Cornerstones

Practice-Based Research Syntheses of Child Find, Referral, Early Identification, and Eligibility Practices and Models

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Educational Outreach (Academic Detailing) and Physician Prescribing Practices

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The use of an educational outreach procedure called *academic detailing* for changing physician prescribing practices was the focus of this research synthesis. The practice is characterized by brief, repeated, face-to-face, informal educational outreach visits to physicians by knowledgeable professionals (academic detailers) in physicians' offices or other practice settings to provide information and materials to change prescribing behavior. The synthesis included 38 studies of more than 5,000 physicians and other health-care providers. Results showed that a number of academic-detailing characteristics were most associated with hypothesized or expected changes in prescribing practices. Characteristics include collecting baseline information on physicians' current prescribing practices, establishing a motivation to change, establishing the credibility of the message and messenger, repeating a highly focused message, and providing positive reinforcement for changes in prescribing practices. Implications for using these practice characteristics for child find are described.

Purpose

The purpose of this practice-based research synthesis is to assess the effectiveness of an educational outreach practice called *academic detailing* for changing physician prescribing practices. Academic detailing is a well developed and researched practice that has been widely used to improve physicians' decision-making choices that involve prescribing medications, diagnostic tests, medical procedures, treatments, etc. (Benincasa et al., 1996; Daly et al., 1993; Ofman et al., 2003; Soumerai & Avorn, 1987; Soumerai et al., 1993). This educational outreach practice is characterized by brief, repeated, face-to-face, informal educational outreach visits to physicians by knowledgeable professionals (academic detailers) in physicians' offices or other practice settings to provide information and materials to change prescribing behavior (Soumerai & Avorn, 1990).

This particular educational outreach practice was the focus of this research synthesis because the prac-

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tice holds promise as a child find strategy for increasing physician referrals to IDEA Part C early intervention programs (Dunst & Trivette, 2004). More specifically, we examined the features of academic detailing that were associated with changes in physician prescribing practices with a focus on those characteristics that could be used as part of child find to promote physician referrals of children with or at risk for disabilities to early intervention programs. Physician outreach is a common child find practice (see Dunst & Trivette, 2004), but no empirical evidence was found regarding the effectiveness of the ways in which this practice is used by early intervention program providers. We therefore conducted a review and synthesis of studies in health-care settings where an evidence base has been amassed about the effectiveness of physician prescribing behavior. (For purposes of this synthesis, a physician making a referral for treatment was deemed a prescribing practice.)

The synthesis was conducted using a characteristics and consequences framework (Dunst, Trivette, & Cutspec, 2002) where the focus of analysis was the identification of those particular characteristics of academic detailing that were associated with desired changes in prescribing practices. This was accomplished by coding different academic detailing characteristics and relating the use of the practice characteristics to variations in study outcomes.

Background

Academic detailing has its roots in communications theory and social marketing (see Smith, 1991; Soumerai & Avorn, 1990). It has been used by pharmaceutical manufacturers for more than 50 years for influencing physicians' prescriptions of the manufacturers' products (Caplow, 1952; Hawkins, 1959; Hubbard, 1955). In 1949, at the point in time where academic detailing was recognized as a profession, the U.S. Department of Labor described an academic detailer as a person who "introduces new pharmaceutical products and their methods of use to physicians, dentists, hospitals, and public-health officials, promoting the use of the product rather than selling it" (cited in Hawkins, 1959, p. 215).

Description of the Practice

There have been various attempts to define academic detailing and describe the key characteristics of the practice (e.g., Allen, 2004; Dietrich et al., 1992; Klein, 1983; Pathak, 1983). Stephen Soumerai and his colleagues by far have been the leaders in attempting to disentangle, unpack, and identify the principles and components of the practice (e.g., Soumerai, 1998; Soumerai & Avorn, 1990). According to Soumerai and Avorn (1990), academic detailing involves:

1. conducting interviews to investigate baseline knowledge and motivations for current prescribing patterns,
2. focusing programs on specific categories of physicians as well as on their opinion leaders,
3. defining clear educational and behavioral objectives,
4. establishing credibility through a respected organizational identity, referencing authoritative and unbiased sources of information, and presenting both sides of controversial issues,
5. stimulating active physician participation in educational interactions,
6. using concise graphic educational materials,
7. highlighting and repeating the essential messages, and
8. providing positive reinforcement of improved practices in follow-up visits.

These characteristics were used to develop the 13 academic-detailing variables listed in Table 1 and to code the studies included in the research synthesis. The five Soumerai and Avorn (1990) characteristics that included multiple elements (Numbers 1, 2, 6, 7 and 8 in the above list) were subdivided in order to discern which characteristics were most important. Additionally, we examined five structural variables as possible determinants of the study outcomes and as well examined the influence of the type of research design on changes in prescribing practices (Table 1).

For purposes of this synthesis, studies were included if the academic-detailing procedure was done face-to-face in physicians' practices or another health-care or medical setting (e.g., hospitals). Studies that implemented and evaluated the practice by mail, telephone, or other non-face-to-face methods were excluded (e.g., McPhee, Bird, Fordham, Rodnick, & Osborn, 1991; Sweet, 1996). Additional exclusion criteria are described in the Selection Criteria section below.

Search Strategy

Search Terms

An initial search was done using *physician outreach*, *marketing* or *marketing strategies*, and *educational outreach* as search terms. Once *academic detailing* was identified as the limiting term used for educational outreach to physicians, the search for relevant studies was done using different variations of academic detailing (*academic detail,* academic* and *detail**) as search terms.

Sources

The following databases were searched for relevant studies: Psychological Abstracts online (PsycINFO), Social Sciences Citation Index, Educational Resources Information Center (ERIC), MEDLINE, Cumulative In-

dex to Nursing and Allied Health Literature (CINAHL), Health Source: Nursing/Academic Edition, The Cochrane Library, Academic Search Elite, Dissertation Abstracts International, OCLC PapersFirst, ABI Inform (ProQuest), Ingenta, Business Source Elite, and WorldCat. Hand searches were conducted of relevant review articles, book chapters, books, and a Cochrane review (O'Brien et al., 2001) to locate additional studies. In addition, the reference lists of the studies identified through the above searches were also examined.

Selection Criteria

Studies were included if at least three of the eight Soumerai and Avorn (1990) academic detailing characteristics were described, mentioned, or could be discerned, and Cohen's *d* effect sizes (Dunst, Hamby, & Trivette, 2004) could be calculated for pretest/posttest or experimental vs. comparison group differences. In a number of instances, the data presented in the research reports were reanalyzed to produce findings that were directly comparable across studies. In so doing, there were cases where the study investigators reported positive findings but our analyses found small effects. In other cases, study investigators reported no significant results but our analyses found large effect sizes.

Studies were excluded from the synthesis if too few academic-detailing characteristics could be discerned (e.g, Kim et al., 1999; van Eijk, Avorn, Porsius, & de Boer, 2001; Zwar, Wolk, Gordon, & Sanson-Fisher, 2000), the outcomes in a study did not include a measure of physician prescribing behavior (e.g., Gorin et al., 2000; Hearnshaw, Khunti, & Robertson, 2000; Ross-Degnan et al., 1996), the intervention was not done on a one-on-one or small group basis (e.g., Bernal-Delgado, Galeote-Mayor, Pradas-Arnal, & Peiro-Moreno, 2002; Ferguson et al., 2003; Mahloch, Taylor, Taplin, & Urban, 1993), the intervention was called academic detailing but the description of practice did not match the academic-detailing characteristics in Table 1 (e.g., Blackstien-Hirsch, Anderson, Cicutto, McIvor, & Norton, 2000; Markey & Schattner, 2001; McCormick et al., 1999) or effect sizes could not be calculated from the data included in the research reports (e.g., Benincasa et al., 1996; Daly et al., 1993; Dietrich et al., 1992).

Search Results

Thirty eight (38) studies met the inclusion criteria for the synthesis. Table 2 shows selected characteristics of the study participants and the settings where the educational outreach was conducted.

Participants

The 38 studies included 5,102 participants, 2,667 in the experimental or intervention groups and 2,435 in the control or comparison groups. The number of participants in two studies (Avorn et al., 1992; Landgren et al., 1988) were not reported (see footnote b in Table 2 for an explanation).

The majority of participants were physicians (86%). The remaining participants were nurse practitioners (5%), residents (5%), physician assistants (2%), and interns (2%).

Participant ages were reported in only six studies and averaged between 38 and 51 years. Years of experience of the study participants was reported in only four studies and averaged between 13 and 40 years. In the 11 studies that reported the gender of the study participants, 61% were male and 39% were female.

Settings

The academic-detailing interventions were implemented in physicians' practices (61%), HMOs, MCOs, or clinics (21%), hospitals (13%), or nursing homes (5%). In all cases, the interventions were implemented on a face-to-face basis with an individual study participant (76%) or with a small group of participants all practicing in the same setting (24%).

Academic Detailers

The 38 studies employed 48 individuals as interventionists. The persons implementing the academic-detailing interventions were mostly physicians (41%) or pharmacists (41%) (Table 3). In eight instances (16%), the profesional backgrounds of the academic detailers were not specified.

Research Designs

Table 3 shows the research designs used by the investigators and the types of analyses performed on the data. The majority of the investigations were randomized clinical trials (60%) or other types of controlled trial studies (29%). The remaining four studies (10%) used some other type of design.

In the largest number of cases, the investigators collected both pretest and posttest measures of physician prescribing behavior or practices (84%). In six studies (16%), only posttest data were collected.

Outcomes

The 38 studies included nine different types of prescribing practices (see Table 3). In most of the studies (60%), the outcome was a change in prescribing some type of drug or medication. Prescribing patient treatments (18%) or diagnostic tests or screenings (18%) were the second most frequent outcomes. In two studies (5%), referrals to other professionals or programs were the outcomes.

The outcomes were considered either targeted (26%) or nontargeted (74%). Outcomes were considered targeted if hypothesized or expected change in prescribing practices was focused and precise (e.g., decreasing the use of the antibiotic tetracycline for treating respiratory infections). Outcomes were considered nontargeted if the hypothesized or expected changes in prescribing practices included both increases and decreases of two or more prescribing behaviors (e.g., increasing prescriptions for beta-blockers and decreasing prescriptions for ace-inhibitors) or included two or more conditions constituting the focus of intervention (e.g., decreasing prescriptions for treating hypertension or depression).

The sources of the outcome data were either the direct observation or measurement of the study participants' prescribing practices (50%) or changes in prescription counts or rates found in databases including the physicians' prescriptions (50%). Direct observation or measurement included, for example, the number of times a physician in a study prescribed or did not prescribe a targeted drug. Indirect outcome measures included, for example, average daily doses of prescriptions from an HMO pharmacy database.

Interventions

Table 4 shows the particular academic-detailing characteristics that were part of the interventions constituting the focus of investigation. The presence of each characteristic was discerned by descriptions included in the research reports and checked by two or more of the authors of this synthesis. Individual studies included an average of 5.60 characteristics (SD = 2.29, Range = 3 to 13). The use of an opinion leader to implement the interventions was used in the fewest studies (11%), and the provision of concise educational materials to the study participants was done in the majority of studies (89%).

The interventions themselves occurred during a single session (45%) or had one or more follow-up contacts (55%). The number of follow-up contacts ranged from as few as one or two (47%) to as many as four or five (5%).

Synthesis Findings

The relationship between both the academic-detailing characteristics (Tables 1 and 4) and the study structural variables (Tables 1) and the study participant prescribing practices (Table 3) was ascertained by calculating effect sizes for either pretest/posttest differences or posttest differences between the experimental/intervention groups and control/comparison groups (Dunst et al., 2004). In the latter studies, information available in the research reports was used to calculate the posttest differences between groups even though the study investigators may have conducted pretest/posttest differences for the experimental and comparison groups separately. In the majority of studies (79%) we were able to compute the posttest difference effect sizes.

Ninety three (93) effect sizes were computed from the findings in the 38 studies. Effect sizes were calculated only on outcomes that were hypothesized or expected to change as a result of the interventions. In all cases, these included the prescribing practices of the study participants. Effect sizes were not computed on study participants' nonprescribing practices (e.g., physician requests for information), patient outcomes (e.g., blood pressure), or for prescriptions that were not the targets of the interventions. In a number of studies, the investigators reported results for individual prescriptions and for all prescriptions combined. The latter were not included in our analyses to reduce confounds associated with duplicative effects.

Table 5 summarizes the expected and observed effects in the 38 studies. The table includes the targets of the study participants prescribing practices, the outcome measures constituting the focus of investigation, the hypothesized or expected increase or decrease in prescriptions, and the effect sizes for the pretest/posttest or posttest group differences. The effect size signs show the direction of effect of the independent variables on the dependent variables (e.g., if there was a hypothesized decrease in prescriptions and this was found, the result is shown as a positive effect sign).

The aggregated findings from our synthesis are shown in Table 6. Because the posttest comparison group studies produced more effect sizes, they are used as the principle findings for interpretative purposes. The academic-detailing characteristics are ordered (for the posttest group difference analyses) from the largest to smallest average size of effect. The confidence intervals (CI) for the effect sizes are also included and provide a basis for ascertaining the relative importance of the academic-detailing characteristics and structural variables. (For interpretative purposes, if the lower bound is at least .25, then the true effect may be considered at least this large.)

Academic Detailing

All of the academic-detailing characteristics, except the use of an opinion leader as an interventionist, have average effect sizes greater than .25 for the pretest/posttest comparisons. Seven characteristics emerged as relatively more important as evidenced by lower bound confidence levels being about .25 or larger. These characteristics are collecting baseline prescribing information, establishing credibility, repeating the intended message, providing positive reinforcement, establishing a motivation to change, having clear intervention objectives, and

using concise educational materials for reinforcing the intended change or desire to change.

A comparison of the average effect sizes from the two different types of analyses (posttest vs. pretest/posttest) shows, with a few exceptions, similar results. Although the magnitude of effect is generally smaller for pretest/posttest studies compared to the posttest group comparison studies. The exception is the single study that yielded an average effect size of .82 for three academic-detailing characteristics, which should be interpreted with caution. The findings taken together indicate that a combination of academic-detailing characteristics are associated with desired changes in prescribing practices.

Exploratory cluster and factor analyses were performed on the use/nonuse of the academic-detailing characteristics (Table 4) to discern if there were unique combinations of practice characteristics. The cluster and factor analyses were done for all 38 studies combined and for the pretest/posttest and the experimental vs. comparison group studies separately. A consistent pattern of findings emerged (regardless of type of analysis or set of data) showing there were four clusters or groupings of practice characteristics:

- *Building rapport and credibility* by establishing physician baseline knowledge, ascertaining the motivation to change prescribing practices, and establishing credibility and delivering a credible message.
- *Fostering change* by establishing specific behavioral objectives, highlighting and repeating the reason(s) why a change in prescribing practices is warranted, actively involving the physicians in the change process, and reinforcing the physicians for changing their practices.
- *Using explanatory materials* by using concise and graphic written materials for describing and explaining the benefits of changing prescribing practices.
- *Maintaining change* by making repeated follow-up visits to answer questions, reinforcing behavior change, and providing additional information.

The reader is referred to Moser, Dorsch, and Kellerman (2004) for a similar categorization of academic-detailing characteristics.

Structural Variables

The structural variables constituting the focus of analysis included three practice-related factors (setting, academic detailer, and type of session) and two outcome-related factors (type and source of outcome data). All three practice-related factors have average effect sizes of .27 or higher for the posttest comparison studies with relatively small differences for the within variable contrasts. These results indicate that *where*, *who*, and *how* academic detailing is done matters less than *what* is done.

In contrast to the findings for the practice-related structural variables, both outcome-related variables were associated with differences in the average effect sizes where the patterns were identical for both types of analyses. Measuring the prescribing practices of the study participants directly produced an average effect size almost twice as large as when the effects of the interventions were discerned using indirect or unobtrusive measures. This was expected because the use of a larger database as a source of outcome data includes prescriptions of physicians who were not participants in the studies.

The findings for the targeted vs. nontargeted outcomes were unexpected inasmuch as one would predict a larger size of effect for prescriptions that were specifically the focus of behavior change. The results suggest that the effects of the interventions were broader based in terms of the observed changes.

Conclusion

Findings from this practice-based research synthesis indicate that most of the academic detailing characteristics constituting the focus of analysis are associated with expected or hypothesized changes in the study participants' prescribing behavior and that a combination of the practice characteristics best represented the key features and components of the practice. Results also show that the practice-related structural variables constituting the focus of analysis were not confounds and that academic detailing is similarly effective regardless of setting, interventionist, or the type of intervention (see Table 6). Moreover, the patterns of findings of the structural variable analyses are nearly the same for the posttest group comparison and pretest/posttest studies. Results from this practice-based research synthesis are similar to those reported elsewhere (e.g., Davis, Thomson, Oxman, & Haynes, 1995; Smith, 2000).

Implications for Practice

The educational outreach practice constituting the focus of this *Cornerstones* was targeted for review and synthesis because it holds promise as a child find strategy for increasing physician referrals of infants and toddlers with disabilities or at risk for developmental delays to early intervention programs. The current landscape of health-care practices makes it very difficult for physicians to take time out of their busy schedules to attend training sessions promoting their understanding of early intervention and the benefits to their patients and themselves. Because of its brief and highly focused emphasis

on communicating a credible message, features of academic detailing would seem especially useful for improving the effectiveness of child find.

Physician outreach is a commonly used strategy for promoting referrals to early intervention (Dunst & Trivette, 2004). The extent to which outreach to physicians is likely to be effective can be strengthened by considering key characteristics of academic detailing as part of planning and implementing child find activities. The use of academic detailing as a child find strategy indicates a need to include a reason (motivation) for making a referral (prescription) to early intervention with an explicit focus (message) on the benefits to a physician and his or her patients. The message needs to be clear, concise, and credible, as well as highly focused. Establishing the credibility of the message and messenger is accomplished by reference to relevant and respected sources (e.g., the American Academy of Pediatrics for pediatricians and the American Academy of Family Physicians for family physicians). The message needs to be communicated orally during visits to physicians' practices, reinforced using concise and graphic written materials (e.g., brochures) left with the physicians, and repeated during regularly scheduled follow-up visits to the physicians offices. To be maximally effective, consistent, relevant, and timely feedback needs to be provided to maintain physician referrals (Smith, 2000).

Findings from this practice-based research synthesis are being used to develop practice guidelines that describe the process and procedures for using academic-detailing characteristics for improving child find. The reader is referred to a nontechnical summary of this synthesis (*Endpoints*, Volume 1, Number 1) for a brief description of the practice guidelines. Interested readers should see especially Cutts and LaCaze (2003) for a description of the principles, benefits, and application of academic detailing.

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Table 1
Characteristics and Variables Coded for Each Study Included in the Synthesis

Characteristic	Description
Academic Detailing [a]	
Baseline Knowledge	Collect baseline information about the physicians' knowledge influencing current practices.
Motivation	Explicit effort made to identify physicians' motives for the practice targeted for change.
Targeted Audience	Intervention targets specific category of physicians.
Entree Method	Use an opinion leader to introduce the targeted prescribing practice.
Opinion Leader	Opinion leader conducts the academic-detailing session(s).
Behavioral Objectives	Clear behavioral objectives are established for changing physician prescribing practices.
Credibility	Establish credibility for targeted practice change with reference to respected and authoritative figures/sources.
Physician Role	Physicians are actively involved in the "change process."
Written Materials	Concise written materials about the targeted practice are used to increase knowledge.
Graphic Materials	Graphic materials include explicit description of practice benefits.
Focused Message	Intervention highlights and repeats a focused message.
Positive Reinforcement	Physicians are reinforced for their responsiveness and willingness to change their prescribing practices.
Follow-Up Visit	Academic detailer makes follow up visit to reinforce message delivered during initial intervention session.
Structural Variables	
Type of Session	One-on-one or a group of physicians in the same practice
Setting	Physician practice (including HMOs, MCOs, clinics) vs. hospital or nursing home
Academic Detailer	Physician, pharmacist, or other
Type of Outcome	Targeted or nontargeted
Source of Outcome	Individual physicians prescribing vs. data in a larger database
Study Variables	
Design	Pretest/posttest or experimental vs. comparison group

[a] Developed based on descriptions in Soumerai and Avorn (1990).

Table 2
Selected Characteristics of Study Participants

Study	Sample		Study Participants	Setting [a]	Gender %		Years in Practice (Mean)	Participant Age (Mean)[d]
	Experimental	Comparison			M	F		
Avorn et al. (1992)	6[b]	6[b]	Physicians	Nursing home	NR[e]		NR	NR
Baran et al. (1996)	22	27	Physicians	Physician practice	NR		NR	NR
Brown et al. (2000)	79	81	Physicians	HMO	76	24	13	44
Cockburn et al. (1992)	80	184	Physicians	Physician practice	84	16	19	47
Cohn et al. (2002)	34	22	Physicians	Physician practice	24	76	NR	NR
Denton et al. (2001)	21	23	Physicians Nurse Practitioners Physicians Assis-tants	Hospital clinic	NR		NR	NR
De Santis et al. (1994)	62	41	Physicians	Physician practice	NR		NR	NR
Everett et al. (1983)	13	11	Residents	Hospital	NR		NR	NR
Fender et al. (1999)	191[c]	157[c]	Physicians	Physician practice	70	30	NR	NR
Finkelstein et al. (2001)	86	71	Physicians Nurse Practitioners	MCO	NR		NR	NR
Freemantle et al. (2002)	81[c]	81[c]	Physicians	Physician practice	NR		NR	NR
Goldberg et al. (1998)	55	23	Physicians	Physician practice	56	44	40	NR
Hansen et al. (1999)	46	97	Physicians	Physician practice	63	37	NR	50
Ilett et al. (2000)	56	56	Physicians	Physician practice	NR		NR	NR
Landgren et al. (1988)	6[b]	6[b]	Physicians	Hospital	NR		NR	NR
Lin et al. (1997)	22	-	Physicians	Clinic	NR		NR	NR
Lin et al. (2001)	56	53	Physicians	Clinic	79	21	NR	NR
May et al. (1999)	210	-	Physicians	Physician practice	77	23	NR	NR
McConnell et al. (1982)	17	16	Physicians	Physician practice	NR		NR	NR
Newton-Syms et al. (1992)	155	223	Physicians	Physician practice	NR		NR	NR
Nilsson et al. (2001)	40	80	Physicians	Clinic	NR		NR	NR
Ofman et al. (2003)	35	48	Physicians	MCO	NR		NR	NR
Peterson & Sugden (1995)	125	-	Physicians	Physician practice	NR		NR	NR
Peterson et al. (1996)	177	-	Physicians	Physician practice	NR		NR	NR

Table 2, continued

Study	Sample		Study Participants	Setting [a]	Gender %		Years in Practice (Mean)	Participant Age (Mean)[d]
	Experimental	Comparison			M	F		
Peterson et al. (1997)	169	-	Physicians	Physician practice	NR		NR	NR
Raisch et al. (1990)	16	8	Physicians	HMO	NR		NR	NR
Ray et al. (1986)	43	142	Physicians	Physician practice	NR		NR	NR
Ray et al. (1987)	45	136	Physicians	Nursing home	NR		NR	NR
Reeve et al. (1999)	16	-	Physicians	Physician practice	NR		NR	NR
Schaffner (1983)	275	248	Physicians	Physician practice	NR		NR	NR
Schroy et al. (1999)	53	23	Physicians	Clinic	48	52	NR	38[d]
Solomon et al. (2001)	36[c]	32[c]	Physicians Interns Residents	Hospital	NR		NR	NR
Soumerai & Avorn (1987) Avorn & Soumerai (1983)	141	294	Physicians	Hospital	NR		NR	NR
Soumerai et al. (1993)	23	17	Physicians	Physician practice	NR		NR	51
Stevens et al. (1997)	59	91	Physicians	Physician practice	42	58	NR	NR
Turner et al. (2000)	63	48	Physicians	Physician practice	NR		NR	NR
Watson et al. (2001)	35	72	Physicians	Physician practice	NR		NR	NR
Young et al. (2002)	30	30	Physicians	Physician practice	57	43	18	47[d]

[a]Type of setting: HMO = health maintenance organization, MCO = managed care organization, Practice = private or group practice, Clinic = health-care center or county clinic.

[b]Individual number of physicians receiving academic detailing intervention is not reported. Numbers are for hospitals.

[c]Number of participants in the experimental and control groups is not reported. Numbers are estimates of individual participants.

[d]Median age of participant reported.

[e]NR = Not reported.

Table 3
Research Designs and Outcome Measures Used in the Studies

Study	Research Design	Type of Data Analysis	Interventionist	Physician Practices	
				Outcome Measure	Targeted Physician Behavior
Avorn et al. (1992)	Randomized controlled trial	Pre Post	Pharmacist	Drugs prescribed	Prescribing psychoactive drugs
Baran et al. (1996)	Prospective blinded	Pre Post	Pharmacist	Drugs prescribed Counseling provided	Prescribing drugs Patient care relating to lipid-lowering therapy
Brown et al. (2000)	Randomized controlled trial	Post only	Pharmacist	Patients receiving treatment	Diagnosing, prescribing, and follow-up care for patients with depression
Cockburn et al. (1992)	Randomized controlled trial	Post only	Not specified	Number of physicians reporting use of intervention kit	Use of smoking cessation intervention kit
Cohn et al. (2002)	Controlled trial	Pre Post	Physician	Patients screened	Screening of patients for DES history
Denton et al. (2001)	Randomized controlled trial	Pre Post	Physician Resident	Overall patient care for hypertension	Prescribing for hypertension
De Santis et al. (1994)	Randomized controlled trial	Pre Post	Pharmacist	Drugs prescribed	Prescribing antibiotics
Everett et al. (1983)	Randomized controlled trial	Post only	Physician	Number of laboratory tests ordered	Ordering of three types of blood tests
Fender et al. (1999)	Randomized controlled trial	Post only	Not specified	Drugs prescribed Referrals to care	Prescribing for menstrual pain Referral to surgery
Finkelstein et al. (2001)	Randomized controlled trial	Pre Post	Physician Not specified	Drugs prescribed	Prescribing of antibiotics
Freemantle et al. (2002)	Randomized controlled trial	Pre Post	Pharmacist	Drugs prescribed	Prescribing of three drugs for three medical conditions
Goldberg et al. (1998)	Randomized controlled trial	Pre Post	Pharmacist Physician	Non-preferred vs. preferred drugs prescribed	Prescribing for hypertension Prescribing for depression
Hansen et al. (1999)	Randomized controlled trial	Post only	Physician	Number of physician requests for intervention kit; number using kit	Screening of patients for alcohol use/abuse
Ilett et al. (2000)	Randomized controlled trial	Pre Post	Not specified	Drugs prescribed	Prescribing antibiotics
Landgren et al. (1988)	Controlled cross-over	Pre Post	Pharmacist Not specified	Drugs prescribed Duration of treatment Timing of treatment	Prescribing antibiotics as prophylaxis in surgery
Lin et al. (1997)	Controlled trial	Pre Post	Physician	Prescribed drugs Adequacy of medication	Prescribing antidepressants Patient care
Lin et al. (2001)	Randomized controlled trial	Pre Post	Physician	New diagnoses of depression New prescriptions and duration	Diagnosis of depression Prescribing for depression
May et al. (1999)	Controlled trial	Pre Post	Pharmacist	Hospital admissions for GI disorders	Prescribing of non-steroidal anti-inflammatory drugs
McConnell et al. (1982)	Randomized controlled trial	Pre Post	Physician	Drugs prescribed	Prescribing antibiotic tetracycline for respiratory infections

Table 3, continued

Study	Research Design	Type of Data Analysis	Interventionist	Physician Practices	
				Outcome Measure	Targeted Physician Behavior
Newton-Syms et al. (1992)	Randomized controlled trial	Pre Post	Pharmacist Physician	Drugs prescribed	Prescribing non-steroidal anti-inflammatory drugs
Nilsson et al. (2001)	Randomized controlled trial	Pre Post	Pharmacist Physician Not specified	Drugs prescribed Patient therapy ordered	Prescribing for three medical conditions
Ofman et al. (2003)	Randomized controlled trial	Pre Post	Pharmacist	Ordered diagnostic test Prescribed drugs Referrals for endoscopy	Compliance with patient care measures for acid-peptic disease
Peterson & Sugden (1995)	Controlled trial	Pre Post	Pharmacist Physician	Drugs prescribed according to recommended dosage	Prescribing allopurinol
Peterson et al. (1996)	Controlled trial	Pre Post	Pharmacist	Drugs prescribed	Prescribing of non-steroidal anti-inflammatory drugs and paracetamol
Peterson et al. (1997)	Controlled trial	Pre Post	Pharmacist	Drugs prescribed	Prescribing of antibiotics for urinary tract infection
Raisch et al. (1990)	Randomized controlled trial	Pre Post	Pharmacist	Indication for prescription Duration of prescription Dosage prescribed	Prescribing of three anti-ulcer drugs
Ray et al. (1986)	Controlled trial	Pre Post	Physician	Number of patients prescribed drugs	Prescribing of diazepam
Ray et al. (1987)	Controlled trial	Pre Post	Physician	Number of patients prescribed drugs	Prescribing of antipsychotic drugs
Reeve et al. (1999)	One group pretest/posttest	Pre Post	Physician	Drugs prescribed	Prescribing of psychoactive drugs, non-steroidal anti-inflammatory drugs, procholorperazines
Schaffner (1983)	Controlled trial	Pre Post	Pharmacist Physician	Drugs prescribed	Prescribing of antimicrobials
Schroy et al. (1999)	Controlled trial	Pre Post	Not specified	Patients screened for cancer	Screening for colorectal cancer using sigmoidoscopy
Solomon et al. (2001)	Randomized controlled trial	Pre Post	Pharmacist Physician	Number of days of unnecessary antibiotics prescribed	Prescribing of antibiotics
Soumerai & Avorn(1987) Avorn & Soumerai (1983)	Randomized ontrolled trial	Pre Post	Pharmacist	Drugs prescribed	Prescribing drugs for three medical conditions
Soumerai et al. (1993)	Randomized controlled trial	Pre Post	Physician	Number of transfusions ordered	Ordering of blood transfusions
Stevens et al. (1997)	Controlled trial	Pre Post	Physician	Number of women screened for cervical cancer	Screening patients for cervical cancer
Turner et al. (2000)	Randomized ontrolled trial	Post Only	Pharmacist	Number of patients prescribed drugs	Prescribing of ACE-inhibitor drugs
Watson et al. (2001)	Randomized controlled trial	Pre Post	Pharmacist	Daily doses prescribed per 1000 of targeted drugs	Prescribing of non-steroidal anti-inflammatory drugs
Young et al. (2002)	Cluster randomized trial	Pre Post	Physician Not specified	Number of patients screened Smoking cessation intervention	Screening patients for smoking Providing smoking cessation intervention

Table 4
Characteristics of Academic Detailing Constituting the Focus of Intervention

Study	Baseline Knowledge	Baseline Motivation	Target Physician	Opinion Leader Opens Door	Opinion Leader Detailer	Clear Objectives Defined	Established Credibility	Active Education Sessions	Concise Education Materials	Graphic Educational Materials	Repeats Message	Positive Reinforcement	Follow-up Contact
Avorn et al. (1992)		X	X	X			X		X	X			X
Baran et al. (1996)			X						X	X			
Brown et al. (2000)		X				X	X	X	X	X	X		
Cockburn et al. (1992)				X		X		X	X	X	X	X	X
Cohn et al. (2002)							X		X	X			
Denton et al. (2001)		X			X	X	X	X	X	X			
DeSantis et al. (1994)	X			X			X		X		X		
Everett et al. (1983)			X			X		X	X	X	X		X
Fender et al. (1999)						X	X	X	X	X		X	X
Finkelstein et al. (2001)					X		X				X		X
Freemantle et al. (2002)						X	X		X				
Goldberg et al. (1996)			X		X				X	X			X
Hansen et al. (1999)		X					X		X				
Ilett et al. (2000)							X		X	X			
Landgren et al. (1988)			X			X	X		X	X	X		
Lin et al. (1997)				X		X		X		X			X
Lin et al. (2001)								X	X		X		X
May et al. (1999)						X	X	X	X		X		X
McConnell et al. (1982)			X			X	X		X				
Newton-Syms et al.(1992)						X			X	X			
Nilsson et al. (2001)						X		X	X	X	X		X
Offman et al. (2003)				X			X		X		X		X
Peterson & Sugden (1995)							X		X	X	X		
Peterson et al. (1996)						X	X		X		X		
Peterson et al. (1997)						X	X		X				
Raisch et al. (1990)		X				X	X	X	X	X	X		
Ray et al. (1986)			X			X	X		X	X	X	X	X
Ray et al. (1987)			X			X			X	X			X
Reeve et al. (1999)	X					X	X	X	X	X	X	X	X
Schaffner (1983)			X			X			X				X
Schroy et al. (1999)	X	X	X			X	X	X			X		X
Solomon et al. (2001)			X			X	X		X	X			
Soumerai & Avorn (1987) Avorn & Soumerai (1983)	X		X				X	X	X	X	X	X	X
Soumerai et al. (1993)	X	X	X	X	X	X	X	X	X	X	X	X	X
Stevens et al. (1997)						X	X	X	X	X			
Turner et al. (2000)				X		X	X						X
Watson et al. (2001)	X	X					X		X				X
Young et al. (2002)	X	X				X	X	X	X	X	X	X	X
TOTAL	7	9	13	7	4	25	28	16	34	24	19	7	21

Table 5
Outcome Measures and Major Findings of the Studies

	Outcomes		Results		
Study	Target	Outcome Measures	Expected Experimental Effects	Effect Size	Effect Size Contrast
Avorn et al. (1992)	Prescriptions	Antipsychotic	Decrease	.02	Post
		Antidepressant (not acceptable)	Decrease	.17	
		Non-benzodiazepine (not acceptable)	Decrease	.47	
		Benzodiazepine (not acceptable)	Decrease	.07	
Baran et al. (1996)	Prescriptions	Lipid lowering drugs (overall prescribing rate)	Decrease	.57	Post
Brown et al. (2000)	Prescriptions	Medication for treatment of depression (average daily dose)	Increase	.02	Post
Cockburn et al. (1992)	Use of kit	Smoking cessation	Increase	.48	Post
Cohn et al. (2002)	Screening	Screening for (DES) cancer risk (double intervention)	Increase	.56	Post
		Screening for (DES) cancer risk (single intervention)	Increase	1.09	
Denton et al. (2001)	Prescriptions	Patient care following hypertension guidelines	Increase	.38	Post
De Santis et al. (1994)	Prescriptions	Narrow spectrum antibiotics	Increase	.57	Post
Everett et al. (1983)	Tests ordered	SMA-12[a] tests ordered	Decrease	.31	Post
		SMA-6[b] tests ordered	Decrease	.15	
		CBC[c] tests ordered	Decrease	.22	
Fender et al. (1999)	Referrals	Secondary care	Decrease	.26	Post
	Prescriptions	Tranexamic drug	Increase	.49	
Finkelstein et al. (2001)	Prescriptions	Antibiotics at age 36 months	Decrease	.82	Post
		Antibiotics at age 72 months	Decrease	.71	
Freemantle et al. (2002)	Prescriptions	Use of guidelines to treat patients with aspirin as anti-platelet (heart disease)	Increase	.41	Pre/Post
		Use of guidelines to treat patients with NSAIDs for pain management	Increase	-.17	
	Patient care	Overall - patient treated according to guidelines	Increase	.12	
		Patient treated according to guidelines (small practices)	Increase	.30	
		Patient treated according to guidelines (large practices)	Increase	.03	
Goldberg et al. (1998)	Prescriptions	Patient care for heart failure:			Post
		K-sparing	Increase	-.05	
		Beta-blockers	Increase	.02	
		CC-blockers	Decrease	.02	
		ACE-inhibitors	Decrease	-.05	
		Psychoactive drugs:			
		Antidepressants	Increase	-.04	
		Tricyclics 1st generation	Decrease	.09	
		Tricyclics 2nd generation	Increase	.04	
		Serotonin reuptake inhibitors (SSRI)	Increase	.02	
Hansen et al. (1999)	Screening	Patient intervention for alcohol use:			Post
		Physicians requests excessive alcohol use screening kit: Academic detailing vs. mail/phone intervention	Increase	.37	
		Physicians uses $\geq$1 AUDIT kit: Academic detailing vs. mail/phone intervention	Increase	.52	
Ilett et al. (2000)	Prescriptions	Antibiotics:			Pre/Post
		Amoxycillin all	Increase	.15	
		Doxycycline 100 mg	Increase	.55	
		Cefaclor 375 mg	Decrease	.28	
		Roxithromycin 150 & 300 mg	Decrease	.26	
Landgren et al. (1988)	Prescriptions	Appropriate timing of antibiotics	Increase	.76	Post
		Appropriate duration of antibiotic	Increase	1.12	

Table 5, continued

	Outcomes		Results		
Study	Target	Outcome Measured	Expected Experimental Effects	Effect Size	Effect Size Contrast
Lin et al. (1997)	Prescriptions	Antidepressants:			Post
		Amitriptyline	Decrease	-.05	
		Imipramine	Increase	.13	
		Adequate antidepressant drug intervention:			
		Adequate antidepressants - all	Increase	.02	
Lin et al. (2001)	Diagnosis	New depression diagnoses	Increase	.07	Post
	Prescriptions	New antidepressant drug prescriptions	Increase	.04	
May et al. (1999)	Admissions	Hospital admissions for GI disorders	Decrease		Post
McConnell et al. (1982)	Prescriptions	Tetracycline drug (antibiotic)	Decrease	.56	Post
Newton-Syms et al.	Prescriptions	Ibuprofen drug (pain management)	Increase	.48	Post
Nilsson et al. (2001)	Prescriptions	Patient care for heart failure:			Post
		Diuretics	Increase	-.26	
		Beta-blockers	Increase	-.08	
		Calcium blockers	Decrease	-.33	
		Renin-angiotensin drugs	Decrease	-.09	
		Drugs for ulcer treatment:			
		Proton-pump therapy	Increase	1.25	
		H2-receptor therapy	Increase	1.14	
		Psychoactive drug therapy			
		Antidepressant tricyclic	Increase	-.21	
		Antidepressants serotonin inhibitors	Increase	.26	
Ofman et al. (2003)	Diagnostic tests ordered	Heliocobacter testing for ulcer diagnosis	Increase	1.51	Post
Peterson & Sugden (1995)	Prescriptions	Drugs for gout and kidney stones treatment			Post
		Allopurinol within dosage recommended (statewide)	Increase	.19	
		Allopurinol within dosage recommended (regions)	Increase	.26	
Peterson et al. (1996)	Prescriptions	NSAID drugs (statewide)	Decrease	.08	Post
		NSAID drugs (regions)	Decrease	.07	
Peterson et al. (1997)	Prescriptions	Recommended antibiotics (statewide)	Increase	.06	Post
		Recommended antibiotics (regions)	Increase	-.05	
Raisch et al. (1990)	Prescriptions	Prescribing drugs for ulcer treatment:			Post
		Inappropriate dosage	Decrease	.68	
		Inappropriate indication	Decrease	.58	
		Inappropriate duration	Decrease	.30	
Ray et al. (1986)	Prescriptions	Number of new patients using diazepam	Decrease	.06	Pre/Post
		Number of patients with long term diazepam use	Decrease	.07	
		Total number of patients with antipsychotics	Decrease	-.01	
Ray et al. (1987)	Prescriptions	Antipsychotic	Decrease	-.07	Pre/Post
		Chronic use of antipsychotic	Decrease	-.07	
		Total new doses of anti-psychotic	Decrease	-.17	
Reeve et al. (1999)	Prescriptions	Community group:			Pre/Post
		Psychoactive 1 drugs	Decrease	.05	
		Prochlorperazine drugs	Decrease	.06	
		NSAIDS drugs	Decrease	.08	
		Nursing home group:			
		Psychoactive 1 drugs	Decrease	.32	
		Prochlorperazine drugs	Decrease	.29	
		NSAIDs drugs	Decrease	.35	

Table 5, continued

Study	Outcomes: Target	Outcomes: Outcome Measured	Results: Expected Experimental Effects	Results: Effect Size	Results: Effect Size Contrast
Schaffner (1983)	Prescriptions	Pharmacists detailers:			Pre/Post
		Contraindicated antibiotics	Decrease	.33	
		Oral cephalosporins	Decrease	.02	
		Physician detailer:			
		Contraindicated antibiotics	Decrease	.76	
		Oral cephalosporins	Decrease	.16	
Schroy et al. (1999)	Screening	Compliance with guidelines for sigmoidoscopy cancer screening	Increase	.81	Post
Solomon et al. (2001)	Prescriptions	Average number of days of unnecessary antibiotics	Decrease	1.53	Post
Soumerai & Avorn (1987), Avorn & Soumerai (1983)	Prescriptions	Antibiotic (cephalexin), Vasodialators, and pain management drug propoxyphene (darvon) (prescribing of total units for all)	Decrease	.09	Pre/Post
Soumerai et al. (1993)	Transfusions	Transfusions ordered compliant with guidelines	Increase	.72	Pre/Post
		Transfusions ordered non-compliant with guidelines	Decrease	.92	
Stevens et al. (1997)	Screening	Women screened for cervical cancer	Increase	-.05	Post
Turner et al. (2000)	Prescriptions	ACE inhibitors per guidelines for heart failure	Increase	.14	Post
Watson et al. (2001)	Prescriptions	Pain management:			Post
		Use of 3 recommended NSAIDs	Increase	.47	
		Ibuprofen (percent total daily dose)	Increase	.12	
		Azopropazone	Decrease	1.12	
Young et al. (2002)	Intervention	Smoking patients' medical records document advice given	Increase	.45	Post
		Patients medical records indicate physician documented smoking status	Increase	.39	

[a] SMA-12 = Sequential Multiple Analysis lab test panel for 12 measures used to screen patients.
[b] SMA-6 = Sequential Multiple Analysis lab test panel for 6 measures used to monitor patients.
[c] CBC = Complete blood count test.

Table 6
Average Effect Sizes for the Academic-Detailing Characteristics and Structural Variables Constituting the Focus of Analysis

Practice Characteristics	Type of Analysis: Posttest Comparisons — Number of Studies	Posttest Comparisons — Effect Sizes: N[a]	Mean	CI (90%)[b]	Pretest/Posttest Differences — Number of Studies	Effect Sizes: N	Mean	CI (90%)
Academic Detailing								
Collected baseline knowledge	4	7	.56	.32, .79	3	9	.32	.13, .51
Establishes message credibility	21	36	.52	.40, .63	6	21	.24	.14, .33
Repeats message	15	32	.42	.28, .56	4	12	.25	.10, .40
Positive reinforcement	3	5	.41	.32, .51	4	12	.25	.10, .41
Baseline motivation	8	17	.41	.28, .53	1	2	.82	.19, 1.45
Clear behavioral objectives	19	37	.35	.23, .48	6	23	.20	.09, .30
Concise educational materials	26	59	.34	.25, .44	8	28	.21	.12, .30
Opinion leader passive support	6	11	.32	.08, .56	1	2	.82	.19, 1.45
Targets physicians for education	8	22	.31	.16, .47	5	13	.22	.04, .39
Graphic educational materials	18	47	.29	.19, .40	6	19	.21	.10, .32
Physicians active in education	13	29	.29	.16, .42	3	9	.32	.13, .51
Follow-up contact	15	43	.28	.17, .39	6	19	.21	.09, .33
Opinion leader active support	3	12	.17	.01, .33	1	2	.82	.19, 1.45
Structural Variables								
Setting:								
Physician Practice (private practice, HMO, MCO, clinic)	25	55	.32	.23, .41	6	23	.20	.12, .27
Hospital or nursing home	5	11	.47	.21, .73	2	5	.27	-.22, .75
Academic Detailer:								.
Physician	15	40	.27	.16, .39	5	18	.21	.09, .34
Pharmacist	17	43	.33	.21, .45	3	10	.20	.05, .35
Other	6	16	.40	.18, .63	1	4	.31	.11, .51
Type of Session:								
One-on-one	24	49	.36	.26, .47	7	23	.23	.12, .33
Small group within a setting	6	17	.30	.13, .46	1	5	.14	-.08, .36
Type of Outcome Measure:								
Targeted	22	54	.32	.22, .41	6	22	.14	.07, .21
Non-targeted	8	12	.49	.27, .70	2	6	.48	.18, .79
Source of Outcome Data:								
Individual prescribing data	14	25	.46	.35, .57	4	10	.27	.04, .50
Data in larger data base	16	41	.28	.15, .40	4	18	.18	.10, .25

[a]N = Number of effect sizes.
[b]CI = Confidence interval.