VIRTUAL PATIENT SIMULATION: IMPROVING MANAGEMENT OF POLYCYTHEMIA VERA PATIENTS NO LONGER RESPONDING TO CYTOREDUCTIVE THERAPY

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BACKGROUND

Clinical symptoms of polycythemia vera (PV) include vascular occlusive events, splenomegaly, aquagenic pruritus, and hemorrhagic complications after injury. Headache, fatigue, excessive sweating, gingival and gastrointestinal bleeding, and abdominal pain are also common. About 20% to 30% of patients go on to develop post-PV myelofibrosis, and 5% to 10% experience leukemic transformation.[1,2] The median survival time after a diagnosis of PV can exceed 15 to 20 years, although this is significantly shortened to 5.7 years in the event of post-PV myelofibrosis (MF).[2] Approximately 24% of patients with PV treated with hydroxyurea (HU) will eventually experience resistance or intolerance to HU, resulting in an increased risk of death and transformation to MF or acute myeloid leukemia (AML). Despite this, many PV patients who experience loss of response to frontline cytoreductive therapy receive suboptimal disease management.[3] Therefore, a study was conducted to determine if clinical guidance provided within a virtual patient simulation (VPS) educational initiative could improve competence and performance of hematologists/oncologists in the management of a PV patient no longer responding to HU.

METHODS

Education was delivered online via a unique, interactive, VPS-based learning platform that modelled real-life clinical encounters. Physician learners were presented with two patient cases of PV, one of which was analyzed for this study (Figure 1).

- Following a virtual interaction to learn more about each patient, physicians were challenged to order lab tests and determine treatment protocols. Possible order options were not limited by multiple choice but rather were supported by a database matching the scope and depth of choices available in actual practice. Clinical decisions made by learners were analyzed using a sophisticated decision engine within the simulation VPS platform, and tailored clinical guidance (CG) based on current evidence and expert recommendation was provided in response to each learner decision.
- Data were collected from a cohort of US-practicing hematologists/oncologists who made clinical decisions from activity launch on April 25, 2016, through June 9, 2016.
- Impact of the education was measured by comparing participant decisions pre- and post-CG using a 2-tailed paired t-test. *P* values were calculated to determine significance. *P* <0.05 was considered statistically significant.

This VPS educational initiative can be accessed online at http://www.medscape.org/viewarticle/860336.[4]

RESULTS

The assessment sample consisted of decisions made by 136 US-practicing hematologists/oncologists who participated in the VPS-based educational initiative and proceeded to the concluding Case Review section within the study period. As a result of CG provided through simulation, significant improvements were observed in several areas of management of PV patients no longer responding to HU, including:

- Continuing HU therapy (9% post-CG vs 46% pre-CG; *P* <.001) (see Figure 2)
- Discontinuation of HU therapy (35% post-CG vs 25% pre-CG; *P* <.04) (see Figure 3)
- Discontinuation of HU therapy and starting an appropriate second-line therapy for PV (56% post-CG vs 29% pre-CG; *P* <.001) (see Figure 4)
- Selecting ruxolitinib as an appropriate second-line therapy (71% post-CG vs 43% pre-CG; *P* <.001) (see Figure 5A). The remaining selected either an interferon or busulfan
- Ordering an MPN Symptom Assessment Form[5] (77% post-CG vs 48% pre-CG; *P* <.001) (see Figure 6)

The most commonly cited reasons for selection of ruxolitinib as their next PV treatment were "impact on hematologic response" and "impact on quality of life." (Figure 5B)

FIGURE 1. Gary L, a 62 year-old man with PV

"I'm here for my scheduled appointment. Unfortunately, I don't think my medicine is working anymore."

Age	62
Gender	Male
Weight	65.80 kg
Height	170.2 cm
BMI	22.7
Allergies	None

Medications	
Hydroxyurea	1000 mg twice daily starting 6 months ago
Aspirin	81 mg daily once daily starting 1 year ago
Diphenhydramine	25 mg as needed starting 1 year ago

Gary L, a 62-year-old man, was diagnosed with PV 1 year ago when he presented with a deep venous thrombosis (DVT). He presents today for a scheduled follow-up visit. At diagnosis the patient was started on warfarin 5 mg daily, 500 mg hydroxyurea twice daily, and aspirin 81 mg once daily. At his 6-month follow-up appointment, his splenomegaly was slightly decreased and his headaches were better, but because of increased WBC, hydroxyurea was increased to 1000 mg twice daily. His hematocrit was maintained at <45% with frequent therapeutic phlebotomies, but the platelet count remained in the upper limit of normal.

Today he does not think his medication is working, reports feeling full before he has finished eating, and has noticed more frequent headaches. His skin feels itchy, especially after showering, and he has been taking "a lot" of diphenhydramine.

FIGURE 2. Continuation of Hydroxyurea Therapy

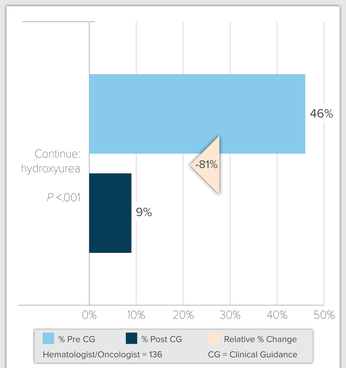


FIGURE 3. Discontinuation of Hydroxyurea Therapy

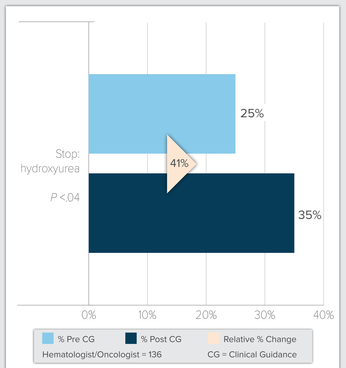


FIGURE 4. Discontinuation of Hydroxyurea & Opting to Begin Second-Line PV Therapy

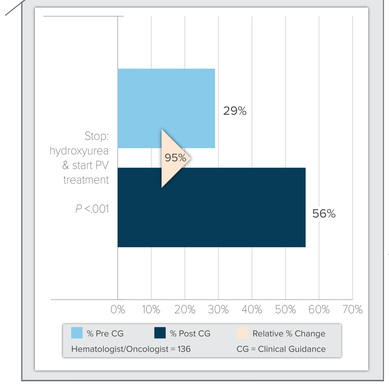


FIGURE 5A. Selection of Ruxolitinib as Appropriate Next PV Therapy

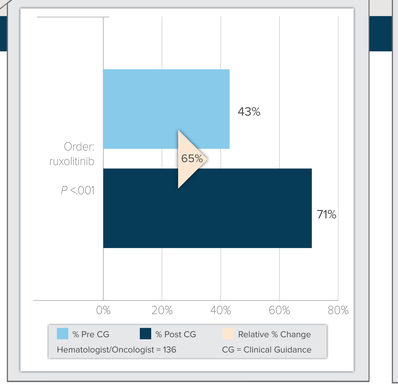
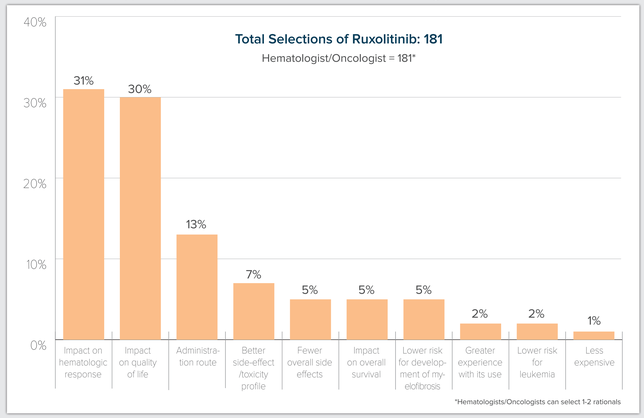


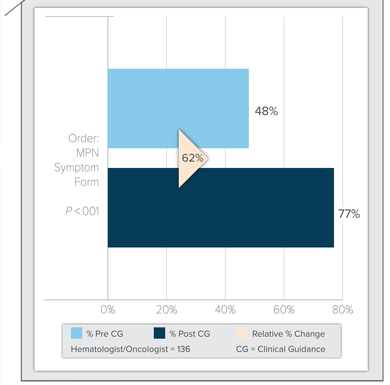
FIGURE 5B. Rationale for Selection of Ruxolitinib as Appropriate Next PV Therapy

Specialists have an opportunity to select 1-2 rationales for their choice in ordering PV treatments



*Hematologists/Oncologists can select 1-2 rationals

FIGURE 6. Ordering an MPN Symptom Assessment Form



CONCLUSION

Hematologists/oncologists who participated in the educational intervention demonstrated significant improvements in clinical decisions related to the management of PV no longer responding to HU therapy. However, because 71% of learners did not follow an evidence-based approach to managing this patient before CG, and 44% are still not following an evidence-based approach post-CG, there is a strong need for further education. A VPS platform that immerses and engages the clinician in an authentic, practical, and consequence-free learning experience has the potential to improve physician performance and to result in more evidence-based decisions, which may enhance patient outcomes and quality of life.

Acknowledgements

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