# A Survey of Prescriber Perceptions and Practice of IV-PO Stepdown Anti-Infective Therapy

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## ABSTRACT

*To characterize prescriber perceptions of parenteral to oral (IV-PO) stepdown concepts and an existing IV-PO stepdown program as well as to characterize the prescriber's knowledge of cefixime, 35 physicians from a large, tertiary care, teaching hospital were surveyed using a pretested questionnaire. Participants were surveyed regarding their general perceptions of IV-PO stepdown, the existing IV-PO Stepdown Program and specific knowledge about cefixime.*

*All respondents claimed to prescribe IV-PO stepdown therapy. Physicians appeared to recognize the benefits of this practice. Our existing efforts to promote stepdown to oral therapy appeared to be well recognized and respondents felt that the efforts are effective. Considerable variation in selection of stepdown agents were identified. Knowledge of the role and appropriate utilization of cefixime was poor and may have been due to the recent introduction of this agent on the formulary. Some differences in terms of knowledge base and attitudes to IV-PO stepdown between physician groups were identified. Our IV-PO stepdown program appears to be a recognized approach to cost containment.*


**Key words:** *anti-infective, cefixime, IV-PO Stepdown, survey*


## RÉSUMÉ

*Afin de caractériser les perceptions des prescripteurs relativement aux concepts et aux programmes existants de traitement séquentiel de la voie parentérale à la voie orale (I.V. - P.O.), et également afin de caractériser les connaissances des prescripteurs sur le céfixime, 35 médecins d'un grand hôpital universitaire de soins tertiaires ont fait l'objet d'un sondage par questionnaire prétesté. Les participants ont été questionnés sur leurs perceptions générales des concepts et des programmes existants de traitement séquentiel I.V. - P.O., et aussi relativement à leurs connaissances spécifiques du céfixime.*

*Tous les répondants ont affirmé prescrire des traitements séquentiels I.V. - P.O. Les médecins semblaient reconnaître les avantages de cette pratique. Il semble que nos efforts de promotion du traitement séquentiel I.V. - P.O. ont été bien reçus et les répondants ont trouvé que les efforts avaient porté fruit. Des différences considérables dans le choix des agents pour le traitement séquentiel ont été identifiées. Les répondants avaient une mauvaise connaissance du rôle et de l'usage approprié du céfixime, ce qui était probablement attribuable à l'inscription récente de ce médicament au formulaire. Certaines différences en termes de base de connaissances et d'attitudes sur le traitement séquentiel I.V. - P.O. entre les groupes de médecins ont été identifiées. Notre approche relativement au traitement séquentiel I.V. - P.O. semble être une approche reconnue pour la réduction des coûts.*


**Mots clés :** antiinfectieux, céfixime, sondage, traitement séquentiel I.V. - P.O.

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## INTRODUCTION

Antimicrobial costs continue to represent the single largest drug class expenditure in many hospitals.[1] At this 1000-bed, tertiary, referral centre, anti-infective expenditures for the 1993 fiscal year exceeded $3.3 million or 31% of the total drug budget. To control costs, we have implemented several strategies over the past nine years including the use of anti-infective cost comparison cards.[1-6] These reference cards permit assessment of comparative anti-infective costs (including acquisition, preparation, and delivery costs) associated with oral and parenteral regimens. Another strategy is the Intravenous-to-Oral (IV-PO) stepdown program implemented in 1987, in which oral formulations of various drugs are promoted for select patients capable of tolerating the oral route of administration.[2-5] Stepdown notices are placed on the front of the health records of patients receiving target parenteral anti-infectives and

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pharmacists also routinely promote conversion to the oral route. This streamlining of anti-infective therapy has also been advocated by others.[7]

Since 1987, the following anti-infective drugs have been added to the program: acyclovir, metronidazole, clindamycin, fluconazole, ciprofloxacin, and cefuroxime.[1-5] Most recently, we have included cefixime (Suprax®, Lederle), the first oral third-generation cephalosporin marketed in Canada. Cefixime possesses an antimicrobial spectrum of activity similar to that of ceftriaxone (Rocephin®, Roche) and this drug is being promoted as a potential stepdown agent for ceftriaxone.

Previous research at our centre has demonstrated that the IV-PO stepdown program has achieved a cumulative cost-avoidance to date of over $429,600. Approximately 22% to 66% of all intravenous anti-infective courses result in stepdown to oral therapy with the same anti-infective.[1-3]

At the time of this study, the role of cefixime in stepdown therapy was unknown. We have observed in previous studies that IV-PO stepdown does not necessarily occur in all eligible treatment courses.[1,5] In this hospital, prescriber feedback about the concept of stepdown and the perceived benefits of the program have largely been limited to anecdotal information. To gain some insight into these issues, we conducted a survey of prescribers at this hospital to determine physicians' awareness of the program, to identify perceptions regarding our IV-PO stepdown promotional efforts, and to determine current stepdown practices and specific knowledge of cefixime use in IV-PO stepdown.

## METHODS

Cefixime was introduced to the drug formulary at this hospital in November 1993 as an oral alternative to ceftriaxone. A newsletter describing cefixime was distributed to all prescribers at this time. A survey of prescriber perceptions and practice regarding general aspects of IV-PO stepdown therapy was subsequently conducted over a five-month period commencing in January 1994.

Prescribers were considered eligible to participate in the survey if they were on staff during the period of the study and involved with either a medical or surgical service. Staff physicians, medical residents, and interns practising in medical or surgical patient care areas at the time of the survey were considered eligible.

At arbitrarily selected times during weekdays, one of the investigators (DE) made visits to medical and surgical patient care areas to solicit prescriber participation. An attempt was made to vary the order of nursing units visited to solicit respondents from a variety of medical and surgical services. Prescribers who were present on the unit at the time of these visits were approached to determine willingness to participate. A complimentary copy of Sanford's Guide to Antimicrobial Therapy 1993 was offered as an incentive.

If the physician was willing to participate, the survey was administered as a 10-15 minute oral interview. The interviewer completed the survey forms based upon prescriber response. If prescribers were willing but unable to participate at the time of the visit, an appointment was made to meet at a future time to complete the survey. All participants were informed that their identity would be kept confidential.

A standardized survey was constructed and after being pretested by select pharmacy staff was used for all interviews (Appendix A). Survey questions were designed to focus on three main topics: awareness of IV-PO stepdown promotional activities; general IV-PO stepdown perceptions and practices; and cefixime-specific views and knowledge level. Subsequent to completion of each survey, the investigator used the interview process as an opportunity to address issues raised by the prescriber and to provide drug-specific information regarding cefixime and other agents.

To assist in the analysis of the survey responses, prescriber demographic information was also obtained. Since the promotion of IV-PO stepdown is a relatively new phenomenon, we decided to stratify responses into two groups according to date of medical school graduation to determine whether perceptions and practice were related to experience. A median split procedure was used for this purpose. Subgroup analysis was also performed according to prescriber status (intern, resident, and staff physician). Data analysis was undertaken using a computerized relational database (dBase IV®) and statistical package program (SPSS for Windows®). Non-parametric data were analyzed by Chi square test (two-tailed) while ANOVA was used to analyze parametric data (using Bonferonni posthoc comparison analysis). For statistical purposes, $p$ values of less than 0.05 were considered to be significant.

## RESULTS

During the five-month study period, 40 physicians were contacted to determine their willingness to participate in the survey. Of these, 35 (88%) agreed to participate and completed the survey. The remaining physicians chose not to participate either due to apparent concerns regarding the intent of the survey or time constraints. The results of the survey are summarized in Tables I-III. Data are presented for all respondents as well as stratified according to graduation from medical school.

### Respondent Demographics

The median year of graduation from medical school was 1991 (range 1966-1995) and the median interval between the survey and graduation from medical school

for all respondents was three years (range 0-28 years) (Table I). Survey results were subsequently stratified into Group 1 respondents (n = 13, graduated earlier than 1991) or Group 2 respondents (n = 22, graduated in 1991 or later) according to the median year of graduation. Eight respondents (23% of total) graduated during 1991 resulting in an unequal distribution of participants between groups.

**Table I: Respondent Demographics**

| Parameter | All respondents (n=35) | Group 1 (n=13) | Group 2 (n=22) | p value[1] |
|---|---|---|---|---|
| **Prescriber service** (% by Group) | | | | 0.09 |
| General medicine[2] | 10 (29) | 4 (31) | 6 (27) | |
| Surgery[3] | 9 (26) | 3 (23) | 6 (27) | |
| Respirology | 5 (14) | 1 (8) | 4 (18) | |
| Hematology | 4 (11) | 4 (31) | 0 (0) | |
| Infectious diseases | 4 (11) | 1 (8) | 3 (14) | |
| All others[4] | 3 (9) | 0 (0) | 3 (14) | |
| **Prescriber status** (% by Group) | | | | 0.0004 |
| Staff physician | 6 (17) | 6 (46) | 0 (0) | |
| Medical resident | 20 (57) | 7 (54) | 13 (59) | |
| Medical student intern (MSI) | 9 (26) | 0 (0) | 9 (41) | |
| # of previous 12 months at hospital, mean (range) | 7 (1-12) | 9.5 (4-12) | 5.5 (1-12) | 0.002 |

1 comparison of Group 1 versus Group 2 responses employing a 2-tailed Chi square test
2 includes family practice (1)
3 includes general (3), orthopedic (2), thoracic (2), urology (1), otorhinolaryngology (1)
4 includes intensive care (1), oncology (1), spinal cord injury unit (1).

Eight prescriber services participated in the survey (Table I). There was no difference in service distribution between the two groups (p = 0.09) although there were no respondents from the hematology service in Group 2.

Medical residents were the most common type of respondent followed by interns and attending physicians. There were no medical student interns in Group 1 and no staff physicians in Group 2.

Respondents claimed to have worked at this hospital for an average of seven of the preceding 12 months. Group 1 respondents tended to have been in practice at this site longer than Group 2 respondents (ANOVA, p=0.002). Medical student interns reported to have been in practice for a shorter time (ANOVA, mean four months (range 1-12)) than medical residents (ANOVA, mean seven months (range 3-12)) and staff physicians (ANOVA, mean 12 months (range 12-12) (p = 0.0001).

**Table II: General IV-PO Stepdown Responses**

| Parameter | All respondents (n=35) | Group 1 (n=13) | Group 2 (n=22) | p value[1] |
|---|---|---|---|---|
| **IV-PO stepdown program awareness (%)** | | | | |
| Aware of IV-PO stepdown program | 22 (63) | 8 (62) | 14 (64) | 0.90 |
| Recognize IV-PO stepdown notice | 31 (89) | 13 (100) | 18 (82) | 0.10 |
| Feel IV-PO stepdown notices are effective | 32 (91) | 12 (92) | 20 (91) | 0.89 |
| Aware of antibiotic cost containment card | 23 (66) | 8 (62) | 15 (68) | 0.69 |
| **Perceptions and practice of IV-PO stepdown therapy** | | | | |
| **Perceived benefits of stepdown therapy (%)[2]** | | | | 0.92 |
| Early patient discharge | 28 (80) | 11 (85) | 17 (77) | |
| Decreased cost | 28 (80) | 10 (77) | 18 (82) | |
| Decreased risk of line sepsis | 14 (40) | 4 (31) | 10 (45) | |
| Patient will be more comfortable | 13 (37) | 5 (38) | 8 (36) | |
| **Factors affecting decision-making for stepdown (%)** | | | | 0.60 |
| Patient clinically improved | 25 (71) | 8 (62) | 17 (77) | |
| Patient tolerant of oral medications | 21 (60) | 8 (62) | 13 (59) | |
| Patient clinically stable | 15 (43) | 6 (46) | 9 (45) | |
| Can achieve high serum levels with oral therapy | 9 (26) | 5 (38) | 4 (18) | |
| Patient afebrile for 48 hours | 6 (17) | 1 (8) | 5 (23) | |
| **Staging of IV-PO stepdown therapy (%)** | | | | |
| Have prescribed stepdown therapy previously | 35 (100) | 13 (100) | 22 (100) | 1.00 |
| Would stepdown to oral therapy on or before day four (assuming patient is a stepdown candidate) | 27 (77) | 9 (69) | 18 (82) | 0.58 |

1 comparison of Group 1 versus Group 2 responses employing a 2-tailed Chi-square test
2 These responses represent the four most commonly identified perceived benefits of IV-PO stepdown in descending order for all respondents. Data reflects incidence of specific responses amongst all respondents.

## IV-PO Stepdown Program Awareness

The majority of respondents were aware of our promotional efforts and there was a general consensus that the IV-PO stepdown notices were an effective method of reminding prescribers of the availability of suitable oral alternatives to parenteral anti-infectives (Table II). No apparent differences between Groups 1 and 2 were observed. When stratified as to physician status, 56% of medical student interns were able

to recognize IV-PO stepdown notices as compared to 100% of residents and attending staff (p=0.001).

## Perception and Practice of IV-PO Stepdown

The four most commonly identified perceived benefits of IV-PO stepdown therapy are listed in Table II. Other less commonly identified benefits included decreased nursing time required to give oral medications, increased patient mobility and decreased amount of fluid received by patient. There were no differences in responses between groups.

Respondents most commonly identified clinical improvement, oral tolerance, and patient stability as the factors which would affect IV-PO stepdown decision-making (Table II). The ability to achieve adequate serum drug concentrations with the oral route and defervescence were also identified, but by a lower proportion of respondents. No difference between groups was apparent; however, Group 1 respondents appeared to be more aware of the potential problems with oral bioavailability of stepdown alternatives.

All respondents claimed to have prescribed IV-PO stepdown anti-infective therapy at least once in their practice (Table II). When questioned regarding the willingness to initiate IV-PO stepdown prior to or on the fourth day of parenteral anti-infective therapy, the majority of respondents claimed that they would be willing to undertake this manoeuvre. No difference between groups was noted.

When questioned regarding empiric stepdown agents of choice for eight selected antibiotics (Appendix A) responses varied according to drug; however, no overall differences between groups was apparent. For the two agents available in both oral and parenteral dosage forms (ampicillin, erythromycin), 96% of respondents chose the oral dosage form of the same drug. For the remaining six parenteral therapies, a range of three to seven different oral alternatives were identified for each parenteral agent. The most common oral stepdown choices were cephalexin for cefazolin (60%), ciprofloxacin for ceftazidime (40%), ciprofloxacin for imipenem (34%), ciprofloxacin for ceftriaxone (26%), and cefuroxime axetil for cefamandole (23% of respondents). Oral ciprofloxacin was the most commonly identified oral stepdown agent followed by cephalexin, cefuroxime axetil, and cefixime. For six of the eight drugs, there were respondents who claimed they would not practice IV-PO stepdown. This response occurred in as low as 3% of all respondents for cefamandole and ampicillin, and as high as 46% of the respondents for imipenem. Seven percent of all Group 1 responses (n=104) versus 18% of Group 2 responses (n=176) were "no stepdown preferred".

## Cefixime-Specific Responses

Although not statistically significant, a higher proportion of Group 2 respondents were able to identify ceftriaxone as the parenteral cephalosporin with the antimicrobial spectrum most similar to cefixime (Table III). Similarly, more

**Table III: Cefixime-Specific Responses**

| Parameter | All respondents (n=35) | Group 1 (n=13) | Group 2 (n=22) | p value[1] |
|---|---|---|---|---|
| **Cefixime spectrum, dosing, cost (%)** | | | | |
| Spectrum of activity similar to ceftriaxone | 19 (54) | 5 (38) | 14 (64) | 0.27 |
| Have prescribed cefixime previously | 9 (26) | 2 (15) | 7 (32) | 0.52 |
| Correct cefixime dose[2] | 6 (17) | 2 (15) | 4 (18) | |
| Incorrect cefixime dose selected | 5 (14) | 0 (0) | 5 (23) | |
| Unsure of cefixime dosing | 24 (68) | 11 (85) | 13 (59) | |
| Knew daily cost of cefixime therapy[3] | 13 (37) | 5 (38) | 8 (36) | 0.21 |
| Knew daily cost of cefriaxone therapy[4] | 24 (68) | 8 (62) | 16 (73) | 0.18 |
| **Potential uses for cefixime alone or in combination (%)** | | | | |
| Urinary tract infections | 28 (80) | 12 (92) | 16 (73) | 0.16 |
| Respiratory tract infections | 27 (77) | 13 (100) | 14 (64) | 0.01 |
| Sinusitis | 25 (71) | 11 (85) | 14 (64) | 0.21 |
| Intra-abdominal infections | 21 (60) | 8 (62) | 13 (59) | 0.54 |
| Skin/soft tissue infections | 20 (57) | 9 (69) | 11 (50) | 0.53 |
| Febrile neutropenic patients | 13 (37) | 5 (39) | 8 (36) | 0.47 |
| Meningitis | 9 (26) | 1 (8) | 8 (36) | 0.06 |
| Endocarditis | 2 (6) | 0 (0) | 2 (9) | 0.53 |
| **Organisms that should not be tested with cefixime (%)** | | | | |
| *Pseudomonas sp.* | 22 (63) | 8 (62) | 14 (64) | 0.94 |
| Anaerobic bacteria | 19 (54) | 8 (62) | 11(50) | |
| *Staphylococcus sp.* | 17 (49) | 6 (46) | 11 (50) | |
| Gram-positive bacteria | 14 (40) | 5 (38) | 9 (41) | |
| *Enterococcus sp.* | 8 (23) | 4 (31) | 4 (18) | |

1 comparison of Group 1 versus Group 2 responses employing a 2-tailed Chi-square test
2 200mg PO BID or 400mg PO daily
3 400mg PO daily regimen within 50% of actual cost ($5)
4 2000mg IV daily regimen within 50% of actual cost ($72)
5 These responses represent the five most commonly identified pathogens that were considered to be resistant to cefixime treatment. Data reflects incidence of specific responses across all respondents.

physicians in Group 2 had prescribed cefixime (32% vs 15%) although statistical significance was not achieved. Although 60% of respondents claimed to have read the cefixime newsletter, less than 20% of respondents were aware of the standard cefixime dosing regimens. Nearly 70% of all respondents said they were unsure of the dosing of cefixime. When asked to estimate hospital costs (acquisition, preparation, and delivery) for a typical daily regimen of cefixime and ceftriaxone, the majority of respondents estimated the cost of ceftriaxone within 50% of actual values, while few were able to do so for cefixime.

Respondents were asked whether they would ever consider using cefixime, either alone or in combination, for the initial or IV-PO stepdown treatment of eight specific types of infections (Table III). Urinary, respiratory, intra-abdominal, and skin/soft tissue infections were commonly identified. All 13 Group 1 respondents were able to identify a potential role for cefixime in the treatment of respiratory tract infections, as compared to 64% of Group 2 (p=0.01). No other group differences were noted; however, all staff physicians and interns felt that cefixime had a place in the therapy of urinary tract infections, while only 65% of medical residents felt cefixime would be useful for treatment of this indication (p=0.04). Twenty-six percent of all respondents (8% of Group 1 and 36% of Group 2, p = 0.06) believed that cefixime may be useful for the treatment of meningitis. Further analysis revealed that none of the staff physicians interviewed felt that cefixime was useful for the treatment of meningitis, while 25% of medical residents and 44% of interns felt that cefixime had a place in the therapy of meningitis (p=0.15).

Respondents were also asked to consider which organisms would not likely be susceptible to cefixime. The five most commonly identified pathogens are shown in Table III.

## DISCUSSION

This survey provided us with some interesting insight into the impact of our promotional efforts, prescriber perceptions regarding IV-PO stepdown, and physician knowledge about cefixime. We are not aware of any investigations into such activities which have been previously reported in the literature.

We were unable to identify major differences in survey responses between physicians who had practised for more than three years as compared to more recent graduates. Both groups appeared to be equally well versed regarding stepdown benefits, criteria, and suitable oral agents to prescribe. This would suggest that our promotional activities have impacted upon the more junior and impressionable practitioner, as well as the seasoned clinician in this hospital.

It is apparent from this survey that our efforts to promote the use of oral anti-infectives are generally well known and acknowledged as being beneficial by prescribers in this institution. All respondents claimed to have practised IV-PO stepdown prescribing and the benefits of this were apparently recognized. In addition, the majority of respondents claimed to be willing to stepdown to oral therapy on or before the fourth day of therapy. In accordance with our promotion efforts, earlier patient discharge and decreased costs were the most frequently cited benefits of stepdown therapy. Avoidance of line sepsis was the third most commonly identified benefit of stepdown therapy. Line sepsis is estimated to occur at a rate of approximately 2.5/100 insertions[8] and the cost per episode of intravascular catheter infection is considered to be in excess of $3500 US.[9] Also of interest was the observation that patient comfort was recognized as a potential benefit of oral therapy by only one-third of respondents. Currently, this important potential benefit is not promoted on our stepdown notices. As both our profession and hospital move towards a more patient-focused philosophy of practice, this is a factor that should be stressed in the future.

We were pleased to determine that the factors identified by the respondents which enable stepdown were identical to those currently promoted on our IV-PO stepdown notices.[1-3,5] This, in addition to responses to the question regarding notice recognition, support the benefits of this tool as a method of disseminating promotion of IV-PO stepdown. In addition, most prescribers claimed they were willing to convert to oral therapy by the fourth day of intravenous therapy for suitable patients. This coincides with previous observations in this hospital regarding the timing of oral stepdown for another oral cephalosporin, cefuroxime axetil.[5] In this latter study, cefuroxime to cefuroxime axetil stepdown typically occurred on the fifth day of therapy. Thus, the survey responses to this query appear to be generally validated by actual practice in this hospital.

We found that prescribers tended to identify a wide variety of oral stepdown agents when questioned about suitable choices for parenteral drugs which have no oral dosage form. For these drugs, as many as seven different choices of oral anti-infectives were selected for any one injectable agent. Generally, we felt the choices of oral agents were acceptable based upon similar spectrum of activity. As well, recent graduates more often indicated that they would not practise stepdown for several drugs. This suggests that we need to focus future promotional efforts on agents for which no identical oral alternative exists and on junior practitioners.

Respondents generally possessed a poor knowledge regarding cefixime. Although cefixime had only been on

formulary for a period of a few months at the time of this survey, a newsletter describing cefixime had been distributed to all prescribers at least six weeks prior to the interviews. The majority (almost two-thirds) of respondents claimed to have read this newsletter. Only one-half of the prescribers surveyed were able to identify the similarity of antimicrobial activity between cefixime and ceftriaxone. Cefixime dosing guidelines and drug costs were not well recognized. Lack of knowledge regarding anti-infective costs has been reported by others.[10] Experienced prescribers tended to have a better knowledge about potential indications for cefixime than more recent graduates. Despite the fact that cefixime poorly penetrates into the cerebrospinal fluid and hence cannot be used to treat meningitis,[11] one of every four respondents believed cefixime could be used for this indication. This was identified on our stepdown notices and should be emphasized by any hospitals interested in adopting a ceftriaxone to cefixime stepdown program.

There were some limitations to this survey and our results must be viewed with caution. Our survey was not based upon a random sample and reflected responses of only those physicians who elected to participate. It is quite possible that responses of the five physicians who chose not to participate would have been different from those who did. As well, the stratification of physicians according to graduation year may have masked differences across respondents. Due to the high proportion of junior medical staff we were unable to identify major dissimilarities between experienced and inexperienced practitioners, with our small sample size. Additional recruitment would have reduced the potential for a Type II error. Finally, the findings in this study reflect the practice environment of this large teaching hospital and may not be readily extrapolated to other institutions.

In conclusion the survey revealed that the IV-PO stepdown is well accepted in our institution. Education of prescribers regarding new anti-infective agents admitted to formulary appears to be necessary for optimal use.

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## Appendix A: Survey of IV-PO stepdown practices

The majority of survey questions were posed to respondents as open-ended questions. Respondents were not prompted (except where marked (**). Information as noted, was provided to respondents if required, after survey responses were recorded.

Survey #_____ Survey Date:_____

1. What year did you graduate from medical school ?
2. What is your physician status (staff, resident, MSI, other) ?
3. What is your physician service ?
4. Of the last 12 months, how many have you spent at VHHSC ?
5. Have you ever prescribed an IV antibiotic and later switched to oral therapy ?
6. What do you feel are the benefits of conversion to oral antibiotic therapy ?
7. Are you aware that VHHSC has a program in place to promote switching from IV to PO therapy ? (IV-PO stepdown therapy) If yes, please describe.

(**)8. Have you ever seen a stepdown reminder notice (show examples) on a patient's chart before ?

9. Is this notice an effective reminder for you to consider conversion from IV to oral therapy ? If not, why not?
10. What suggestions can you offer to improve the stepdown reminder notice or the process of promoting stepdown therapy ?
11. If you have a patient on IV antibiotics, what criteria do you use to decide if a patient can be converted from IV to oral therapy ? (Assume the organism is sensitive to both antibiotics.)
12. For these IV antibiotics, list the oral antibiotic you would choose for conversion from IV to oral therapy. You may also choose not to convert to oral therapy.

    a. Ampicillin IV
    b. Cefazolin IV
    c. Erythromycin IV
    d. Cefamandole IV
    e. Ceftizoxime IV
    f. Ceftriaxone IV
    g. Ceftazidime IV
    h. Imipenem IV

(**)13. Cefixime has recently been added to formulary at VHHSC. What information have you read or received regarding cefixime ? (Give individual prompts)

    a. Pharmacy department drug information supplement
    b. Pharmaceutical representative detailing
    c. Journal articles regarding cefixime
    d. Drug information from a pharmacist
    e. Read poster display outside main pharmacy
    f. Seen IV-PO stepdown reminder notice for cefixime
    g. Discussion with colleagues regarding cefixime
    h. other sources of information regarding cefixime

14. Have you prescribed cefixime for any of your patients, either at VHHSC or in any other setting ?
15. Cefixime is an oral cephalosporin. Which IV cephalosporin would you say its spectrum of antimicrobial activity most closely compares to ?

    (Information: cefixime is a third generation cephalosporin with a spectrum of activity most similar to ceftriaxone, although it is somewhat similar to ceftizoxime and ceftazidime as well).

## Appendix A continued

16. Which bacteria do you feel are **NOT** susceptible to cefixime ?
(Which organisms do you feel should not be treated with cefixime).

(**)17. Which types of infections would you ever consider using cefixime for conversion from IV to PO therapy or as initial antibiotic therapy?

a. Skin and soft tissue infections
b. urinary tract infections
c. Abdominal infections
d. Respiratory tract infections
e. endocarditis
f. sinusitis
g. meningitis
h. febrile neutropenic patients

(Information: cefixime has poor activity versus Staph. and is not active versus enterococci, Listeria, mycoplasma, bacteroides (and other anaerobes) or pseudomonas sp., and should not be used in meningitis due to its poor BBB penetration. It is generally useful for genito-urinary infections, respiratory tract infections, sinusitis, otitis media, and may be useful in some abdominal infections.)

18. You have a 55 year old patient with a community-acquired pneumonia. On day 2 of therapy, the following criteria are met: The patient is clinically improved and stable, he is capable of tolerating and absorbing oral medications, and he continues to require antibiotic therapy. Would you be willing to convert to oral antibiotic therapy today (day 2)?

If not, on what day of therapy would you be willing to convert to oral therapy ?

19. This patient is currently receiving ceftriaxone 1g IV Q24h, and can be stepped down to oral therapy with cefixime. What dose of cefixime would you order ? (Assume that the organism is sensitive to both antibiotics)

(Information: cefixime has a relatively long half-life of 3.5 hours. It is available in 200 and 400 mg tablets and a 100mg/5 mL liquid suspension). Cefixime can usually be dosed as 400 mg po daily, which is as effective as 200 mg po BID. Cefixime is 50% orally available, and achieves serum concentrations of 4-5 mg/L after single doses.

20. What do you estimate the daily cost to be of a regimen of ceftriaxone 2g IV Q24H ? Consider cost of drug, preparation and administration costs.

21. What do you estimate the daily cost to be of a regimen of cefixime 400 mg PO Q24H ? Consider cost of drug, preparation and administration costs.

(**)22. Have you ever seen or used the antibiotic cost comparison card (show example) prepared by pharmacy and microbiology ?

(If physician does not have one, give an antibiotic cost comparison card. Additionally, give the following information:)
Ceftriaxone 2g IV Q24H = $72/day
Cefixime 400mg PO Q24H = $5/day (not in card currently)

23. List additional information requested by respondent.