Meenaghan, T,O'Dwyer, M,Hayden, P,Hayat, A,Murray, M,Dowling, M (2010) 'Home administration of bortezomib: Making a difference to myeloma patients' lives'. European Journal Of Oncology Nursing, 14 :134-136.

Introduction

Multiple myeloma is a clonal malignancy of plasma cells, characterized by anaemia, renal dysfunction, lytic bone lesions and the presence of excess monoclonal immunoglobulin. It is the second most common hematological disorder (Devenney and Erikson 2004). It remains a complex disease to diagnose and treat. However, our understanding of the biology of myeloma continues to develop, and hence a number of new potential therapies have been idenfied, with improved outcomes and survival (Kumar et al., 2008).

The introduction of novel agents, such as immunomodulatory drugs or proteasome inhibitors, either alone or in combination with traditional agents for the treatment of myeloma has led to a major improvement in patient outcomes, including survival, in the past decade. Based on significant improvements in response rates and overall survival in elderly patients when combined with melphalan in elderly patients (San Miguel et al., 2008), Bortezomib, a proteasome inhibitor, is now licensed as front line treatment for myeloma. Bortezomib combined with dexamethasone has also proven to be a very effective induction therapy in younger patients prior to autologous stem cell transplant (Harousseau et al., 2006) and is now viewed by some as the new standard for initial therapy of younger patients. Younger patients are those less than 65 years of age and eligible for stem cell transplant. However, they must also have good performance status and without other co-morbidities.

Initiatives in the home administration of chemotherapy are evident internationally (e.g. Lashlee and O'Hanlon Curry, 2007). With regard to the home administration of bortezomib, a pilot feasibility project of home administration of bortezomib to patients with myeloma has recently been reported from Bournmouth Hospital in England

(McCarthy et al., 2009). However, that pilot program only included patients with relapsed disease and patients had to live within a 12 mile radius of the hospital. In addition, Day 1 and Day 4 doses were administered in the hospital, and blood samples were taken on each visit. Three of our patient group were newly diagnosed, receiving initial treatment for their myeloma. Furthermore, all patients on our program received first doses of bortezomib safely at home. In addition, bloods on our program are only taken on Day 8; the platelet nadir is day 11 so checking on day 8 detects any significant drop prior to this. Finally, our patients live as far away as 100 miles from the hospital.

Why the initiative was started

Galway University Hospital (GUH) is a regional Irish hospital serving a local urban and widely dispersed rural population. Given the emerging data supporting its use in all categories of patients with multiple myeloma, there has been a major increase in the use of bortezomib as treatment of multiple myeloma patients attending GUH. Since bortezomib requires frequent intravenous administration (usually twice a week, for two consecutive weeks with a 10 day rest period) this has impacted significantly on the hospital's haematology day unit facility, which has severe capacity issues. The administration of bortezomib only takes ten seconds. However, between blood sampling, review by an attending doctor and dispensing and administration, patients can frequently spend up to six hours per visit in the day unit. Moreover, many of these patients would have to travel long distances to the unit and as a result experience significant inconvenience. It was therefore decided to explore an alterative arrangement for the administration of bortezomib.

Two years of preparation were required before beginning the pilot program. This involved sourcing a suitable home administration company and ensuring the pharmacy had the capacity to reconstitute the drug early in the day to allow the administering company deliver it safely to all the patients on the program. The process for nursing staff co-ordinating the service had also to be organised. In addition, the team had to determine what side effects the nurse would assess on each visit and record on the hand held

computer recording system. Three administering nurses are on the program and the first home administration of bortezomib was administered in early December 2008.

`

Implementation of home administration of bortezomib

Initially, the Haematologist identifies suitable patients. These patients are asked if they would like to enroll on the pilot program. All patients who have met the inclusion criteria have opted to join the program. Inclusion criteria are: needing bortezomib for myeloma, willing to enrol on the program, good performance status (i.e. able to attend appointments, good cardiac and renal function), able to give verbal consent and able to demonstrate good understanding of what the program involved (i.e. compliance with other drugs, such as steroids, melphalan, lenalidomide and cyclophosphomide, given with bortezomib). Patients are excluded from the program is they are unable to give consent and fail to demonstrate an understanding of what the program involves. Moreover, patients with poor venous access are excluded because difficult cannulation requiring anaesthetic involvement is not suitable for home administration (two patients required central line insertion for this reason). In addition, the administering nurse undertakes a risk assessment, using a nine item risk assessment tool which assesses the following: General access to the patient's home, general safety in the patient's home, patient consent, the home environment, communication, clinical nursing, storage of medical and nursing supplies, pets, and moving, lifting and handling.

Home administration of bortezomib is then coordinated by the haematology clinical nurse specialist and treatment options and decisions are managed by the patient's Haematologist. Bortezomib is supplied from the hospital pharmacy. Patients who are identified as suitable for the home administration of bortezomib attend the haematology day ward on day 0. Clinical examination and evaluation of relevant laboratory results are carried out and chemotherapy is prescribed. The prescription is then sent to pharmacy and the administering company (a company outside the hospital, which employs state registered nurses to administer treatments in the home). On day 0, each patient is also seen by the haematology clinical nurse specialist, and possible side effects and risks associated with bortezomib are discussed. Patients are also given an information booklet

on bortezomib, which lists its side effects, self-care measures and who to contact should the need arise.

Patients are not required to receive their first dose of bortezomib at the hospital; first doses are given at the patient's home by the administering nurse, who performs systematic clinical evaluation for side effects and detection of contraindications for the administration of bortezomib. Additionally on day 8 of each cycle, samples for the full blood count and biochemistry profile are collected.

Each nurse typically administers two to three doses each Tuesday, Thursday and Friday. The administrating nurse documents each administration and results of laboratory tests are sent to the patient's treating haematologist. Patients are routinely evaluated prior to commencing each cycle of therapy (or more frequently if required) by the medical registrar and clinical nurse specialist in haematology (the program's co-ordinating nurse). Each patient has routine bloods performed (FBC, U&E and myeloma blood markers). Patients also undergo a physical assessment and are questioned about possible adverse effects of bortezomib (i.e. peripheral neuropathy, constipation, diarrhoea).

Barriers encountered

A number of barriers had to be overcome in order to implement the initiative. Support for the home administration of bortezomib from all hospital personnel was needed, this included hospital management, haematologists, pharmacy staff and haematology day ward nursing staff. In addition, nursing personnel to co-ordinate the service were required. Finally, another challenge has been the delivery of bortezomib, once reconstituted, to the patient within the eight hour window before expiry. This has required close coordination and planning between the home administration nurse and the hospital pharmacy to ensure the collection of bortezomib as soon as possible after it has been prepared.

Evaluation of the pilot program

As this was a pilot program, it was planned to initially enrol a maximum of 10 patients only. To date (September 2009) however, we have enrolled a total of 23 patients. All patients who received bortezomib as induction therapy prior to stem cell harvest and transplant have completed therapy and have successfully harvested and transplanted. Three other patients were discontinued treatment as a result of other medical complications (i.e. Parkinson's and Cardiac complication). One patient died from pneumonia. One patient was not responding and had her treatment changed. All other patients continue on their planned treatment.

Over 300 home administrations of bortezomib have been given. Since the program has commenced, about 15 doses have been missed. The reasons for the missing doses were varied; because of bank holidays (e.g. Christmas day), and because one patient missed a few doses due to her developing bilateral leg neuropathy. This patient's dose was reduced and she is now tolerating treatment well.

No other problems related to home administration have been encountered and no significant complications of therapy have been observed. Extravasation of bortezomib does not cause tissue damage. Its principal side effects include gastrointestinal effects, fatigue, transient thrombocytopenia and reversible peripheral neuropathy, which are generally manageable (Colson et al., 2008). No patient developed nausea. Although four patients did experience neutropenia, this was felt to be due to concurrent myelosuppressive chemotherapy (e.g. melphalan and lenalidomide), and there were no episodes of neutropenic sepsis. Some patients have experienced some constipation and diarrhoea, but not severe enough to stop treatment. In addition, no bleeding complication was experienced by any of the patients. Once the presence of possible specific side effects are assessed for (i.e. peripheral neuropathy, gastric upset, and febrile episodes), the risks associated with home administration of bortezomib are minimal.

While the sample size is too small to make any valid comparison, the responses achieved by patients on home administration are what would have been expected with standard administration and there is no reason to question the efficacy of this approach.

Feedback from patients reveals that they are very satisfied with the program and find the service convenient with minimum negative impact on quality of life. Indeed, it is more likely that quality of life improves rather than deteriorates during bortezomib therapy (Colson et al., 2008). To quote one patient: "*I could be gone from half-nine until half-four or more…a trip is a day wasted, a day lost in my life*". The patient's partner added that: "*Sometimes she wouldn't sleep for two or three nights thinking about it*". The patient also commented that, "*When you're at the hospital, you hear what the doctors and nurses are saying but it doesn't always sink in. At home, you can pay attention, listen to what you're being told*". She also commented that she was now more confident and her partner added to this by saying that "…*Sometimes the tension grows in the person who's being treated…you don't see that when she's being treated at home*".

Another patient also commented on the difficulties experienced with the hospital visits: "*You'd just sit there. Sometimes, they'd be so busy…it was very hard*". She also talked about the anxiety she felt before hospital visits: "*You'd be worried the night before; there'd be more tension (for you) in the hospital…you'd be less likely to pick up infection here*."

A third patient also commented on the anxiety provoked thinking about the hospital visits: "*I wouldn't sleep that well the night before; it was a lot of hassle*". She also added that the nurse coming to her home to administer her treatment was "*lovely…she* [nurse] *came at three and I was able to do my own thing before; then the next time she came at eleven and that was beautiful altogether".*

Conclusion

This program illustrates the positive effects for patients with multiple myeloma when bortezomib is administered in their own home. Moreover, the central role played by nurses in developing and delivering this program as part of the multidisciplinary team is evident in its success.

The program is now well established, and consideration is currently focused on the possibility of other regional centres with a laminar flow unit (aseptic unit) preparing bortezomib for home administration. We are also currently undertaking an audit to examine the cost of the program. The team have learnt a lot from the pilot; in particular, the need to identify each person's role in order to avoid overlap and confusion. In addition, good communication between the nurse co-ordinating the service and the administering nurse is vital so that there is prompt reporting of a patient's side effects. Finally, to avoid wastage and contain costs, the co-ordinating nurse needs to maintain good communication with the pharmacy so that they are aware of dose adjustments and any changes in a patient's therapy.

Acknowledgment
We would like to thank the support of the pharmaceutical company, Jannseen Cilag, for funding this pilot program, and TCP (Temperature Control Pharmacy) the administering company.

REFERENCES

Colson, K., Doss, D.S., Swift, R., Tariman, J., 2008. Expanding role of bortezomib in multiple myeloma, *Cancer Nursing*, 31(3), 239-249.

Devenney, B., Erickson, C., 2004. Multiple myeloma, an overview, *Clinical Journal of Oncology Nursing*, 8(4), 401-405.

Harousseau, J. L., Attal, M., Leleu, X., Troncy, J., Pegourie, B., Stoppa, A. M., et al., 2006. Bortezomib plus dexamethasone as induction treatment prior to autologous stem cell transplantation in patients with newly diagnosed multiple myeloma: Results of an IFM phase II study, *Haematologica*, 91(11), 1498-1505.

Kumar, S. K., Rajkumar, S. V., Dispenzieri, A., Lacy, M. Q., Hayman, S. R., Buadi, F. K., et al. (2008). Improved survival in multiple myeloma and the impact of novel therapies. *Blood*, 111(5), 2516-2520.

Lashlee, M., & O'Hanlon Curry, J. 2007. Pediatric home chemotherapy: Infusing "quality of life". *Journal of Pediatric Oncology Nursing*, 24(5), 294-298.

McCarthy, H., Hammond, L. Ryman, N. & Hall, R., 2009. A pilot feasibility study of home administration of bortezomib to patients with relapsed myeloma, X11 International Myeloma Workshop, Washington, DC, 26th February.

San Miguel, J. F., Schlag, R., Khuageva, N. K., Dimopoulos, M. A., Shpilberg, O., Kropff, M., et al., 2008. Bortezomib plus melphalan and prednisone for initial treatment of multiple myeloma, *New England Journal of Medicine*, 359(9), 906-917.