In the diabetes group visits study conducted by Sadur et al, HbA1C levels declined significantly by 1.3% for those attending group visits, compared with 0.22% for controls at 6 months. In addition, there was a significant decrease in the average home blood glucose level compared with controls. At 12 months, however, there were no significant differences between groups in regards to HbA1C.³⁵

Clancy et al found no differences between group visit patients and controls in lipid profiles and HbA1C^{30–32}; similarly, Wagner reported no significant differences between diabetic patients receiving usual care or group care in HbA1C and cholesterol. However, frequency of group visit attendance was positively correlated with reduced HbA1C levels and improved cholesterol.⁴²

Blumenfeld and Tischio found that 92% of patients attending group visits for headache reported subjective improvement of symptoms at the completion of the program; this was maintained at 6 months. This intervention offered one 2-hour group visit led by a neurologist and followed by a very comprehensive and lengthy individual visit at 2 and 8 weeks led by a nurse practitioner. The individual visit included careful case management of headache patients with medications and lifestyle modifications, and collaboration as needed with a psychiatrist for depression comorbidity, biofeedback for stress management, pain management for patients with pain comorbidities such as fibromyalgia, and anesthesia services for detoxification from narcotics.⁴⁵ Similarly, Maizels et al reported a decrease in the frequency of severe headaches among group visit patients, although significance was not assessed.⁴⁴ These 2 studies were uncontrolled prospective cohorts.

Satisfaction of Physicians Participating in Group Visits

Physician satisfaction, when measured, has been shown to be high across all group visit studies. Beck et al found that all physicians who participated in CHCCs reported that they greatly enjoyed and were extremely satisfied with their ability to treat group visit patients.³⁴ Blumenfeld and Tischio found that of 77 primary care physicians who responded to a satisfaction survey after their patients attended a group visit for headache conducted by a neurologist/nurse practitioner team, 86% were satisfied overall, approximately 10% were neutral, and less than 4% were somewhat dissatisfied.⁴⁵

Group visits have been shown to increase physician productivity, which may in turn increase physician satisfaction. In a study of 4 pilot DIGMA programs that took place weekly for 6 weeks, Noffsinger and Atkins found that physicians were able to see an average of 41.8 patients per week in 5.5 hours of physician time. If these physicians had used those hours to provide traditional care, they would have been only able to see an average of 16.3 patients each. Overall, the average combined increase in productivity was 256.4%.¹⁶ This was associated with greater levels of qualitatively reported physician satisfaction, specifically in relation to spending more time with patients without increasing total time worked.

Cost of Care

To date, most group visits have not demonstrated a decrease in total cost of care. All total cost of care analyses was done in fully capitated health-maintenance organizations (HMOs) or a nationalized health care system.

The study conducted by Beck et al of chronically ill high utilizers was the only quality study that demonstrated a decrease in total cost of care: \$14.79 per participant per month in CHCC patients, compared with controls.³⁴

Maizels et al reported that prescription costs were reduced in previously high utilizers of triptans after a group visit intervention, and the overall cost of the program to the physicians' practice was reduced by \$18,757. This was based on a theoretical cost of \$60 for office visits and \$100 for emergency department visits,⁴⁴ although significance was not assessed.

Scott et al assessed total costs, including pharmacy, hospital, professional, and health plan termi-

nation costs, for all CHCC patients compared with controls and did not find the cost savings significant. Patients attending CHCCs, however, demonstrated significantly lower emergency department costs compared with controls.³⁶

The data of Coleman et al implied no significant reduction in total or pharmacy costs secondary to the group visit intervention.⁴³ Similarly, Masley et al found that the intervention group had lower per-member-per-month expenses than a control group that received the National Cholesterol Education Program's Step II-III diet plan; however, the cost difference was not statistically significant.³³

Trento et al examined 2 types of direct costs—those paid by the Italian National Health Service for staff, educational materials, clinical procedures, and pharmacological treatment, and those incurred by patients and their caregivers, including transportation costs and opportunity-cost value of time.³⁷ Only costs for pharmacological treatment decreased among group visit patients compared with controls. In fact, group visits were more costly than control visits, and the researchers concluded that an each per-point increase in quality of life (as calculated from modified Diabetes Quality of Life Questionnaires) would cost an additional \$2.12 per patient over usual care.

Discussion

The interpretation of these results is difficult, due in part to differences in study applications of the group visit model. As depicted in Table 1, interventions differ widely in structure, processes of care, and research quality. Our summary of results, however, is consistent with the conclusions of the major and higher quality studies.^{30,33,34,36,37,42,43}

Studies differed in group visit model, education content, presentation style, population treated, and length and frequency of program sessions (Table 1). In many cases, different instruments were used to measure the same outcome (ie, physical function). Some scales were general, whereas some were disease-specific (ie, quality of life). In addition, individual visits were not always provided, and if provided, differed in length and comprehensiveness. In addition, telephone follow-ups were sometimes added to the intervention. Although flexibility is one of the main advantages of the group visit model (because it can be altered to fit various patient populations, specific physician practices/orga-

nizations, and a number of health care delivery systems), the resultant variability limits the ability to compare studies and to generalize the results of a given study to other contexts.

There seems to be, however, a consensus among the data that group visits improve satisfaction, quality of life, and quality of care indicators. We believe this is due to the expanded time component that provides greater interaction between patients and providers and affords physicians time to apply and monitor specific chronic care guidelines. On the other hand, healthy behavior and self-efficacy improvement is much more complex and linked to the facilitator's skills in motivational interviewing,⁴⁹ presence of behavior-specific objectives, and patients confidence level.¹⁸

In general, however, patients seem to incur fewer visits to emergency rooms and specialists, implying better management and self-management skills. The lack of improvement of function in 3 major studies^{34,36,43} may have been due to the poor match between instrument and population. For example, it may have been more appropriate to use the ADLs and IADLs scales with the very sick frail elderly⁴³ and use the SF-36 for chronically ill elderly.^{34,36} In addition, none of the studies involved an experiential component, such as exercise, to improve physical function. It was sobering to see that depression did not improve when measured, because depression is an important and common comorbidity that may have an effect on patient self-management and disease outcomes.⁵⁰ Treatment of depression, however, was not explicitly addressed by any of the studied interventions. Group visits (as any chronic disease management program) need to address and treat depression. Finally, the variability in behavior change and disease outcome may also be linked to the availability and quality of the individual visit. We believe that the individual visit plays an important role in providing patients with personalized feedback by tailoring the education discussion to their specific needs. Therefore, occasional or very short individual visits may be problematic.

If the group visit is to become an adjunctive model for chronic disease management for family physicians, there is an obvious need to delineate and refine the structural elements, process and content of these visits, as well as to delineate the best instruments to use for measuring general and spe-

cific chronic illness outcomes. In particular, researchers need to note:

- I. Structure
 - A. Are individual visits separate from the group or within the group?
 - B. What is the program length and frequency?
 - C. What is the nature of the patient cohort (ie, from a physician's practice, from the community, or both)?
 - D. Is the group composed of the same patients from week to week?
 - E. What are the population characteristics that determine inclusion in the group?
 - F. Are there follow-up telephone calls or sessions for "graduates"?
 - G. Will the group include a mental health practitioner or other providers in addition to a physician/nurse team?
- II. Processes of care
 - A. Is information presented in a didactic lecture or via interactive discussions?
 - B. Is skill-building experiential (ie, via exercise, breathing and meditation sessions or a potluck meal)?
 - C. Are motivational interviewing techniques used, specific behavioral goals set, and self-efficacy assessed at each session, as recommended by Lorig and Holman?¹⁸
- III. Content
 - A. What are the details about group education information regarding physiology, disease development, medications, lifestyle interventions (including nutrition, exercise, and stress management), and other aspects of chronic disease self-management?
 - B. What is the content of the individual visit?
 - C. Is screening and treatment of depression provided?
 - D. What is the degree of comprehensiveness of assessment and case management and collaboration with other providers (ie, physical therapists, dietitians, psychotherapists)?

We believe that whereas randomized controlled trials are justifiably the standard in the assessment of causality, the time-intensive nature of group visits requires the choice of highly motivated subjects to enhance participation, at the risk of intro-

ducing an element of selection bias. The potential for bias is enhanced due to the impossibility of conducting a blinded study, because patients are, out of necessity, aware of the intervention they will receive. One option is to use willingness to participate in group visits as a criterion for study inclusion and then randomizing all respondents who fit that criterion to the experimental or control arm. It must be noted, however, that many studies demonstrated low attendance rates, particularly if meetings occurred at infrequent intervals or over an extended period (over 1 year) even when patient populations were motivated at the outset.^{26,34,42,43} This phenomenon will affect study conclusions and will require inclusion of a dose-response analysis of data that allows for interpretation of patient results based on the number of group visit sessions attended, in addition to an intent-to-treat analysis.

Most researchers examining the efficacy of the group visit model did so in the context of a fully capitated HMO (ie, Kaiser Permanente,^{35,36,44,45} Group Health Cooperative of Puget Sound^{33,42,43}) or a nationalized health care system.^{37,38} In these contexts, it is easier to use a multidisciplinary team to conduct group visits and to measure total costs of care and health care utilization, including visits to specialists and emergency rooms and admissions to skilled nursing facilities and hospitals.

Although the cost of care and health care utilization are more important to fully capitated systems, they are also relevant to fee-for-service managed care insurance models. Improvements in disease outcomes and quality of care indicators are attractive to the Medicare and private sector, as well. Financial profitability, however, can be computed by comparing group visits' level of billing and patient numbers to usual care. Several articles have been written that address how to provide group visits in a fee-for-service context.^{11,51} Some of these report a positive profit margin secondary to seeing a larger number of patients in less time^{11,16}; this has not been our experience.²¹

Conclusion

Group visits improve patient and physician satisfaction, quality of care, and quality of life, as well as decrease health care utilization, particularly visits to the emergency department and specialists and sometimes rates of hospitalization or readmission. Their impact on healthy behaviors, self-efficacy,

and disease outcomes is more variable, probably because of the study differences in structures, processes, and content of care. Their impact on physical function has also been variable, probably due to lack of exercise training and inappropriate choice of measurements. Depression has not improved when measured and has not been specifically addressed as an important comorbidity by this model. It is not yet evident that group visits decrease total cost of care.

There is a need to explore the feasibility and reproducibility of this model in primary care practices. Future research may benefit, however, from abandoning old nomenclatures and clearly defining the structure and processes of care, the content of visits, and appropriate outcome measures.

Group visits are a promising approach to chronic care management for the motivated patient. They provide a mechanism for providing time for education combined with medical care in a manner that at least maintains productivity and revenue. The combination of individual medical attention and group education, if well-designed, has the potential to address multiple aspects of patient care in a personalized, tailored fashion but may only be applicable to motivated patients who are willing to invest extra time in their care. Thus, the group visit model is a useful adjunct to the chronic care model.

References

1. National Center for Chronic Disease Prevention and Health Promotion. Chronic disease overview. Centers for Disease Control and Prevention, 2003 [Accessed 03/15/04]. Available from: <http://www.cdc.gov/nccdphp/overview.htm>.
2. Mili F, Helmick C, Zack M, Moriarty D. Health related quality of life among adults reporting arthritis: analysis of data from the Behavioral Risk Factor Surveillance System, US, 1996–99. *J Rheumatol* 2003;30:160–6.
3. Haggerty C, Schulz R, Ness R, Investigators. PEaCHS. Lower quality of life among women with chronic pelvic pain after pelvic inflammatory disease. *Obstet Gynecol* 2003;102:934–9.
4. Wehler M, Reulbach U, Nichterlein R, et al. Health-related quality of life in chronic pancreatitis: a psychometric assessment. *Scand J Gastroenterol* 2003;38:1083–9.
5. Cheng L, Cumber S, Dumas C, Winter R, Nguyen K, Nieman L. Health related quality of life in pregeriatric patients with chronic diseases at urban,

- public supported clinics. *Health Qual Life Outcomes* 2003;1:63.
6. Wellington M. Stanford Health Partners: rationale and early experiences in establishing physician group visits and chronic disease self-management workshops. *J Ambulatory Care Manage* 2001;24:10–6.
7. Feldman M. Cluster visits. *Am J Nurs* 1974;74:1485–8.
8. Spann SJ. Task Force Report 6. Report on financing the new model of family medicine. *Ann Fam Med* 2004;2:S1–21.
9. Pennachio DL. Should you offer group visits? *Med Econ* 2003;80:70–2, 82, 85.
10. Shute N. That old-time medicine. *U.S. News and World Report*, 2002;55–8:60–1.
11. Masley S, Sokoloff J, Hawes C. Planning group visits for high-risk patients. *Fam Pract Manag* 2000;7:33–7.
12. Walker T. Medical visits get group mentality approach: group appointments can increase efficiency and patient and physician satisfaction. *Managed Healthcare* 2000;10:10.
13. Thompson E. The power of group visits: improved quality of care, increased productivity entice physicians to see up to 15 patients at a time. *Mod Healthcare* 2000;30:54.
14. Trilling J. Selections from current literature: focus group technique in chronic illness. *Fam Pract* 1999;16:539–41.
15. Jaber R, Braksmajer A, Trilling J. Group visits: models, benefits, and challenges. *Fam Pract Manag* 2006;13:37–40.
16. Noffsinger EB, Atkins TN. Assessing a group medical appointment program: a case study at Sutter Medical Foundation. *Group Pract J* 2001;48:42–9.
17. Noffsinger E, Sawyer DR, Scott JC. Group medical visits: a glimpse into the future? (enhancing your practice). *Patient Care* 2003;37:18–27.
18. Lorig KR, Holman HR. Self-management education: history, definition, outcomes, and mechanisms. *Ann Behav Med* 2003;26:1–7.
19. Bandura A. *Social foundations of thought and action*. Englewood Cliffs (NJ): Prentice-Hall, 1986.
20. Marks R, Allegrante JP, Lorig K. A review and synthesis of research evidence for self-efficacy-enhancing interventions for reducing chronic disability: implications for health education practice (Part I). *Health Promotion Pract* 2005;6:37–43.
21. Jaber R, Braksmajer AS, Trilling J. Group visits: our experience with this adjunctive model to chronic care management. *Internet J Fam Pract* 2005;4. Available from: <http://www.ispub.com>.
22. Noffsinger EB. Answering physician concerns about drop-in group medical appointments. *Group Pract J* 1999;48:14–21.
23. Noffsinger EB. Benefits of drop-in group medical

- appointments (DIGMAs) to physicians and patients. *Group Pract J* 1999;48:21–8.
24. Dreffer D. Group visits hit the road. *Fam Pract Manag* 2004;11:39–42.
 25. Houck S, Kilo C, Scott J. Improving patient care: group visits 101. *Fam Pract Manag* 2003;10:66–8.
 26. Scott J, Gade G, McKenzie M, Venohr I. Cooperative health care clinics: a group approach to individual care. *Geriatrics* 1998;53:68–74.
 27. Escobar GJ, Braveman PA, Ackerson L, et al. A randomized comparison of home visits and hospital-based group follow-up visits after early postpartum discharge. *Pediatrics* 2001;108:719–27.
 28. Trento M, Passera P, Tomalino M, et al. Group visits improve metabolic control in type 2 diabetes. *Diabetes Care* 2001;24:995–1000.
 29. Coleman E, Eilertsen T, Kramer A, Magid D, Beck A, Conner D. Reducing emergency visits in older adults with chronic illness: a randomized, controlled trial of group visits. *Eff Clin Pract* 2001;4:49–57.
 30. Clancy DE, Brown SB, Magruder KM, Huang P. Group visits in medically and economically disadvantaged patients with type 2 diabetes and their relationships to clinical outcomes. *Top Health Inf Manage* 2003;24:8–15.
 31. Clancy DE, Cope DW, Magruder KM, Huang P, Salter KH, Fields AW. Evaluating group visits in an uninsured or inadequately insured patient population with uncontrolled type 2 diabetes. *Diabetes Educ* 2003;29:292–301.
 32. Clancy DE, Cope DW, Magruder KM, Huang P, Wolfman TE. Evaluating concordance to American Diabetes Association standards of care for type 2 diabetes through group visits in an uninsured or inadequately insured patient population. *Diabetes Care* 2003;26:2032–6.
 33. Masley S, Phillips S, Copeland JR. Group office visits change dietary habits of patients with coronary artery disease. *J Fam Pract* 2001;50:235–9.
 34. Beck A, Scott J, Williams P, et al. A randomized trial of group outpatient visits for chronically ill older HMO members: the cooperative health care clinic. *J Am Geriatr Soc* 1997;45:543–9.
 35. Sadur CN, Moline N, Costa M, et al. Diabetes management in a health maintenance organization: efficacy of care management using cluster visits. *Diabetes Care* 1999;22:2011.
 36. Scott JC, Conner DA, Venohr I, et al. Effectiveness of a group outpatient visit model for chronically ill older health maintenance organization members: a 2-year randomized trial of the cooperative health care clinic. *J Am Geriatr Soc* 2004;52:1463–70.
 37. Trento M, Passera P, Bajardi M, et al. Lifestyle intervention by group care prevents deterioration of type II diabetes: a 4-year randomized controlled clinical trial. *Diabetologia* 2002;45:1231–9.
 38. Trento M, Passera P, Borgo E, et al. A 5-year randomized controlled study of learning, problem solving ability, and quality of life modifications in people with type 2 diabetes managed by group care. *Diabetes Care* 2004;27:670–5.
 39. Ebell MH, Siwek J, Weiss BD, et al. Strength of Recommendation Taxonomy (SORT): A patient-centered approach to grading evidence in the medical literature. *J Am Board Fam Pract* 2004;17:59–67.
 40. Osborn LM, Wooley FR. Use of groups in well child care. *Pediatrics* 1981;67:701–6.
 41. Miller D, Zantop V, Hammer H, Faust S, Grumbach K. Group medical visits for low-income women with chronic disease: a feasibility study. *J Womens Health* 2004;13:217–25.
 42. Wagner E, Grothaus L, Sandhu N. Chronic care clinics for diabetes in primary care. *Diabetes Care* 2001;25:695–700.
 43. Coleman E, Grothaus L, Sandhu N, Wagner E. Chronic care clinics: a randomized controlled trial of a new model of primary care for frail older adults. *J Am Geriatr Soc* 1999;47:775–83.
 44. Maizels M, Saenz V, Wirjo J. Impact of a group-based model of disease management for headache. *Headache* 2003;43:621–7.
 45. Blumenfeld A, Tischio M. Center of excellence for headache care: group model at Kaiser Permanente. *Headache* 2003;43:431–40.
 46. Dodds M, Nicholson L, Muse B, Osborn LM. Group health supervision visits more effective than individual visits in delivering health care information. *Pediatrics* 1992;91:668–70.
 47. Power L. Group office visits in obesity. *J Fla Med Assoc* 1992;79:392–5.
 48. Power L. Group approach to diabetes care: a preliminary note. *Postgrad Med* 1983;73:211–6.
 49. Rubak S, Sandbaek A, Lauritzen T, Christensen B. Motivational interviewing: a systematic review and meta-analysis. *Br J Gen Pract* 2005;55:305–12.
 50. Kupfer DJ, Frank E. Comorbidity in depression. *Acta Psychiatr Scand Suppl* 2003;418:57–60.
 51. Masley S. Group visit templates for osteoporosis, asthma, and hypertension. Preconference on Group Medical Visits. Rye (NY): Northeast Society of Teachers of Family Medicine, 2004.